Loading in required libraries

In [1]:
```
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
import seaborn as sns
```

Exploratory Data Analysis - EDA

In [ ]:
```
```

Import file Data ==> Nobel

In [2]:
```
nobel = pd.read_csv('nobel.csv')
nobel.head()
```

Out[2]:

	year	category	prize	motivation	prize_share	laureate_id	laureate_type	full_name	birth_date	birth_city	birth_country	se
0	1901	Chemistry	The Nobel Prize in Chemistry 1901	"in recognition of the extraordinary services ...	1/1	160	Individual	Jacobus Henricus van 't Hoff	1852-08-30	Rotterdam	Netherlands	Ma
1	1901	Literature	The Nobel Prize in Literature 1901	"in special recognition of his poetic composit...	1/1	569	Individual	Sully Prudhomme	1839-03-16	Paris	France	Ma
2	1901	Medicine	The Nobel Prize in Physiology or Medicine 1901	"for his work on serum therapy, especially its...	1/1	293	Individual	Emil Adolf von Behring	1854-03-15	Hansdorf (Lawice)	Prussia (Poland)	Ma
3	1901	Peace	The Nobel Peace Prize 1901	NaN	1/2	462	Individual	Jean Henry Dunant	1828-05-08	Geneva	Switzerland	Ma
4	1901	Peace	The Nobel Peace Prize 1901	NaN	1/2	463	Individual	Frédéric Passy	1822-05-20	Paris	France	Ma

In [3]:
```
nobel.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 1000 entries, 0 to 999
Data columns (total 18 columns):
 #   Column                Non-Null Count  Dtype 
---  ------                --------------  ----- 
 0   year                  1000 non-null   int64 
 1   category              1000 non-null   object
 2   prize                 1000 non-null   object
 3   motivation            912 non-null    object
 4   prize_share           1000 non-null   object
 5   laureate_id           1000 non-null   int64 
 6   laureate_type         1000 non-null   object
 7   full_name             1000 non-null   object
 8   birth_date            968 non-null    object
 9   birth_city            964 non-null    object
 10  birth_country         969 non-null    object
 11  sex                   970 non-null    object
 12  organization_name     736 non-null    object
 13  organization_city     735 non-null    object
 14  organization_country  735 non-null    object
 15  death_date            596 non-null    object
 16  death_city            579 non-null    object
 17  death_country         585 non-null    object
dtypes: int64(2), object(16)
memory usage: 140.8+ KB
```

In [4]:
```
nobel.describe()
```

Out[4]:

	year	laureate_id
count	1000.000000	1000.000000
mean	1973.721000	509.099000
std	34.523195	298.130617
min	1901.000000	1.000000
25%	1949.750000	250.750000
50%	1979.000000	500.500000
75%	2003.000000	764.250000
max	2023.000000	1034.000000

Handling & Missing Values

In [5]:
```
nobel = nobel.dropna(subset=
['motivation','birth_date','birth_city','birth_country','sex','organization_name','organization_city','organization_country',
 'death_date','death_city','death_country'])
```

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

Out[6]:
```
year                    0
category                0
prize                   0
motivation              0
prize_share             0
laureate_id             0
laureate_type           0
full_name               0
birth_date              0
birth_city              0
birth_country           0
sex                     0
organization_name       0
organization_city       0
organization_country    0
death_date              0
death_city              0
death_country           0
dtype: int64
```

In [7]:
```
nobel.head()
```

Out[7]:

	year	category	prize	motivation	prize_share	laureate_id	laureate_type	full_name	birth_date	birth_city	birth_country	se
0	1901	Chemistry	The Nobel Prize in Chemistry 1901	"in recognition of the extraordinary services ...	1/1	160	Individual	Jacobus Henricus van 't Hoff	1852-08-30	Rotterdam	Netherlands	Ma
2	1901	Medicine	The Nobel Prize in Physiology or Medicine 1901	"for his work on serum therapy, especially its...	1/1	293	Individual	Emil Adolf von Behring	1854-03-15	Hansdorf (Lawice)	Prussia (Poland)	Ma
5	1901	Physics	The Nobel Prize in Physics 1901	"in recognition of the extraordinary services ...	1/1	1	Individual	Wilhelm Conrad Röntgen	1845-03-27	Lennep (Remscheid)	Prussia (Germany)	Ma
6	1902	Chemistry	The Nobel Prize in Chemistry 1902	"in recognition of the extraordinary services ...	1/1	161	Individual	Hermann Emil Fischer	1852-10-09	Euskirchen	Prussia (Germany)	Ma
8	1902	Medicine	The Nobel Prize in Physiology or Medicine 1902	"for his work on malaria, by which he has show...	1/1	294	Individual	Ronald Ross	1857-05-13	Almora	India	Ma

The most commonly awarded gender and birth country?

