Setup

Seaborn sits on top of MatPlotLib and makes several assumptions about what you're doing in matplotlib. This makes visualizations in fewer lines of code.

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

%matplotlib inline
%reload_ext autoreload
```

Import Data

In [2]:
```
print(sns.get_dataset_names())
```

```
['anagrams', 'anscombe', 'attention', 'brain_networks', 'car_crashes', 'diamonds', 'dot
s', 'exercise', 'flights', 'fmri', 'gammas', 'geyser', 'iris', 'mpg', 'penguins', 'plane
ts', 'tips', 'titanic']
```

In [3]:
```
crash_df=sns.load_dataset('car_crashes')

crash_df.head()
```

Out[3]:

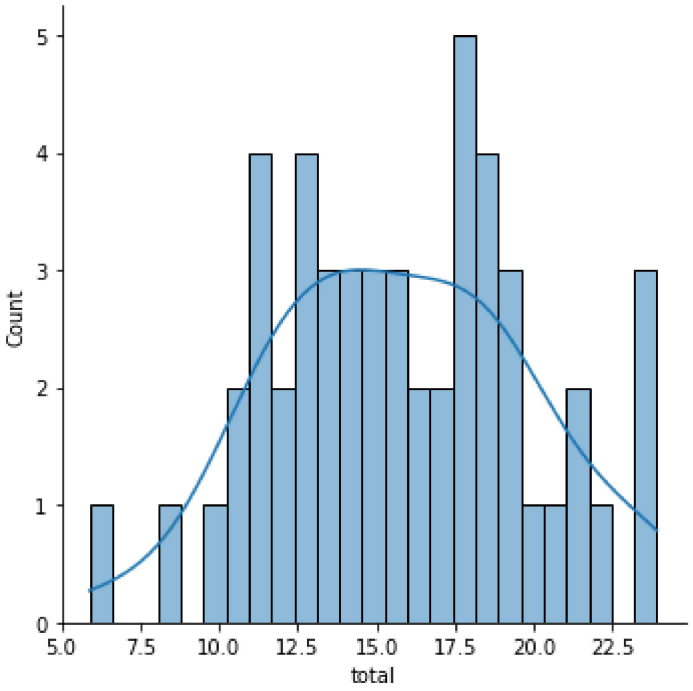
	total	speeding	alcohol	not_distracted	no_previous	ins_premium	ins_losses	abbrev
0	18.8	7.332	5.640	18.048	15.040	784.55	145.08	AL
1	18.1	7.421	4.525	16.290	17.014	1053.48	133.93	AK
2	18.6	6.510	5.208	15.624	17.856	899.47	110.35	AZ
3	22.4	4.032	5.824	21.056	21.280	827.34	142.39	AR
4	12.0	4.200	3.360	10.920	10.680	878.41	165.63	CA

Distribution Plots

Univariate Distribution

In [4]:
```
# Univariate Distributions
sns.displot(crash_df['total'], kde=True, bins=25)
```

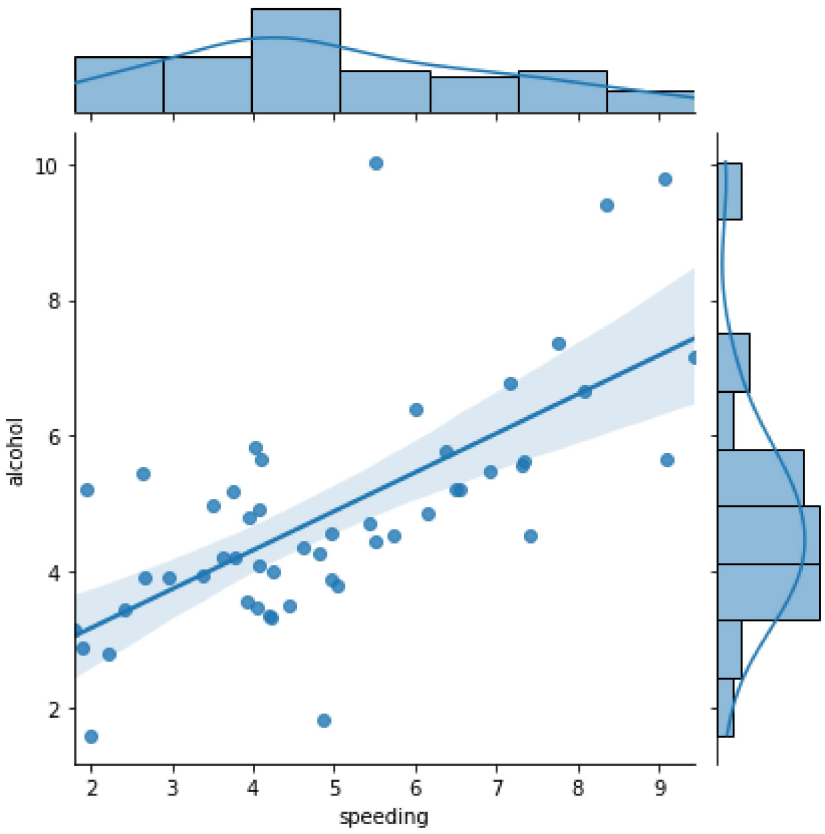
Out[4]:
```
<seaborn.axisgrid.FacetGrid at 0x1f2efe9dd68>
```



Joint Plot

In [5]:
```
# joint distribution
sns.jointplot(x='speeding',y='alcohol', data=crash_df,
              kind='reg')
```

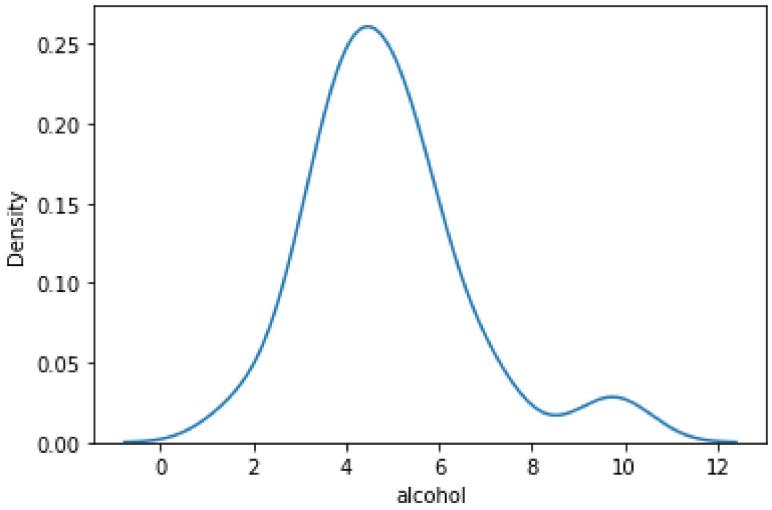
Out[5]: <seaborn.axisgrid.JointGrid at 0x1f2f00c9550>



KDE Plot

In [6]:
```
sns.kdeplot(crash_df['alcohol'])
```

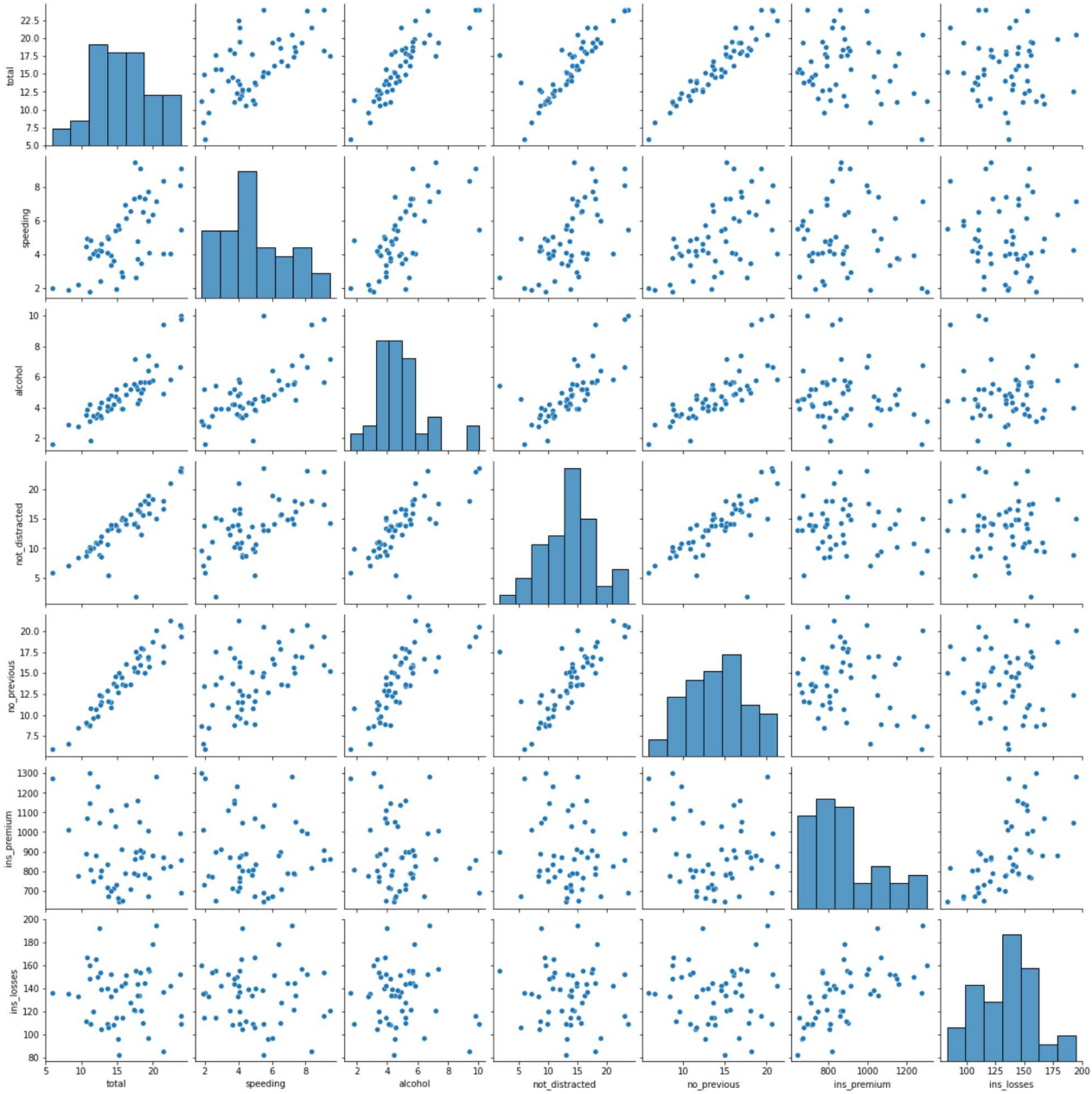
Out[6]: <AxesSubplot:xlabel='alcohol', ylabel='Density'>



Pair Plot

In [7]:
```
# correlogram of all numerical datapoints
sns.pairplot(crash_df)
```

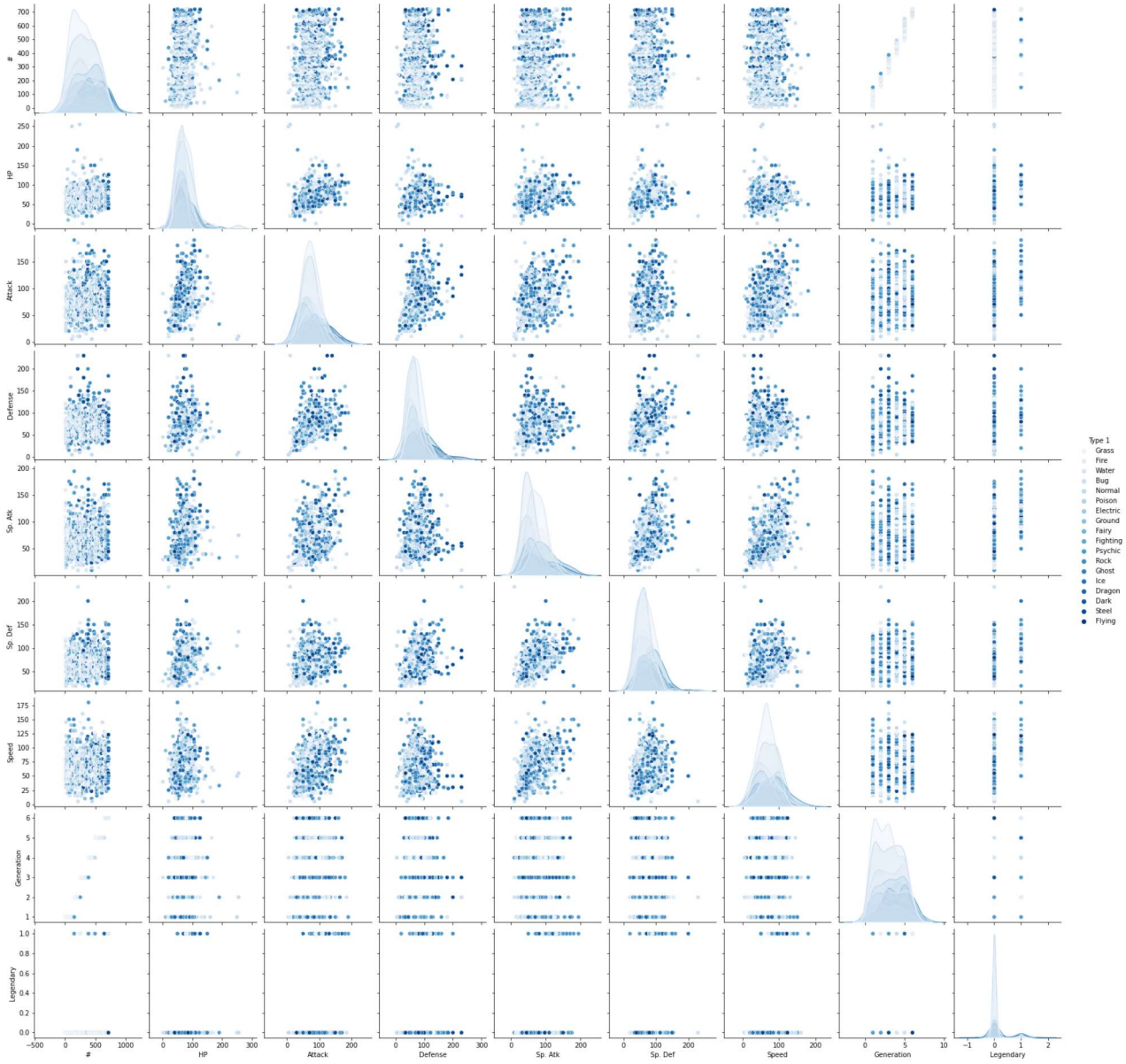
Out[7]: <seaborn.axisgrid.PairGrid at 0x1f2f2306be0>



In [9]:
```
pokemon_df = pd.read_csv('./data/pokemon_data.csv')