In [8]:
```
# the most commonly awarded gender
top_gender = nobel['sex'].value_counts().idxmax()

# the most commonly awarded birth country
top_country = nobel['birth_country'].value_counts().idxmax()

print(top_gender)
print(top_country)
```

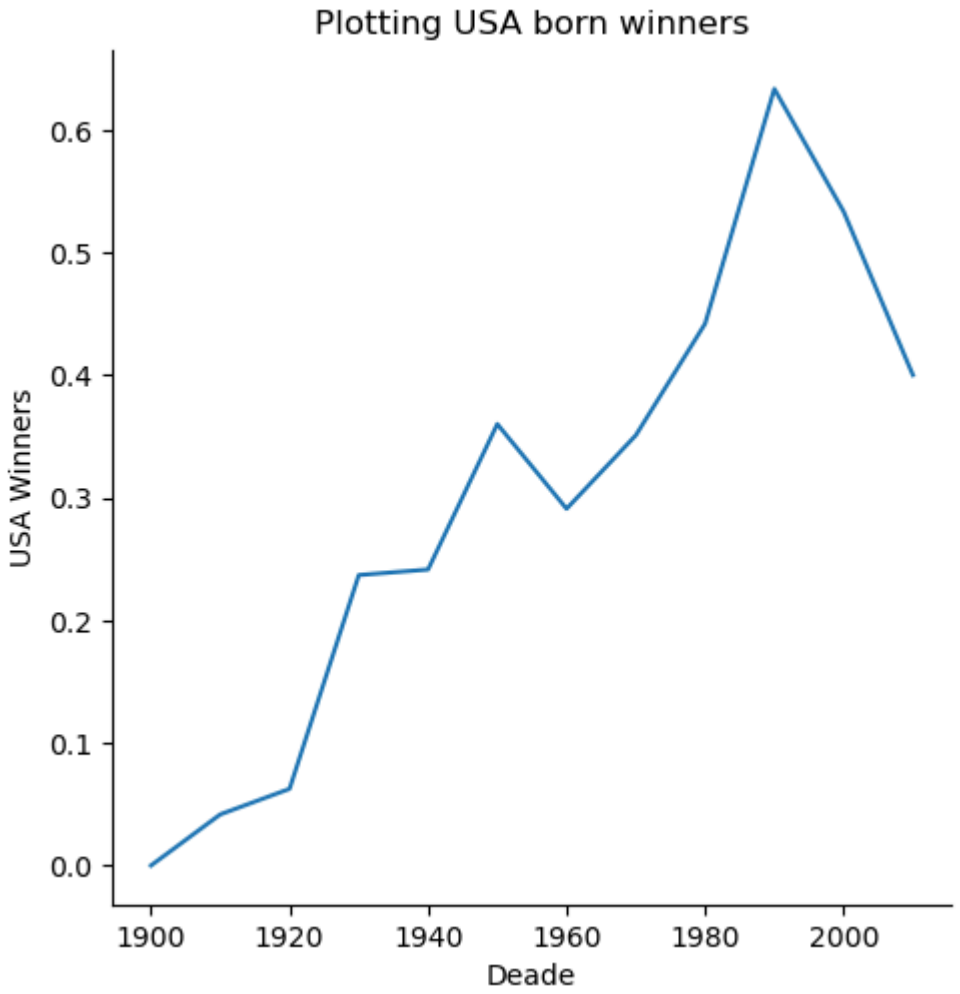
```
Male
United States of America
```

In [ ]:
```

```

The Heighst ration winners in USA

In [9]:
```
# Create column calculate the Decade
nobel['decade'] = (nobel['year'] // 10)*10
# winners in USA
nobel['usa_winners'] = nobel['birth_country'] == 'United States of America'
ration_winner = nobel.groupby('decade',as_index=False)['usa_winners'].mean()
max_usa_decade = ration_winner[ration_winner['usa_winners'] == ration_winner['usa_winners'].max()]['decade'].values[0]
print(max_usa_decade)

# create vis
sns.relplot(kind='line',x='decade', y='usa_winners',data= ration_winner)
plt.title('Plotting USA born winners')
plt.xlabel('Deade')
plt.ylabel('USA Winners')
plt.show()
```

```
1990
```

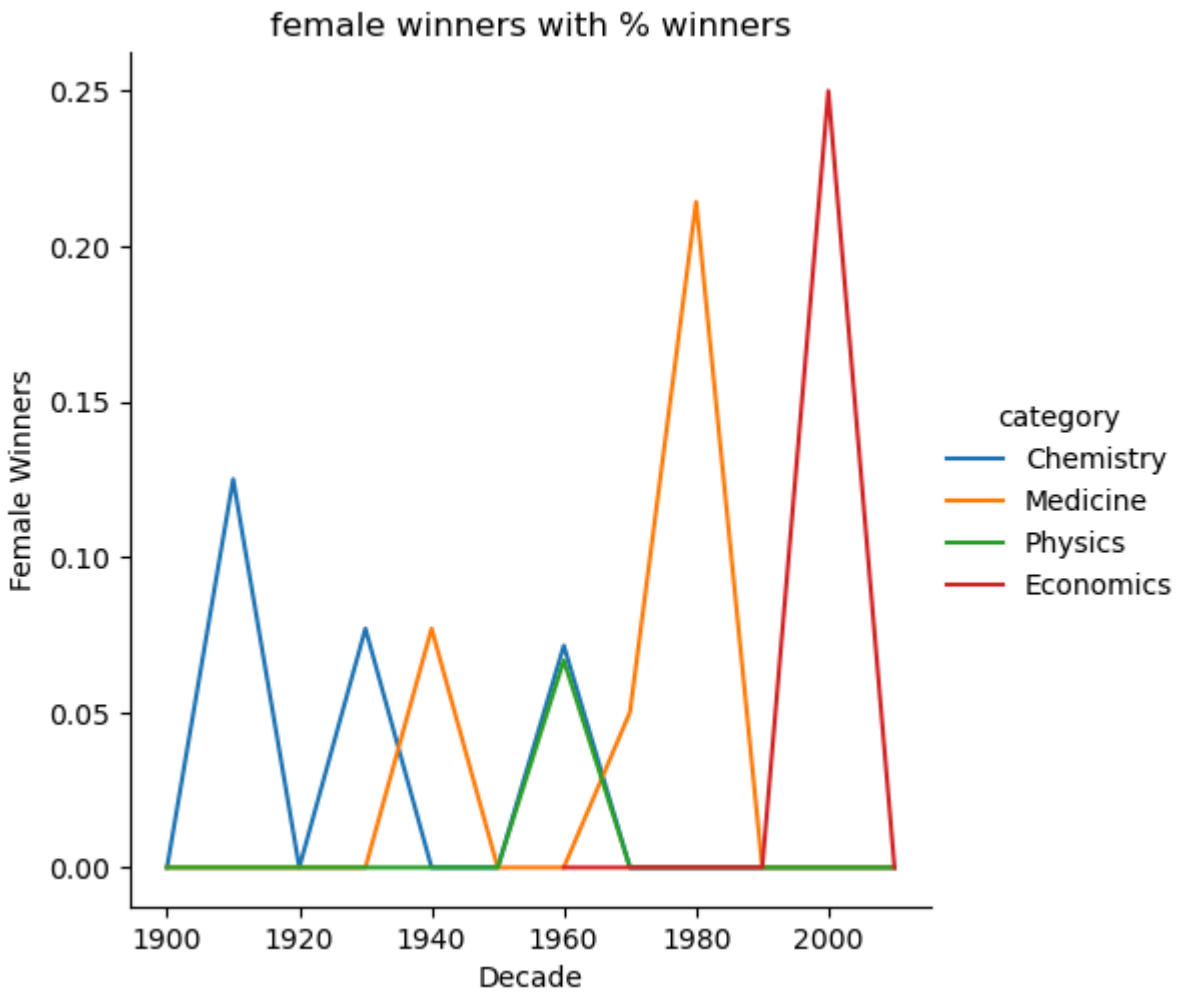


Calculating the proportion of female laureates per decade

In [10]:
```
# Calculating the proportion of female laureates per decade
nobel['female_winner'] = nobel['sex'] == 'Female'
prop_fema_winner = nobel.groupby(['decade','category'],as_index=False)['female_winner'].mean()
female_dec_categ = prop_fema_winner[prop_fema_winner['female_winner'] == prop_fema_winner['female_winner'].max()][['decade','c
```

```
max_female_dic = {female_dec_categ['decade'].values[0]:female_dec_categ['category'].values[0]}
print(max_female_dic)
# create Visu female winners

sns.relplot(x= 'decade', y= 'female_winner', data= prop_fema_winner, hue ='category', kind= 'line')
plt.title('female winners with % winners')
plt.xlabel('Decade')
plt.ylabel('Female Winners')
plt.show()
```

```
{2000: 'Economics'}
```



The first woman to receive a Nobel Prize, and in what category?