#breaking out datapoint colors for a categorical variable
sns.pairplot(pokemon_df, hue='Type 1', palette='Blues')
```

```
c:\users\gunna\documents\my_code\data_science_notes\env\lib\site-packages\seaborn\distri
butions.py:306: UserWarning: Dataset has 0 variance; skipping density estimate.
  warnings.warn(msg, UserWarning)
c:\users\gunna\documents\my_code\data_science_notes\env\lib\site-packages\seaborn\distri
butions.py:306: UserWarning: Dataset has 0 variance; skipping density estimate.
  warnings.warn(msg, UserWarning)
c:\users\gunna\documents\my_code\data_science_notes\env\lib\site-packages\seaborn\distri
butions.py:306: UserWarning: Dataset has 0 variance; skipping density estimate.
  warnings.warn(msg, UserWarning)
```

Out[9]: <seaborn.axisgrid.PairGrid at 0x1f2f3620ef0>

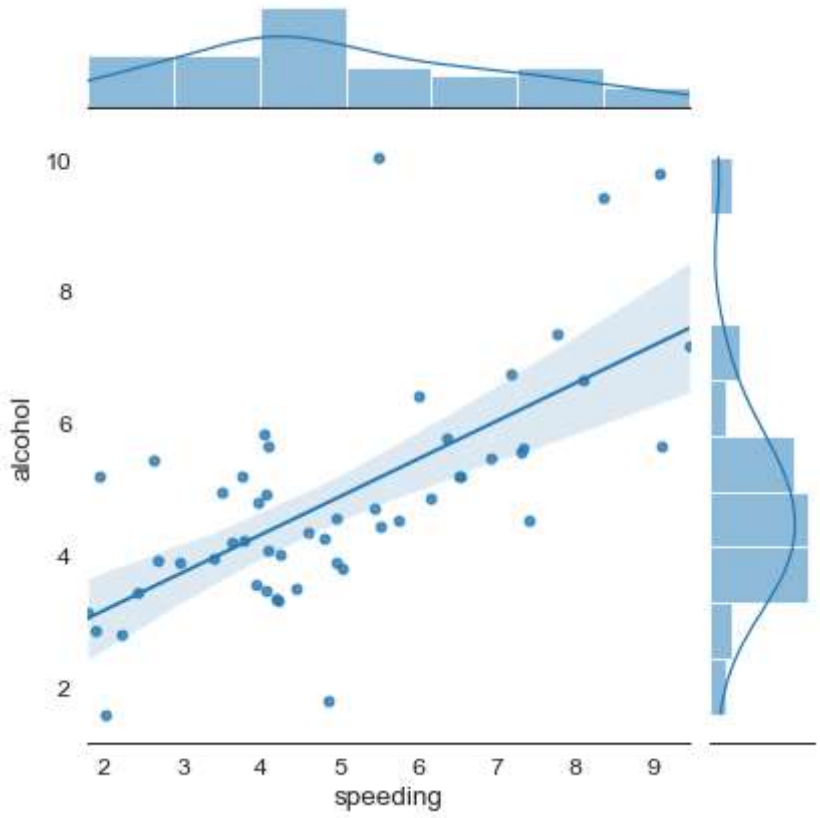


Styling

In [10]:

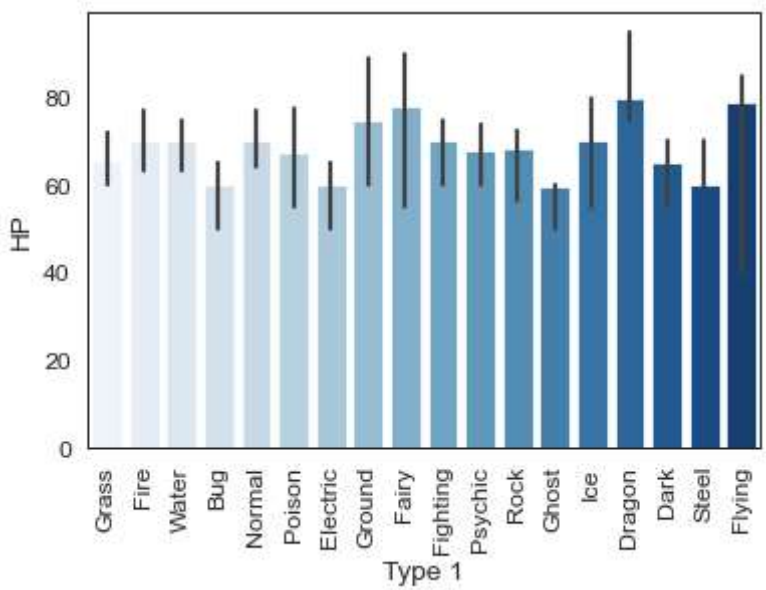
```
# setting style
sns.set_style('white')
#styles include white, whitegrid, dark, and darkgrid

# changing size
plt.figure(figsize=(8,4))

# changing fonts
sns.set_context('paper', font_scale=1.4)
#fonts are paper, talk, and poster

sns.jointplot(x='speeding', y='alcohol', data=crash_df,
              kind='reg')

#removing axis
sns.despine(left=True)
```

```
<Figure size 576x288 with 0 Axes>
```



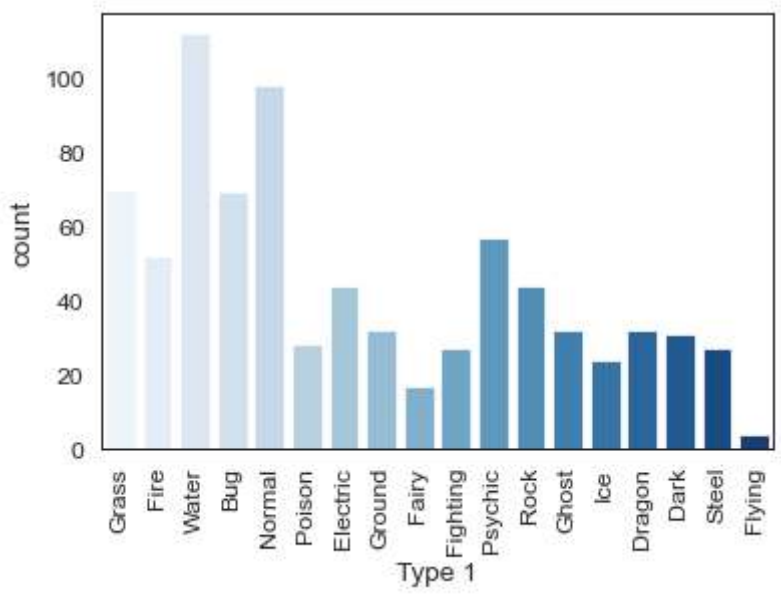
Categorical Plotting

In [11]:
```
#Default here is mean for the estimator
sns.barplot(x='Type 1', y='HP', data=pokemon_df,
            estimator=np.median, palette='Blues')

#rotating labels
plt.xticks(rotation=90)
print('')
```



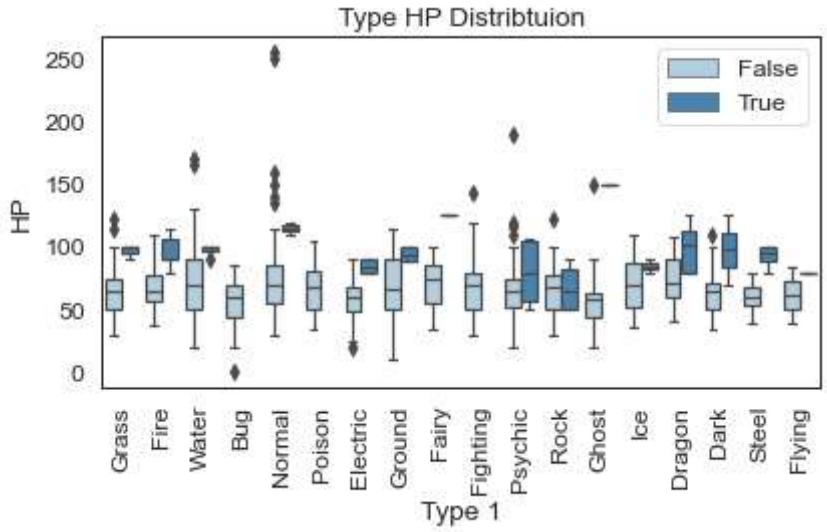
Count Plot

In [12]:
```
sns.countplot(x='Type 1', data=pokemon_df, palette='Blues')
plt.xticks(rotation=90)
print('')
```



Box Plot

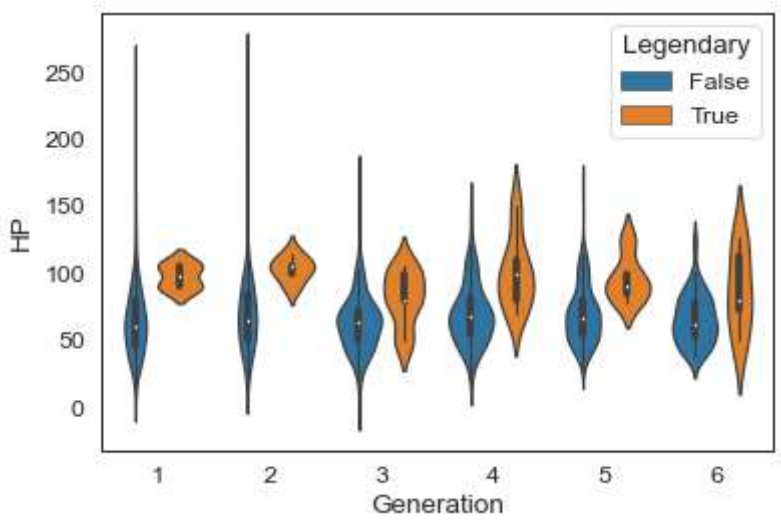
In [13]:
```
sns.boxplot(x='Type 1',y='HP', hue='Legendary',
            data=pokemon_df,
           palette='Blues')

plt.xticks(rotation=90)
plt.title('Type HP Distribtuion')
plt.legend(loc=0)
plt.tight_layout()
```



Violin Plot

In [14]:
```
# Uses KDE estimation of the distribution
sns.violinplot(x='Generation', y='HP', hue='Legendary',
               data=pokemon_df)
```

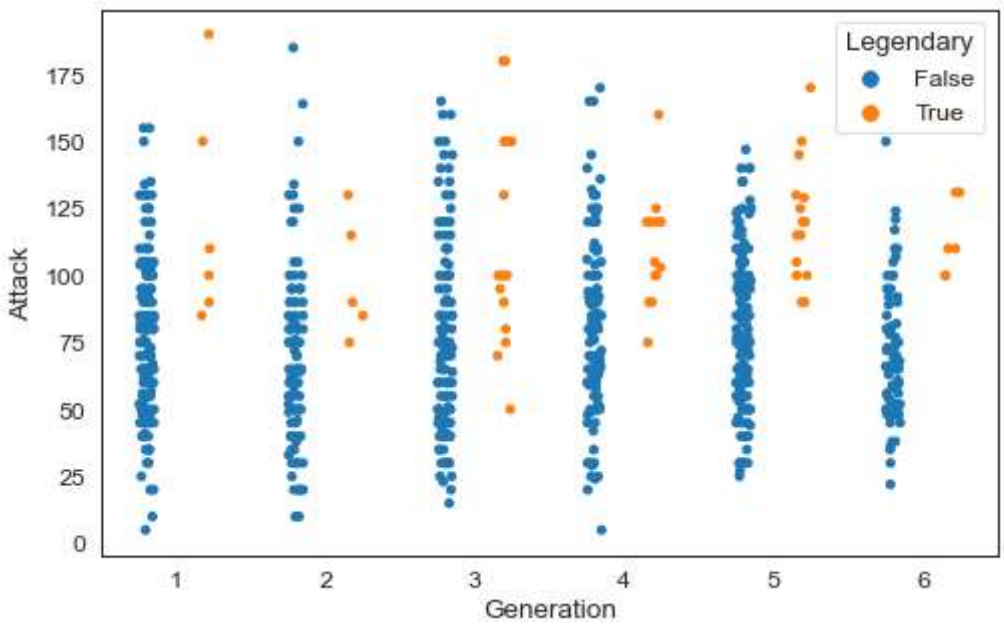
Out[14]: <AxesSubplot:xlabel='Generation', ylabel='HP'>



Strip Plots

In [15]:
```
plt.figure(figsize=(8,5))

sns.stripplot(x='Generation', y='Attack',
              hue='Legendary',
              jitter=True, #spreads out points
              dodge=True, # breaks out Hue
              data=pokemon_df)
```

Out[15]: <AxesSubplot:xlabel='Generation', ylabel='Attack'>

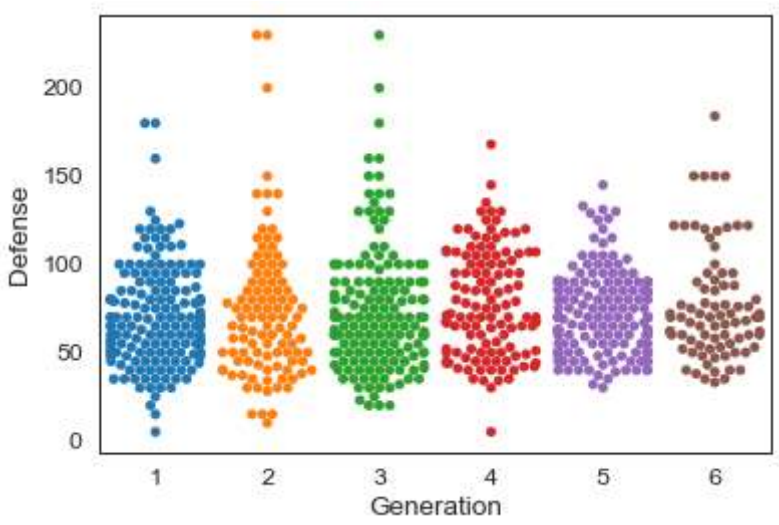


Swarm Plot

In [16]:
```
#Effectively recreates a violin plot
#sns.violinplot(x='Generation',y='Defense', data=pokemon_df)
sns.swarmplot(x='Generation',y='Defense', data=pokemon_df)
#Getting a warning because I have too many points
```

```
c:\users\gunna\documents\my_code\data_science_notes\env\lib\site-packages\seaborn\categorical.py:1296: UserWarning: 19.9% of the points cannot be placed; you may want to decrease the size of the markers or use stripplot.
  warnings.warn(msg, UserWarning)
c:\users\gunna\documents\my_code\data_science_notes\env\lib\site-packages\seaborn\categorical.py:1296: UserWarning: 15.0% of the points cannot be placed; you may want to decrease the size of the markers or use stripplot.
  warnings.warn(msg, UserWarning)
c:\users\gunna\documents\my_code\data_science_notes\env\lib\site-packages\seaborn\categorical.py:1296: UserWarning: 12.4% of the points cannot be placed; you may want to decrease the size of the markers or use stripplot.
  warnings.warn(msg, UserWarning)
c:\users\gunna\documents\my_code\data_science_notes\env\lib\site-packages\seaborn\categorical.py:1296: UserWarning: 30.3% of the points cannot be placed; you may want to decrease the size of the markers or use stripplot.
  warnings.warn(msg, UserWarning)
c:\users\gunna\documents\my_code\data_science_notes\env\lib\site-packages\seaborn\categorical.py:1296: UserWarning: 7.3% of the points cannot be placed; you may want to decrease the size of the markers or use stripplot.
  warnings.warn(msg, UserWarning)
```

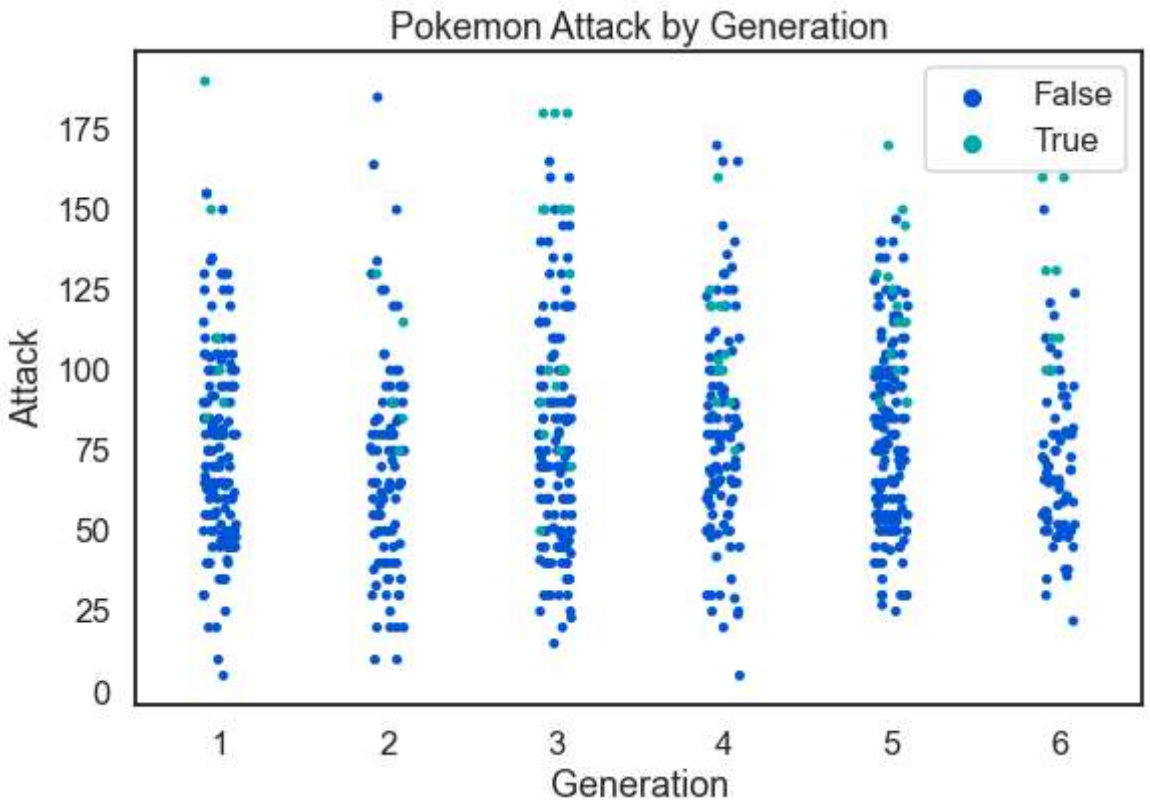
Out[16]: <AxesSubplot:xlabel='Generation', ylabel='Defense'>



Palettes

In [17]:
```
plt.figure(figsize=(9,6))
sns.set_style('white')
sns.set_context('talk')
sns.stripplot(x='Generation', y='Attack',
              data=pokemon_df,
              hue='Legendary',
              palette='winter')