In [11]:
```
# Find the frist woman win the prize and in what category
woman_winners = nobel[nobel['female_winner']]
if not woman_winners.empty:
    frist_woman = woman_winners.sort_values(by='year').iloc[0]
    frist_woman_name = frist_woman['full_name']
```

```
    frist_category = frist_woman['category']
    country_name = frist_woman['birth_country']
    print(f'The Frist Woman: {frist_woman_name} \t Category: {frist_category}\t Country: {country_name}')
```

```
The Frist Woman: Marie Curie, née Sklodowska     Category: Chemistry     Country: Russian Empire (Poland)
```

Selecting the laureates that have received 2 or more prizes

In [12]:
```
repet_list = []
# ----------- Check Individual full name -------
count_name = nobel['full_name'].value_counts()
repet_name = count_name[count_name >1].index
# ------------- Check Organization name -------
count_org = nobel['organization_name'].value_counts()
repet_org = count_org[count_org >= 2].index
# Display the result
repet_list.extend(repet_name)
repet_list.extend(repet_org)
print(repet_list)
```

```
['Frederick Sanger', 'John Bardeen', 'University of California', 'Harvard University', 'University of Cambridge', 'University o
f Chicago', 'California Institute of Technology (Caltech)', 'Stanford University', 'University of Oxford', 'Rockefeller Univers
ity', 'Massachusetts Institute of Technology (MIT)', 'Cornell University', 'Columbia University', 'London University', 'Rockefe
ller Institute for Medical Research', 'University of Heidelberg', 'Berlin University', 'University College', 'Princeton Univers
ity', 'Uppsala University', 'MRC Laboratory of Molecular Biology', 'Institut Pasteur', 'Goettingen University', 'Munich Univers
ity', 'Harvard Medical School', 'Sorbonne University', 'Washington University', 'National Institutes of Health', 'University of
Wisconsin', 'University of Pennsylvania', 'Kiel University', 'Stockholm University', 'University of Oslo', 'Imperial College',
'Academy of Sciences', 'Copenhagen University', 'University of Zurich', 'Yale University', 'Karolinska Institutet', 'Victoria U
niversity', 'University of Illinois', 'Bell Laboratories', 'Wellcome Research Laboratories', 'University of Toronto', 'Institut
du Radium', 'National Institute for Medical Research', 'Mayo Clinic', 'Basel Institute for Immunology', 'Eidgenössische Technis
che Hochschule (Swiss Federal Institute of Technology)', 'Graz University', 'Vienna University', 'Leipzig University', 'P.N. Le
bedev Physical Institute', 'Amsterdam University', 'Northwestern University', 'University of Moscow', 'Leiden University', 'Edi
nburgh University', 'Bell Telephone Laboratories']
```

In [ ]:
```

```

In [13]:
```
nobel.head()
```

Out[13]:

	year	category	prize	motivation	prize_share	laureate_id	laureate_type	full_name	birth_date	birth_city	...	sex	organiza
0	1901	Chemistry	The Nobel Prize in Chemistry 1901	"in recognition of the extraordinary services ...	1/1	160	Individual	Jacobus Henricus van 't Hoff	1852-08-30	Rotterdam	...	Male	Berli
2	1901	Medicine	The Nobel Prize in Physiology or Medicine 1901	"for his work on serum therapy, especially its...	1/1	293	Individual	Emil Adolf von Behring	1854-03-15	Hansdorf (Lawice)	...	Male	Marbur
5	1901	Physics	The Nobel Prize in Physics 1901	"in recognition of the extraordinary services ...	1/1	1	Individual	Wilhelm Conrad Röntgen	1845-03-27	Lennep (Remscheid)	...	Male	Munic
6	1902	Chemistry	The Nobel Prize in Chemistry 1902	"in recognition of the extraordinary services ...	1/1	161	Individual	Hermann Emil Fischer	1852-10-09	Euskirchen	...	Male	Berli
8	1902	Medicine	The Nobel Prize in Physiology or Medicine 1902	"for his work on malaria, by which he has show...	1/1	294	Individual	Ronald Ross	1857-05-13	Almora	...	Male	Univer

5 rows × 21 columns

In [14]:
```
nobel['category'].unique()
```

Out[14]:
```
array(['Chemistry', 'Medicine', 'Physics', 'Economics'], dtype=object)
```

Number of awards in each Category

In [15]:
```
count_category = nobel['category'].value_counts()
print(count_category)
```

```
category
Medicine     142
Physics      116
Chemistry    110
Economics     38
Name: count, dtype: int64
```

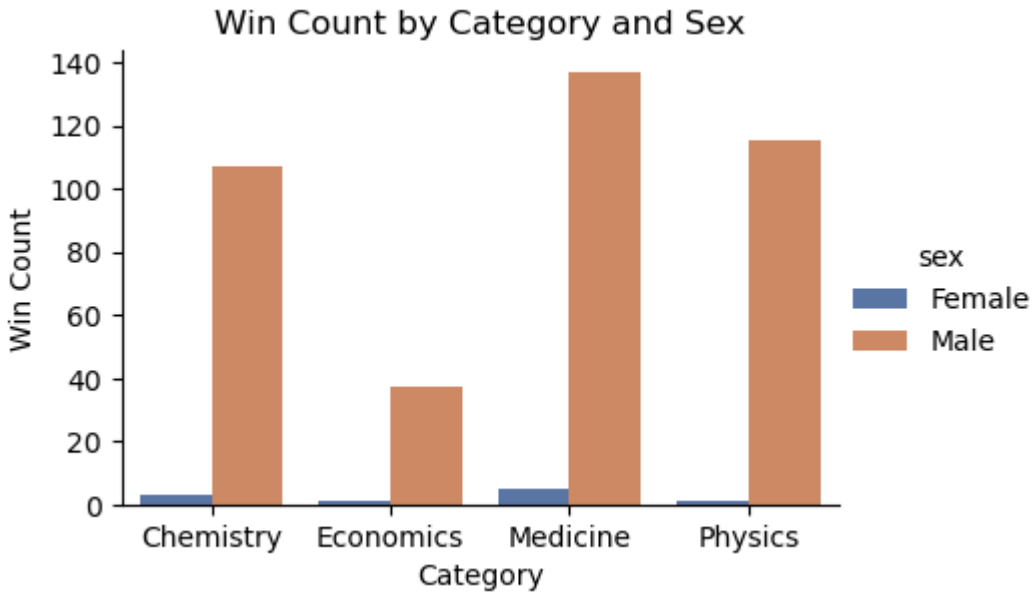
Collect data by sex and category and calculate the number of winners in each group

In [26]:
```
# Collect data by sex and category and calculate the number of winners in each group

sex_category_counts = nobel.groupby(['sex', 'category']).size().reset_index(name='win_count')
pivot_sex_cate = sex_category_counts.pivot(index = 'category',columns = 'sex',values = 'win_count')

# Display Result

print(pivot_sex_cate)
```

```
sex         Female  Male
category
Chemistry        3   107
Economics        1    37
Medicine         5   137
Physics          1   115
```

In [29]:
```
# Create Vis Count win by category and sex
g = sns.catplot(x = 'category',y = 'win_count',hue='sex', data = sex_category_counts,
            kind = 'bar',height=3,aspect=1.5,palette=['#4c72b0', '#dd8452'])
```

```
plt.title('Win Count by Category and Sex', fontsize=12)
g.set_axis_labels("Category", "Win Count",size=10)
plt.show()
```