plt.legend(loc=1)
```

```
plt.title('Pokemon Attack by Generation')
print('')
```

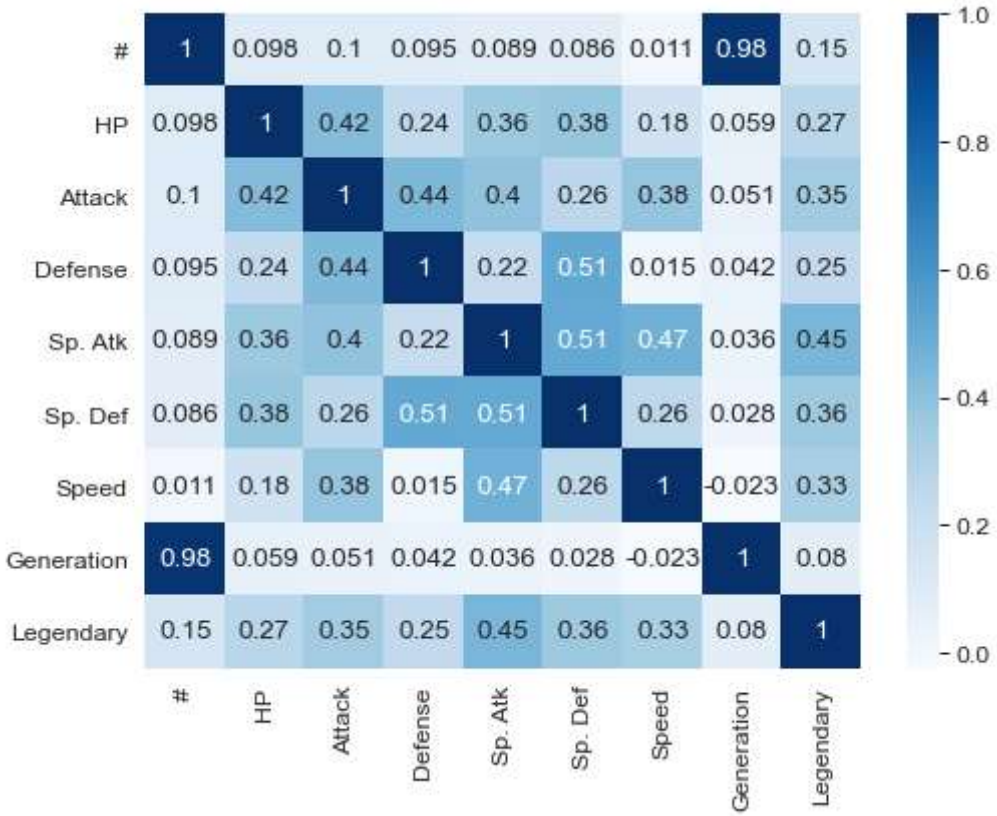


Matrix Plots

Heatmaps

In [18]:
```
plt.figure(figsize=(8,6))
sns.set_context('paper',font_scale=1.4)

#creating a correlation matrix
poke_mx=pokemon_df.corr()

#heat map
sns.heatmap(poke_mx, annot=True, cmap='Blues')
```

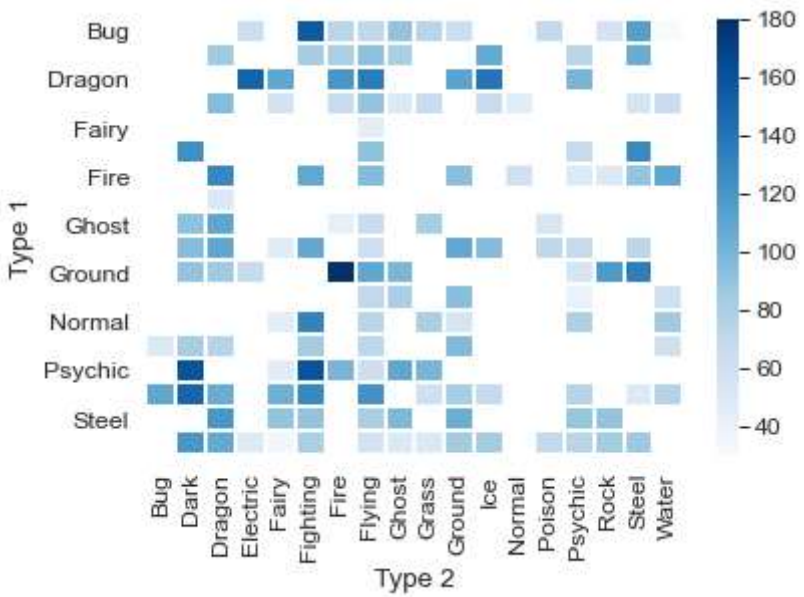
Out[18]: <AxesSubplot:>



In [19]:

```
type_granular=pokemon_df.groupby(['Type 1', 'Type 2']).agg(
    mean_attack=pd.NamedAgg(column='Attack', aggfunc='mean')
)

type_pivot=pd.pivot_table(type_granular, values='mean_attack',
                          index='Type 1', columns='Type 2',
                          aggfunc='sum')

sns.heatmap(type_pivot, cmap='Blues',linecolor='white',
            linewidth=1)
```

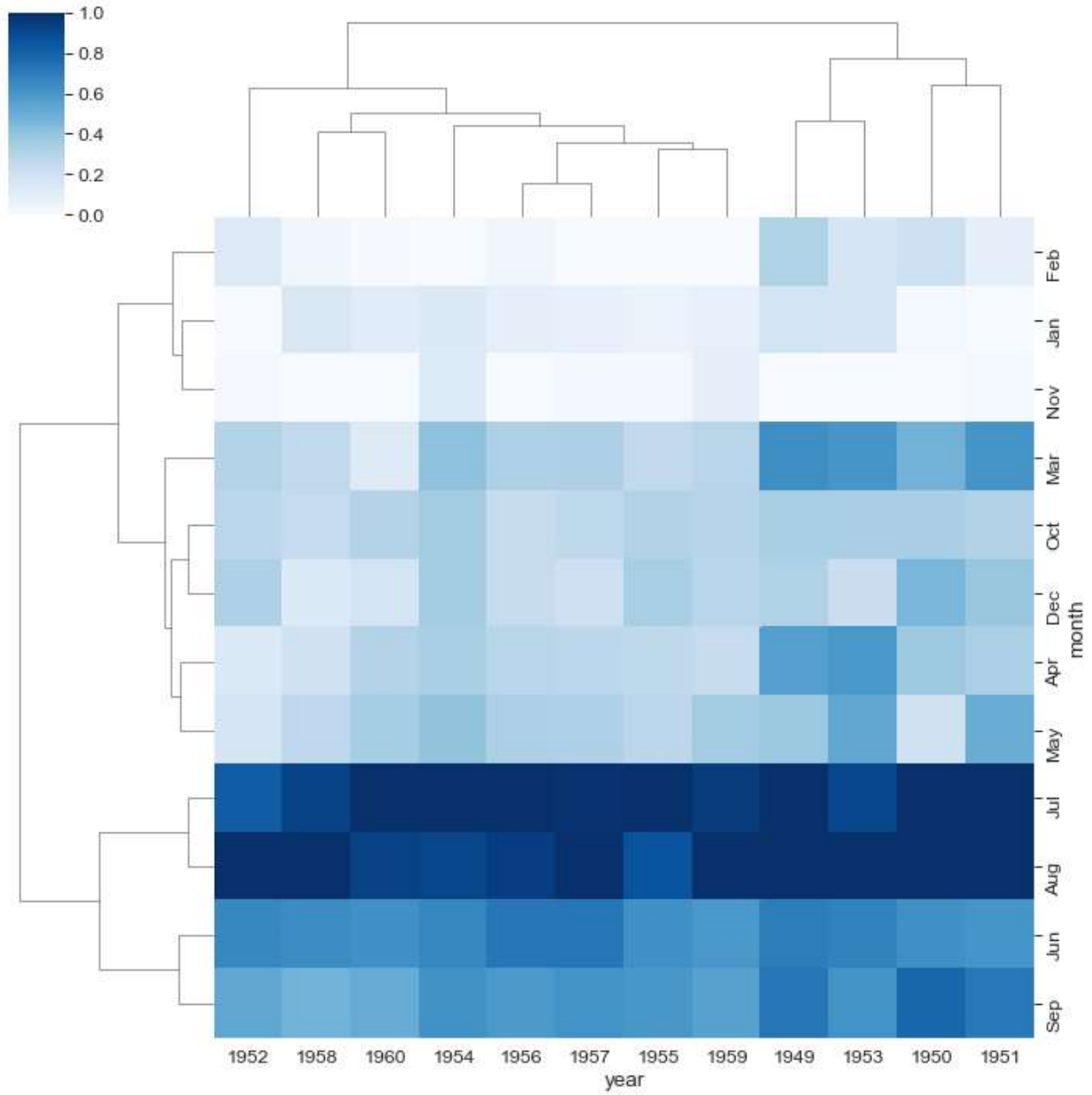
Out[19]: <AxesSubplot:xlabel='Type 2', ylabel='Type 1'>



Cluster Maps

In [20]:
```
flights= sns.load_dataset('flights')

flights_pvt=pd.pivot_table(flights, values='passengers',
                           index='month', columns='year',
                           aggfunc='sum')

#Effectively attempting to cluster like data points
#Standard scale will bet everything between 0 and 1
sns.clustermap(flights_pvt, standard_scale=1, cmap='Blues')
```

Out[20]: <seaborn.matrix.ClusterGrid at 0x1f2fcd6f278>

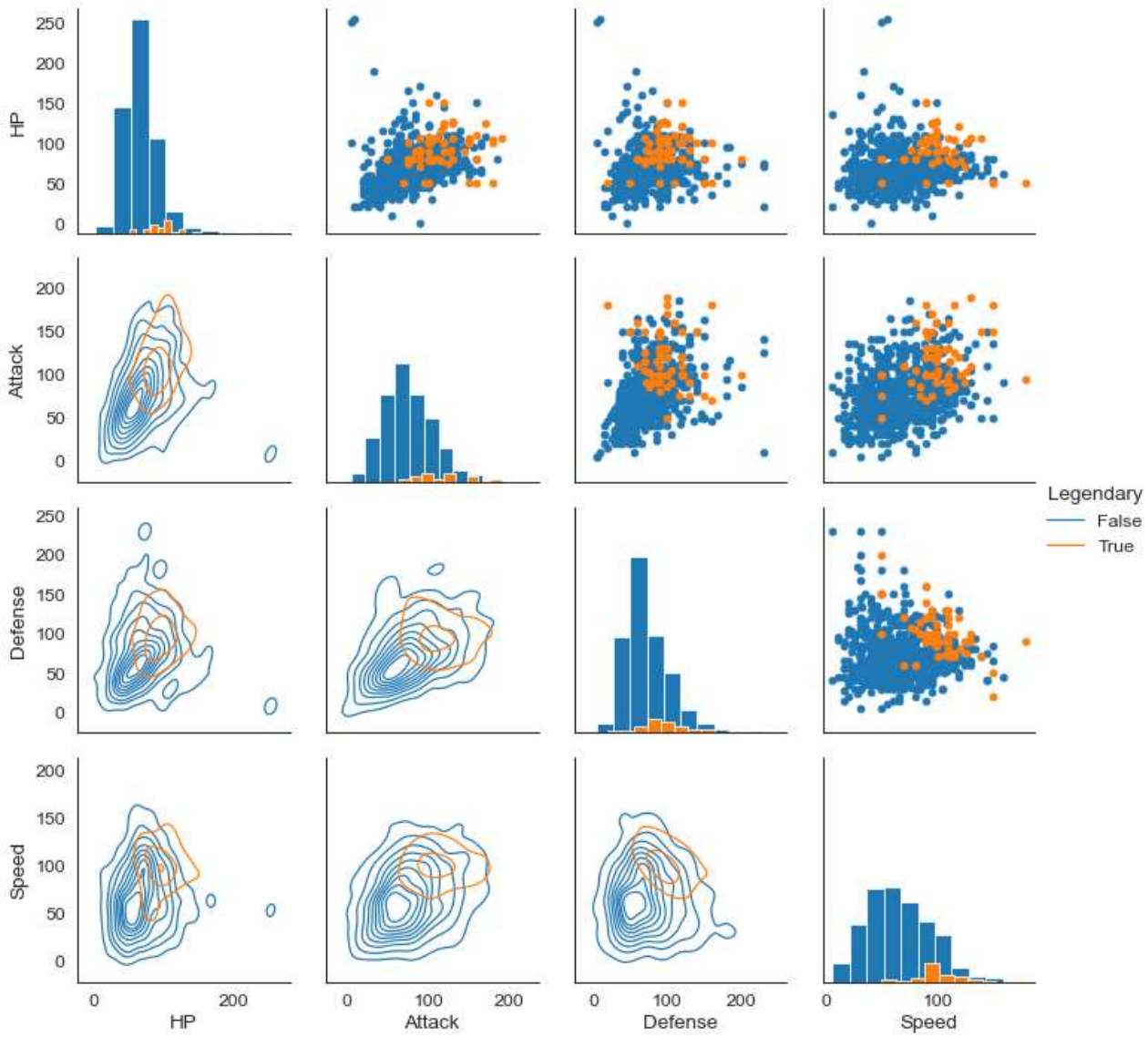


Pair Grid

In [21]:
```
#like correlograms but with scatterplots and more control
```