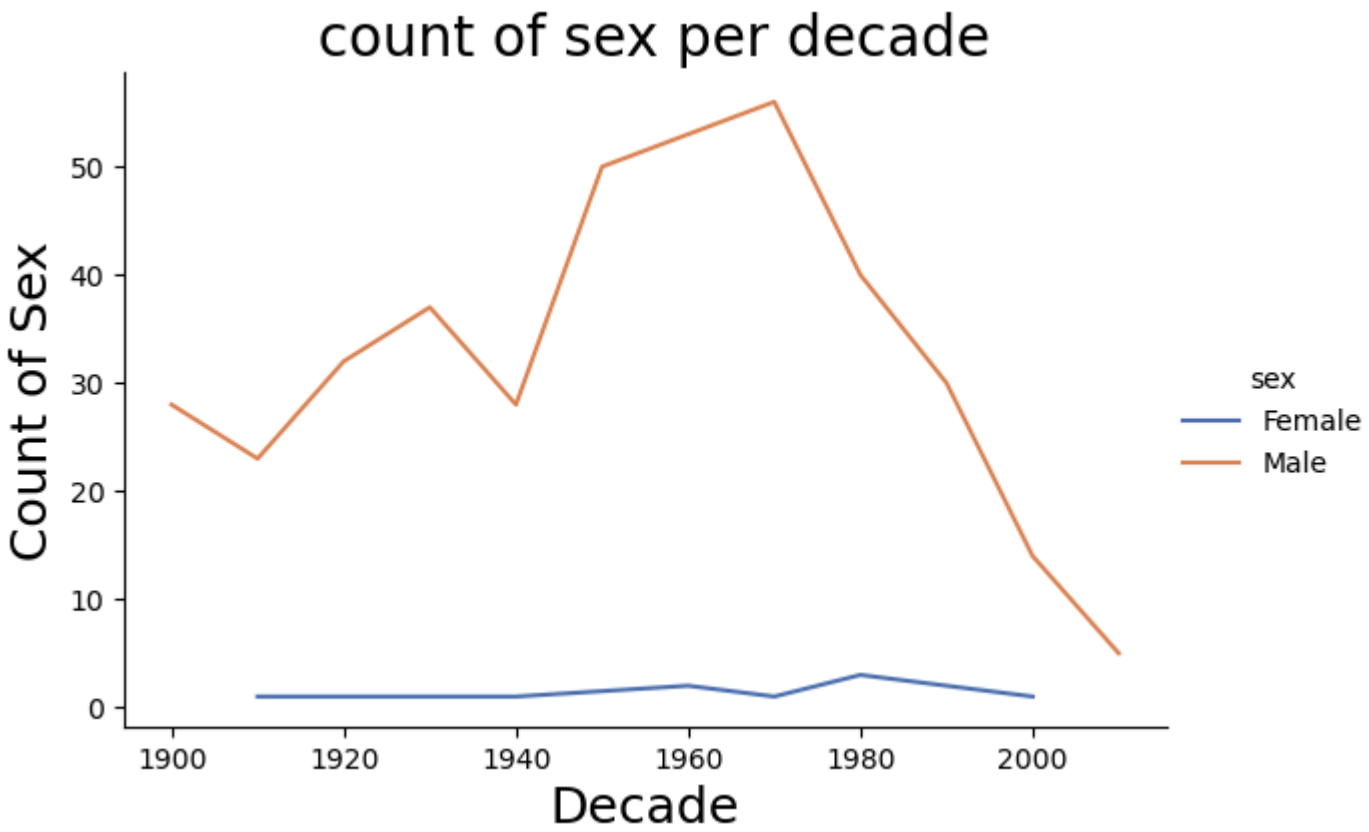


collect data by sex and Decade to know the winner's sex per decade

In [18]:
```
# Group data by sex and decade, counting the occurrences
decade_sex = nobel.groupby(['sex','decade']).size().reset_index(name = 'decade_sex')

# Pivot the DataFrame so that 'decade' becomes the index, 'sex' the columns, and 'decade_sex' the values
df_dec_sex = decade_sex.pivot(index='decade', columns='sex', values='decade_sex')

# Fill all NaN Value and convert to int
df_dec_sex = df_dec_sex.fillna(0).astype(int)
# Display Data
print(df_dec_sex)
```

```
sex     Female  Male
decade
1900         0    28
1910         1    23
1920         0    32
1930         1    37
1940         1    28
1950         0    50
1960         2    53
1970         1    56
1980         3    40
1990         0    30
2000         1    14
2010         0     5
```

In [30]:
```
g = sns.relplot(x='decade', y= 'decade_sex', data= decade_sex, hue = 'sex', kind='line',
                height=4,aspect=1.5,palette=['#4c72b0', '#dd8452'])
plt.title(' count of sex per decade',fontsize=20)
g.set_axis_labels('Decade', 'Count of Sex',fontsize=18)
plt.show()
```