```
#Can control how things are presented and which data points are shown
poke_grid=sns.PairGrid(pokemon_df, hue='Legendary',
                       x_vars=['HP','Attack','Defense','Speed'],
                       y_vars=['HP','Attack','Defense','Speed'])

#Can also specify which plots are used where
#poke_grid.map(plt.scatter)
poke_grid.map_diag(plt.hist)
#poke_grid.map_offdiag(plt.scatter)
poke_grid.map_upper(plt.scatter)
poke_grid.map_lower(sns.kdeplot)

poke_grid.add_legend()
```

Out[21]: <seaborn.axisgrid.PairGrid at 0x1f2fd1dd358>

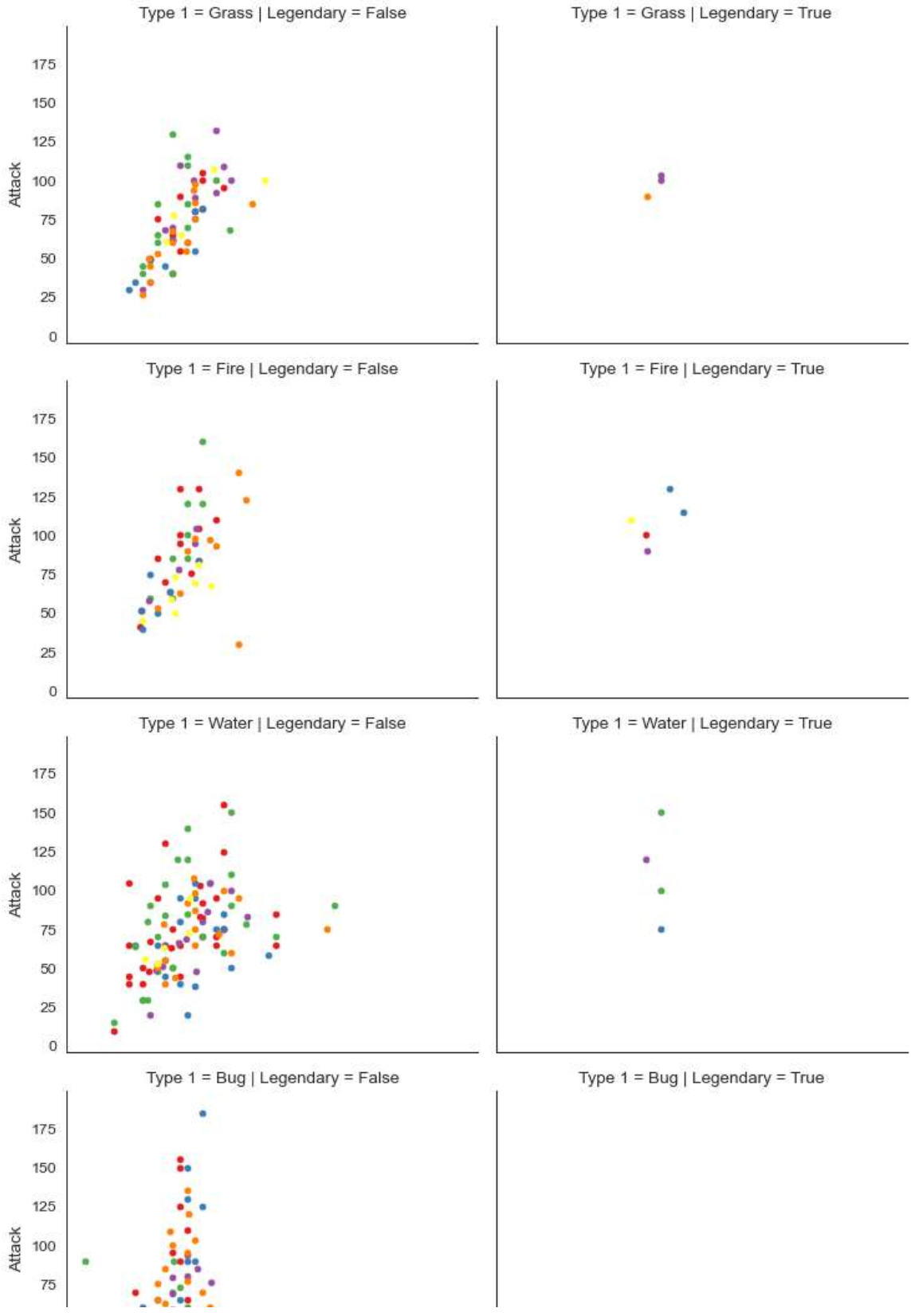


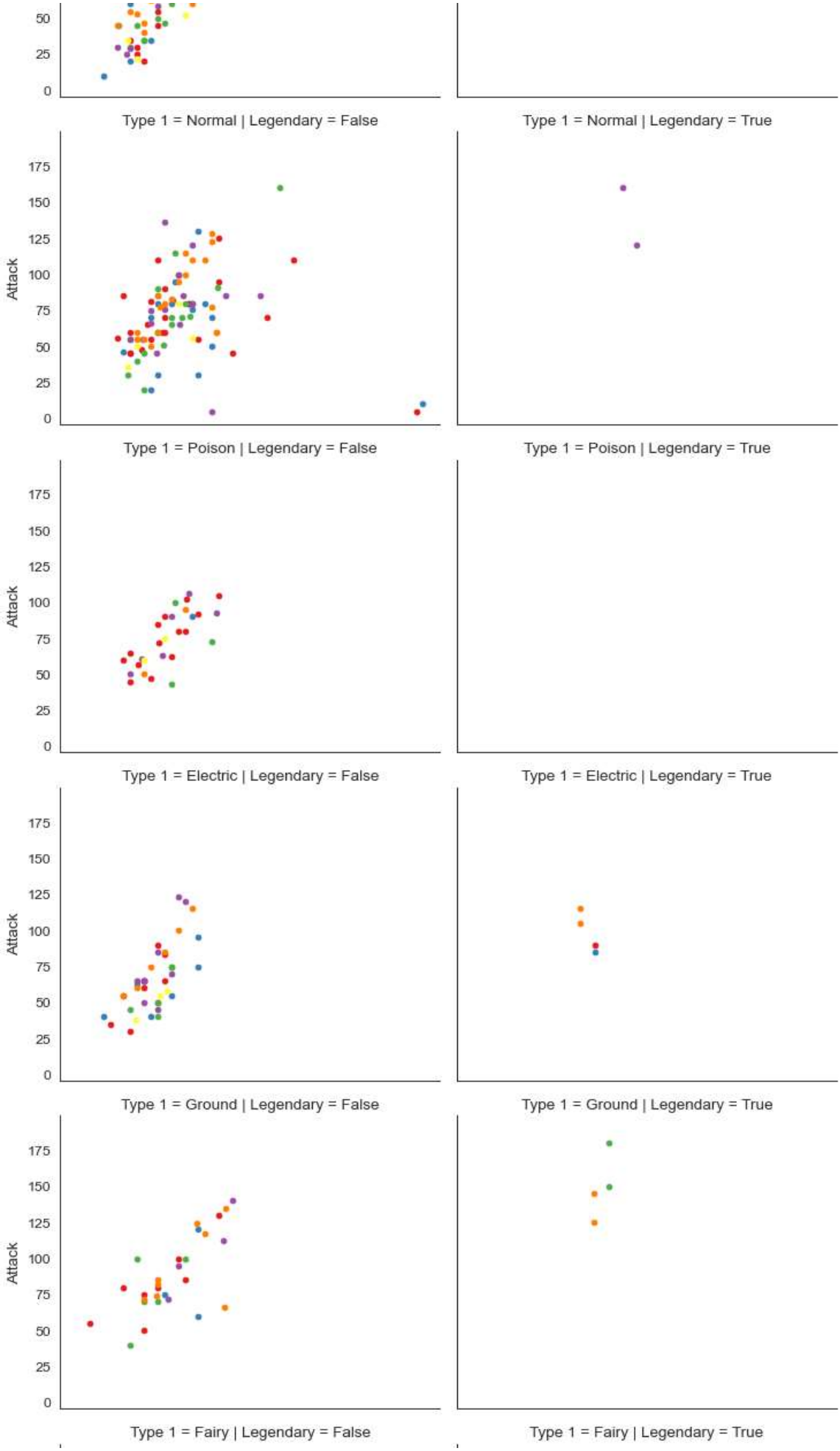
Facet Grid

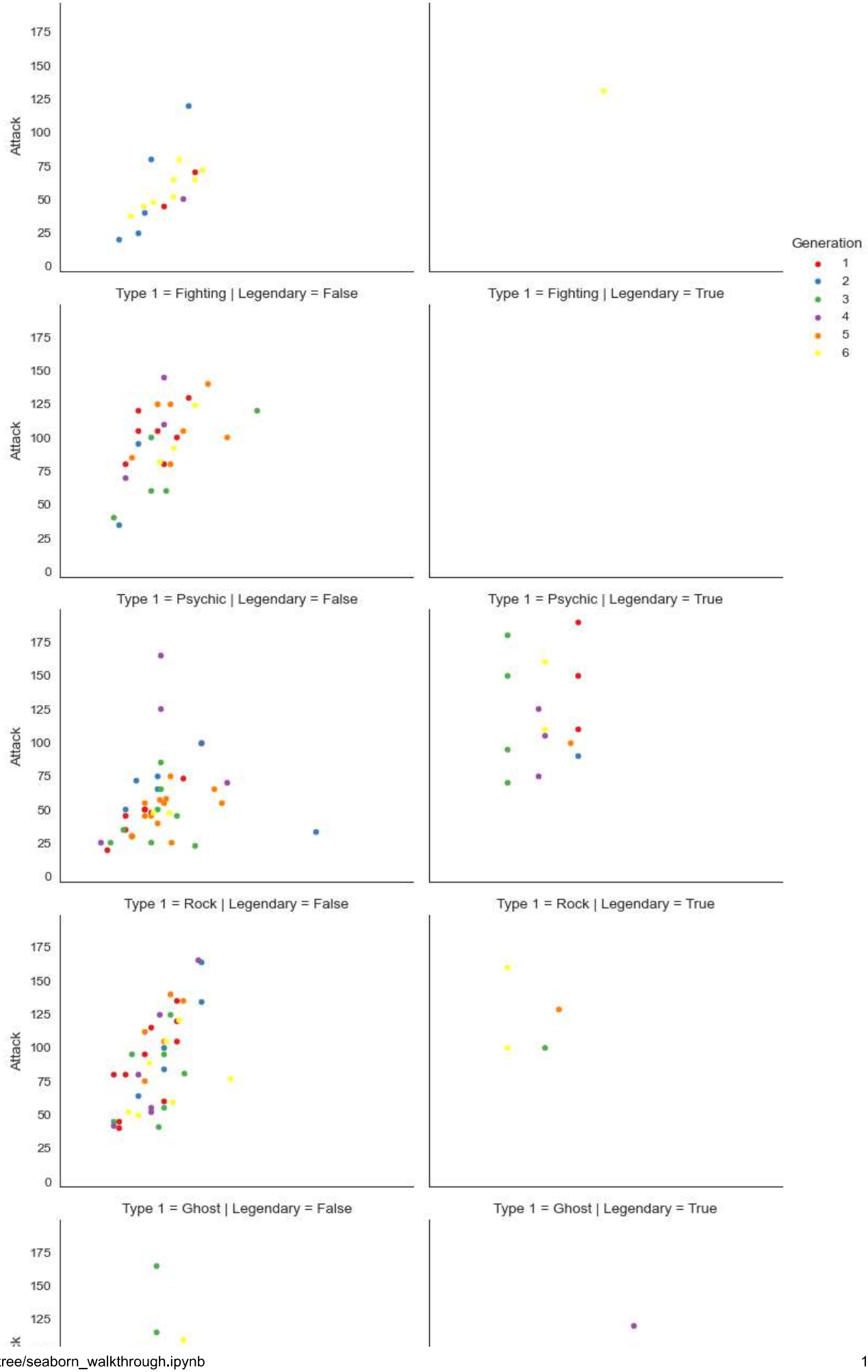
In [22]:
```
# Allows for multpile plots by attributes