Who is first man to win the Nobel

In [20]:
```
nobel['male_winner'] = nobel['sex'] == 'Male'
man_winners = nobel[nobel['male_winner']]
if not man_winners.empty:
    frist_man = man_winners.sort_values(by='year').iloc[0]
    frist_man_name = frist_man['full_name']
    frist_category = frist_man['category']
    country_name = frist_man['birth_country']
    print(f'The Frist Man: {frist_man_name} \t Category: {frist_category}\t Country: {country_name}')
```

```
The Frist Man: Jacobus Henricus van 't Hoff      Category: Chemistry     Country: Netherlands
```

In [ ]:

In [21]:
```
nobel.head()
```

Out[21]:

	year	category	prize	motivation	prize_share	laureate_id	laureate_type	full_name	birth_date	birth_city	...	organization_n
0	1901	Chemistry	The Nobel Prize in Chemistry 1901	"in recognition of the extraordinary services ...	1/1	160	Individual	Jacobus Henricus van 't Hoff	1852-08-30	Rotterdam	...	Berlin Unive
2	1901	Medicine	The Nobel Prize in Physiology or Medicine 1901	"for his work on serum therapy, especially its...	1/1	293	Individual	Emil Adolf von Behring	1854-03-15	Hansdorf (Lawice)	...	Marburg Unive
5	1901	Physics	The Nobel Prize in Physics 1901	"in recognition of the extraordinary services ...	1/1	1	Individual	Wilhelm Conrad Röntgen	1845-03-27	Lennep (Remscheid)	...	Munich Unive
6	1902	Chemistry	The Nobel Prize in Chemistry 1902	"in recognition of the extraordinary services ...	1/1	161	Individual	Hermann Emil Fischer	1852-10-09	Euskirchen	...	Berlin Unive
8	1902	Medicine	The Nobel Prize in Physiology or Medicine 1902	"for his work on malaria, by which he has show...	1/1	294	Individual	Ronald Ross	1857-05-13	Almora	...	University Col

5 rows × 22 columns

In [22]:
```
nobel['prize_share'].unique()
```

Out[22]:
```
array(['1/1', '1/2', '1/4', '1/3'], dtype=object)
```

How many times has the the award been shared and how many entries

In [23]:
```
# count prize share
count_prize_share = nobel['prize_share'].value_counts()
print(count_prize_share)
```

```
prize_share
1/2    148
1/1    145
1/3     90
1/4     23
Name: count, dtype: int64
```