#fire_water=pokemon_df.loc[(pokemon_df['Type 1']=='Fire')|(pokemon_df['Type 1']=='Water
```

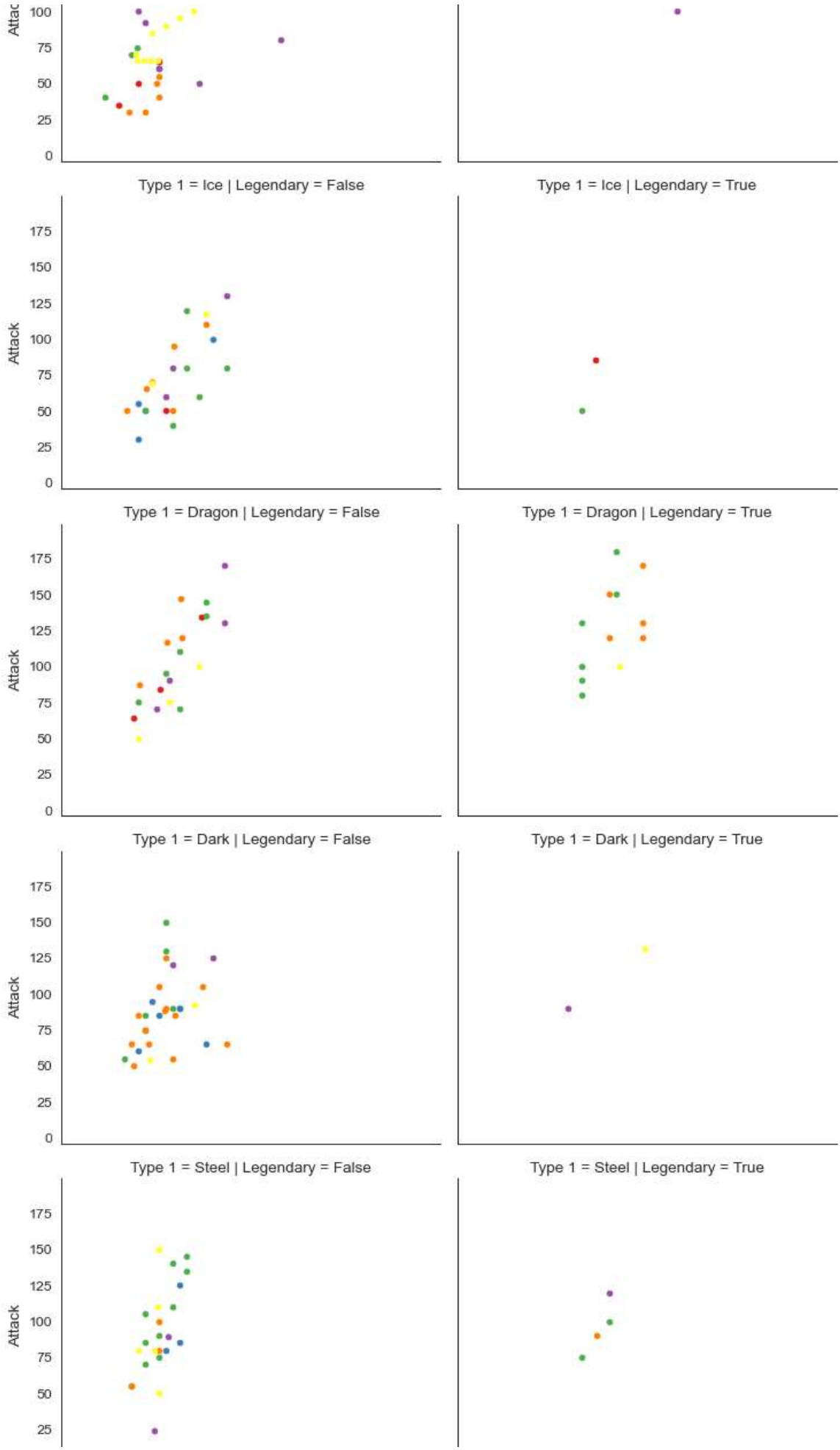
```
poke_fg=sns.FacetGrid(pokemon_df, col='Legendary',
                      row='Type 1', height=4,
                     aspect=1.3, # aspect is width
                      hue='Generation', palette='Set1')

poke_fg.map(plt.scatter,'HP','Attack')
poke_fg.add_legend()
```

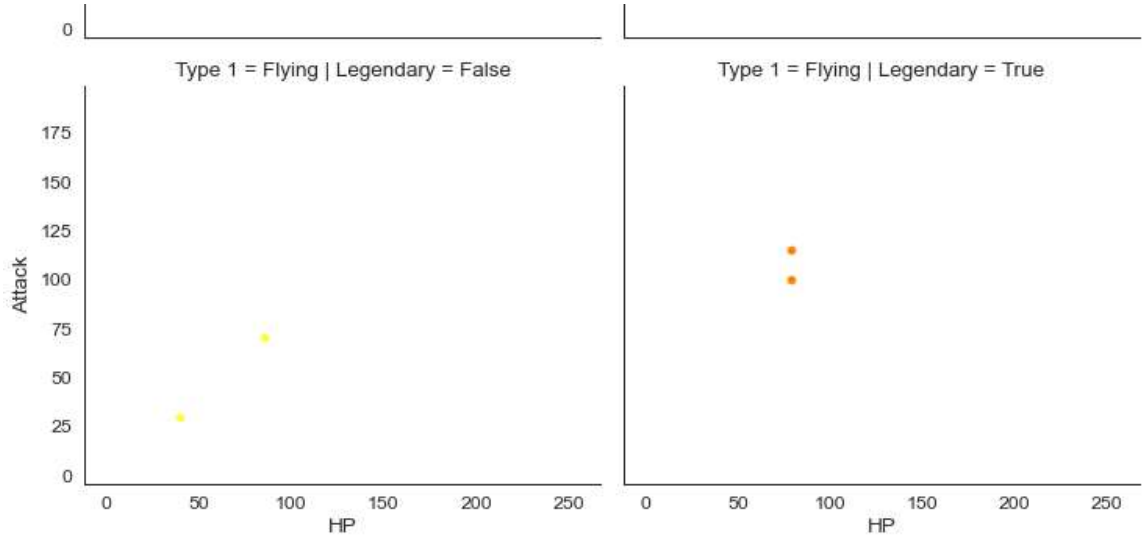
Out[22]: <seaborn.axisgrid.FacetGrid at 0x1f2ff894898>




Attack
0
25
50
75
100
125
150
175
Type 1 = Normal | Legendary = False
Type 1 = Normal | Legendary = True
Type 1 = Poison | Legendary = False
Type 1 = Poison | Legendary = True
Type 1 = Electric | Legendary = False
Type 1 = Electric | Legendary = True
Type 1 = Ground | Legendary = False
Type 1 = Ground | Legendary = True
Type 1 = Fairy | Legendary = False
Type 1 = Fairy | Legendary = True


Attack
Type 1 = Fighting | Legendary = False
Type 1 = Fighting | Legendary = True
Type 1 = Psychic | Legendary = False
Type 1 = Psychic | Legendary = True
Type 1 = Rock | Legendary = False
Type 1 = Rock | Legendary = True
Type 1 = Ghost | Legendary = False
Type 1 = Ghost | Legendary = True
Generation
1
2
3
4
5
6

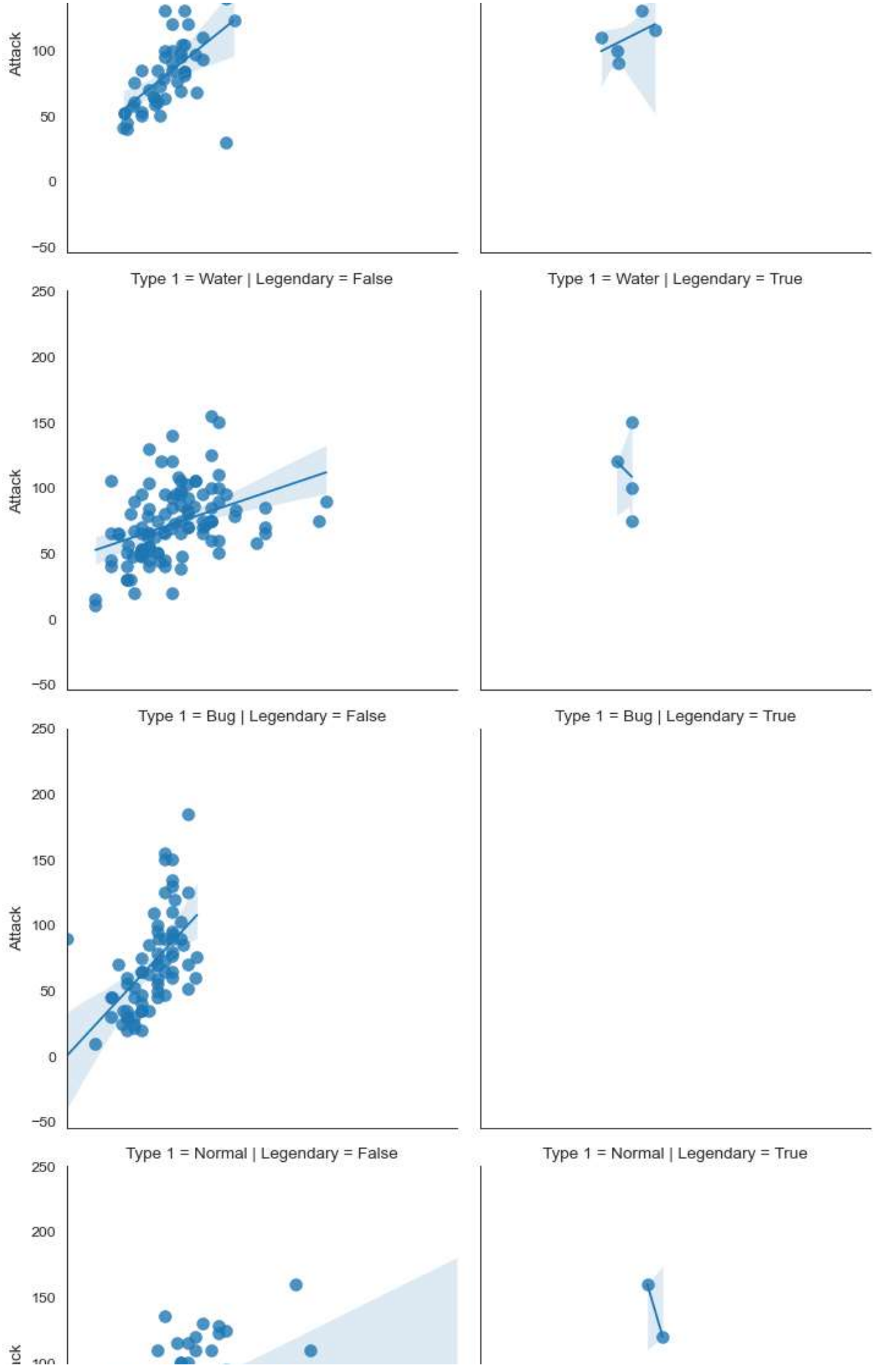

Attac
100
75
50
25
0
Type 1 = Ice | Legendary = False
Type 1 = Ice | Legendary = True
Attack
175
150
125
100
75
50
25
0
Type 1 = Dragon | Legendary = False
Type 1 = Dragon | Legendary = True
Type 1 = Dark | Legendary = False
Type 1 = Dark | Legendary = True
Type 1 = Steel | Legendary = False
Type 1 = Steel | Legendary = True

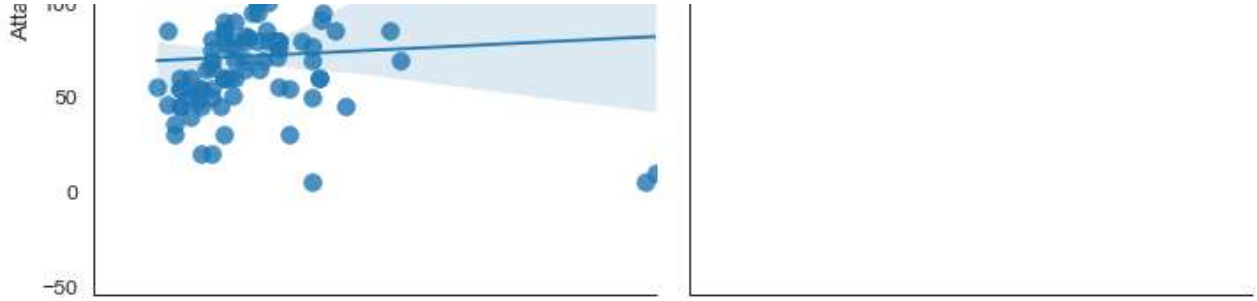


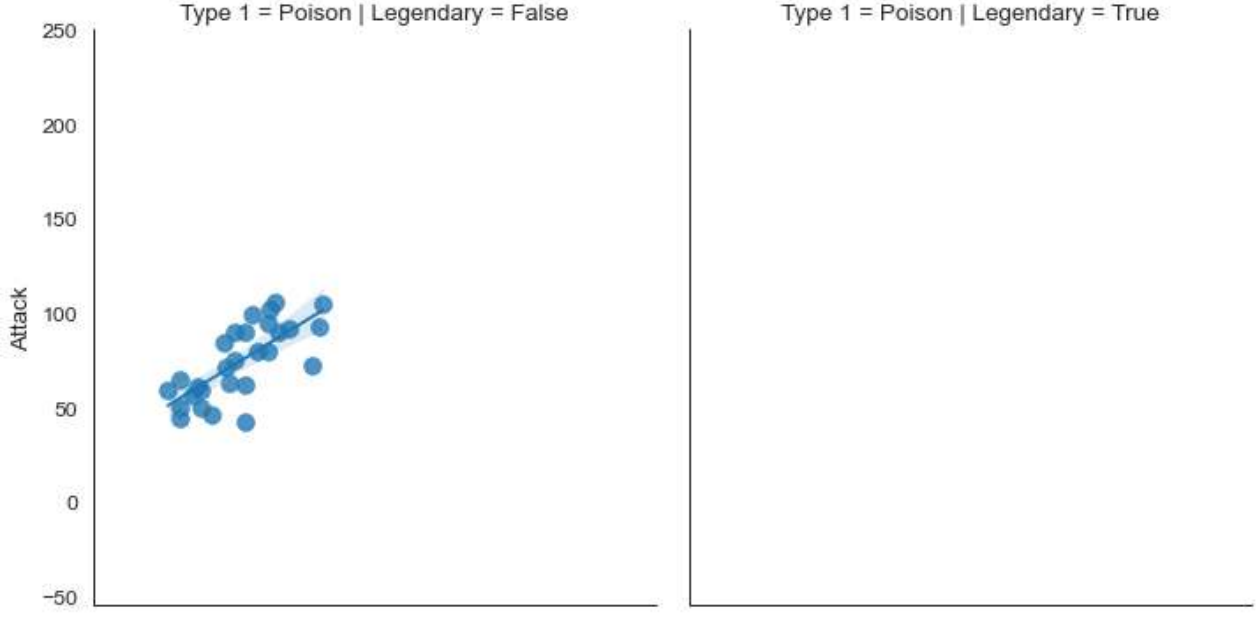
Regression Plots

In [23]:
```
plt.figure(figsize=(8,6))
sns.set_context('paper', font_scale=1.4)