Sharing the award across decades

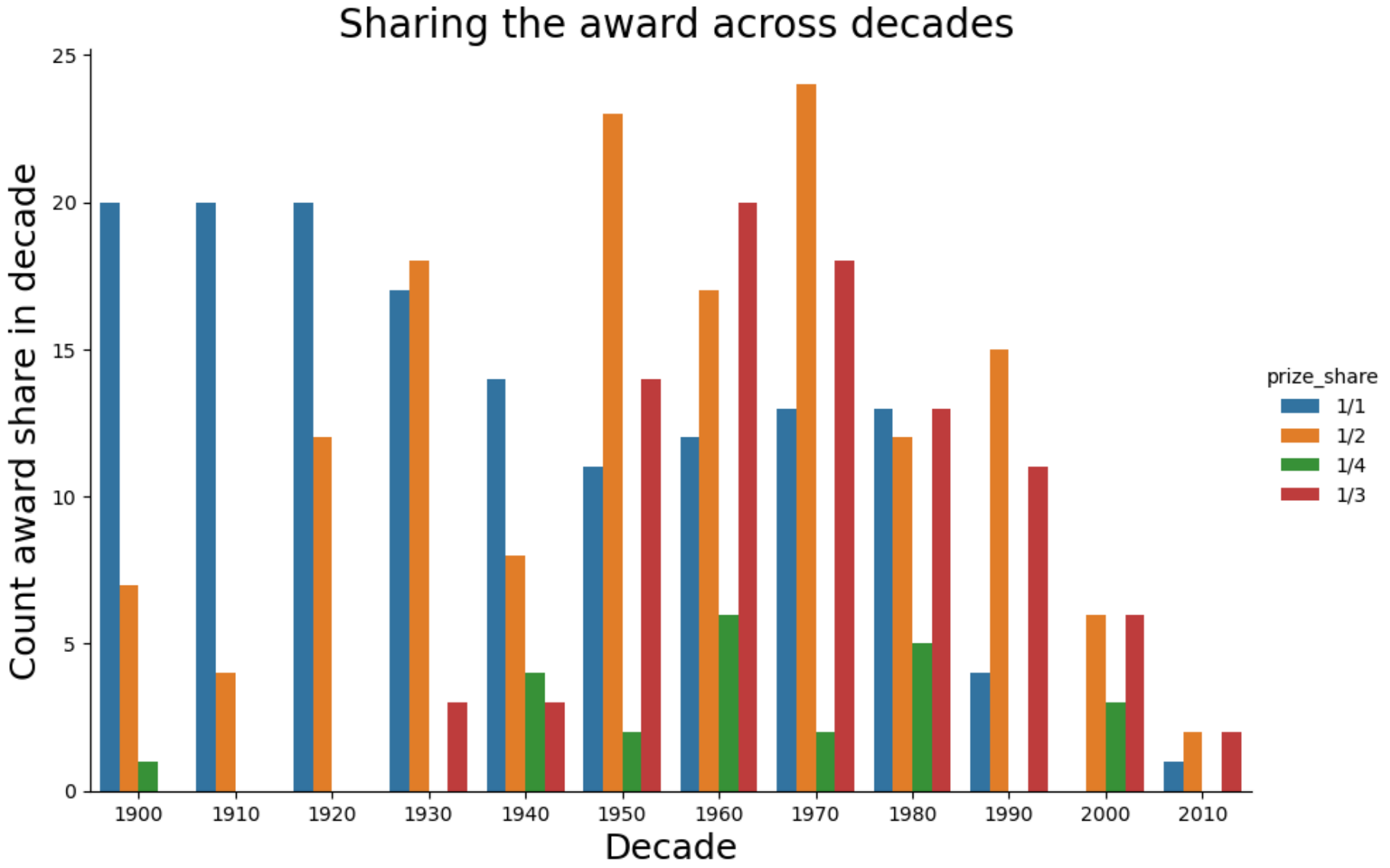
In [24]:
```
# grouped by decade and prize_share called decade_shera
decade_shera = nobel.groupby(['decade', 'prize_share']).size().reset_index(name='prize_decade_share')

# create pivot table
prize_decade = decade_shera.pivot(index='decade', columns='prize_share', values='prize_decade_share')

# Fill NaN Values (0) and convert to int
prize_decade = prize_decade.fillna(0).astype(int)

# Total award per decade
prize_decade['total'] = prize_decade.sum(axis=1)

# grouped decade  and sex  new column called count
nobel_sex = nobel.groupby(['decade', 'sex']).size().reset_index(name='count')

# create piovt table nobel_sex and fill NaN values (0) and convert to int
nobel_sex_pivot = nobel_sex.pivot(index='decade', columns='sex', values='count').fillna(0).astype(int)

# Merge two pivot tables nobel_sex and prize_decade
prize_decade = prize_decade.merge(nobel_sex_pivot, on='decade', how='left')
```

```
cate_decade = nobel.groupby(['decade','category']).size().reset_index(name = 'Count')
cate_decade_piovt = cate_decade.pivot(index='decade',columns='category', values='Count').fillna(0).astype(int)
prize_decade = prize_decade.merge(cate_decade_piovt, on='decade',how='left')
# Display Result
print(prize_decade)
```

```
        1/1  1/2  1/3  1/4  total  Female  Male  Chemistry  Economics  \
decade
1900     20    7    0    1     28       0    28          9          0
1910     20    4    0    0     24       1    23          8          0
1920     20   12    0    0     32       0    32         10          0
1930     17   18    3    0     38       1    37         13          0
1940     14    8    3    4     29       1    28          9          0
1950     11   23   14    2     50       0    50         14          0
1960     12   17   20    6     55       2    53         14          2
1970     13   24   18    2     57       1    56         14         12
1980     13   12   13    5     43       3    40          7          9
1990      4   15   11    0     30       0    30          6          9
2000      0    6    6    3     15       1    14          5          4
2010      1    2    2    0      5       0     5          1          2

        Medicine  Physics
decade
1900          11        8
1910           6       10
1920          10       12
1930          14       11
1940          13        7
1950          20       16
1960          24       15
1970          20       11
1980          14       13
1990           7        8
2000           2        4
2010           1        1
```

Plotting award across decade

In [25]:
```
g=sns.catplot(x= 'decade',y= 'prize_decade_share',data= decade_shera, hue='prize_share',
              kind='bar',height=6,aspect=1.5)
plt.title(' Sharing the award across decades',fontsize=20)
g.set_axis_labels('Decade', 'Count award share in decade',fontsize=18)
plt.show()
```



In [ ]:

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