# creates a linear regression
sns.lmplot(x='HP', y='Attack', data=pokemon_df,
           scatter_kws={'s':100,
                        'linewidth':.5},
          col='Legendary', row='Type 1')
```

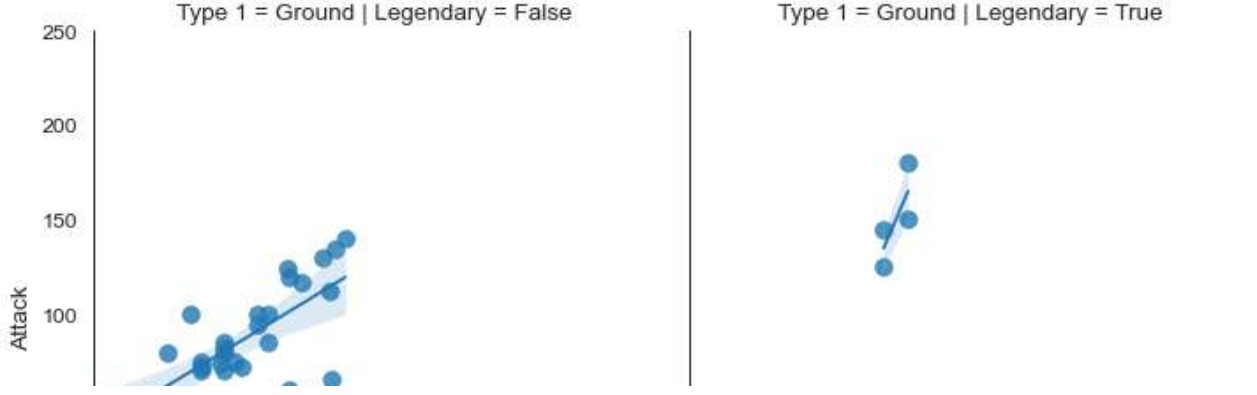
Out[23]:
```
<seaborn.axisgrid.FacetGrid at 0x1f2826ce908>

<Figure size 576x432 with 0 Axes>
```

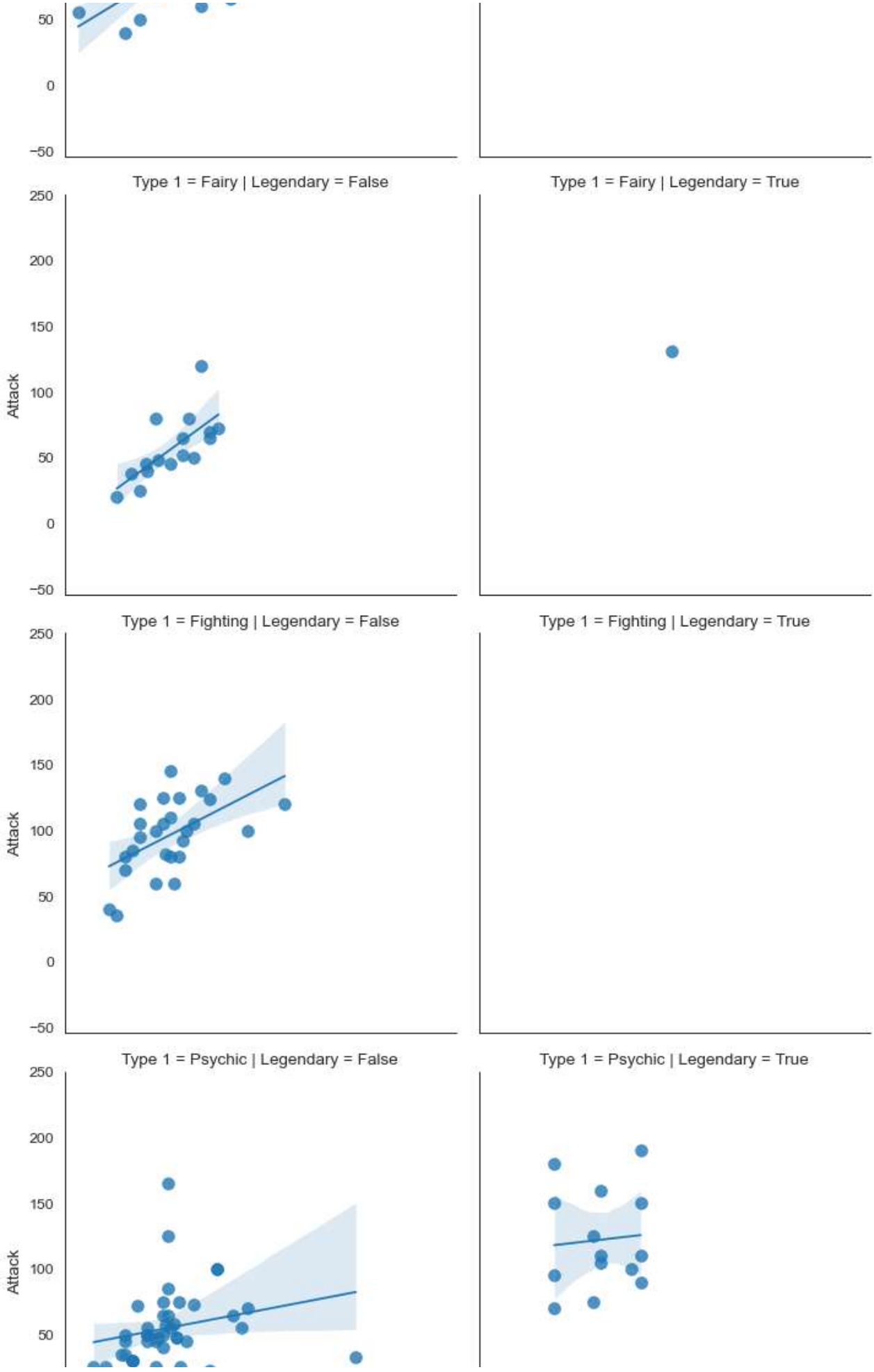

Attack
100
50
0
−50
Type 1 = Water | Legendary = False
Type 1 = Water | Legendary = True
250
200
150
100
50
0
−50
Attack
Type 1 = Bug | Legendary = False
Type 1 = Bug | Legendary = True
250
200
150
100
50
0
−50
Attack
Type 1 = Normal | Legendary = False
Type 1 = Normal | Legendary = True
250
200
150

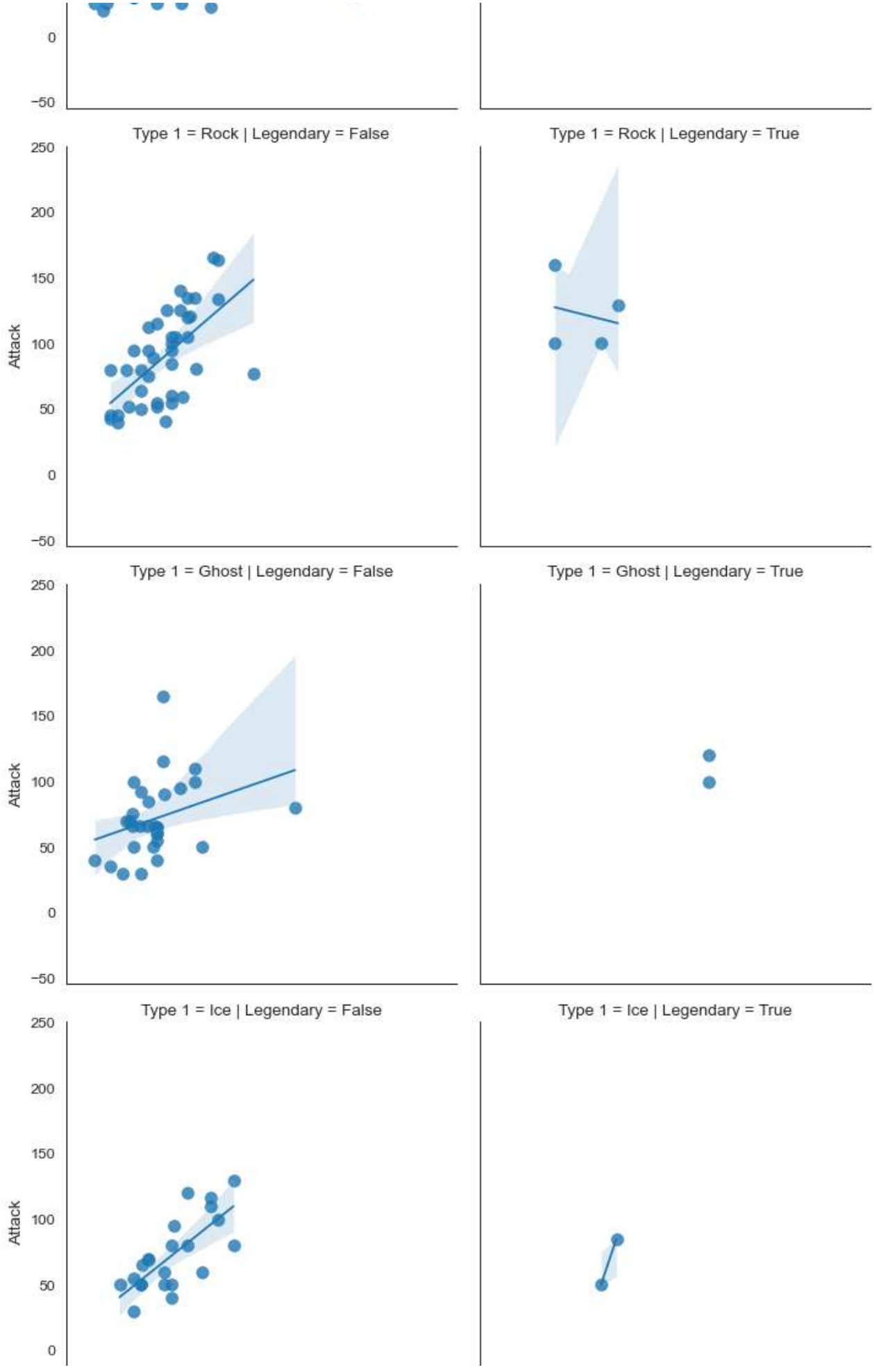

Atta
100
50
0
−50
Type 1 = Poison | Legendary = False
Type 1 = Poison | Legendary = True

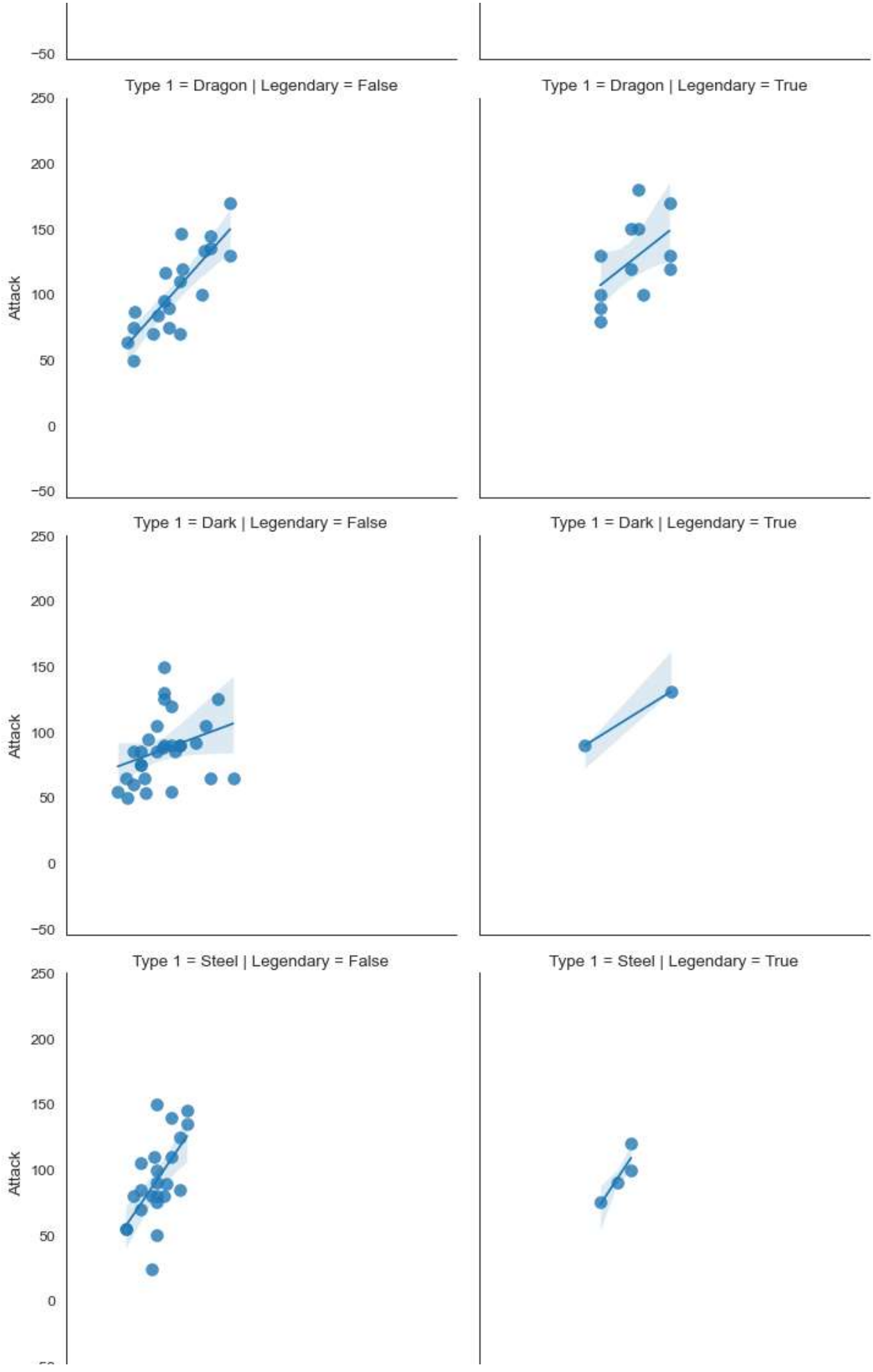

250
200
150
100
50
0
−50
Attack
Type 1 = Electric | Legendary = False
Type 1 = Electric | Legendary = True

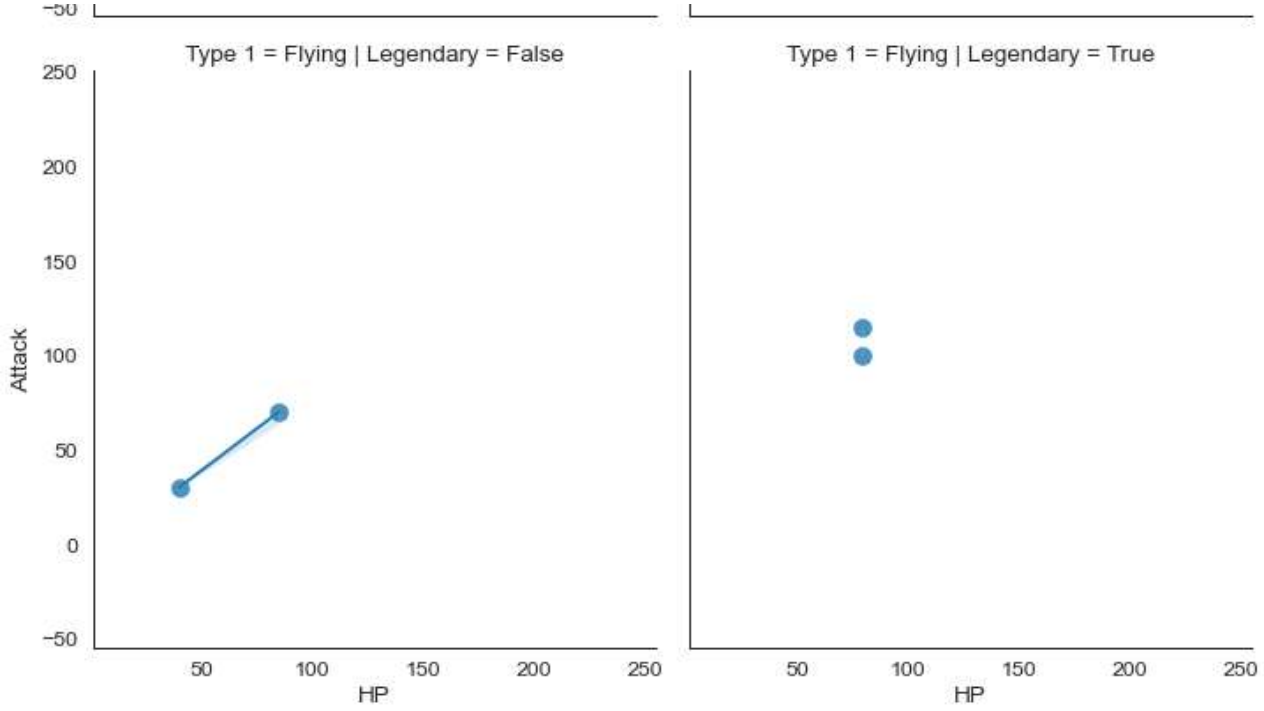

250
200
150
100
50
0
−50
Attack
Type 1 = Ground | Legendary = False
Type 1 = Ground | Legendary = True


250
200
150
100
Attack


Type 1 = Fairy | Legendary = False
Type 1 = Fairy | Legendary = True
Type 1 = Fighting | Legendary = False
Type 1 = Fighting | Legendary = True
Type 1 = Psychic | Legendary = False
Type 1 = Psychic | Legendary = True
Attack
250
200
150
100
50
0
−50


Type 1 = Rock | Legendary = False
Type 1 = Rock | Legendary = True
Type 1 = Ghost | Legendary = False
Type 1 = Ghost | Legendary = True
Type 1 = Ice | Legendary = False
Type 1 = Ice | Legendary = True
Attack
250
200
150
100
50
0
−50


Type 1 = Dragon | Legendary = False
Type 1 = Dragon | Legendary = True
Type 1 = Dark | Legendary = False
Type 1 = Dark | Legendary = True
Type 1 = Steel | Legendary = False
Type 1 = Steel | Legendary = True
Attack
250
200
150
100
50
0
−50


Type 1 = Flying | Legendary = False
Type 1 = Flying | Legendary = True
Attack
HP
HP
250
200
150
100
50
0
−50
50
100
150
200
250