Portfolio assignment 14

Perform a bivariate analysis on at least 1 combination of 2 columns with categorical data in the dataset that you chose in portfolio assignment 4.

- Do you expect their to be a correlation between the two columns?
- Create a contingency table. Do you observe different ratios between categories here?
- Create a bar plot for this contingency table. Do you observe different ratios between categories here?
- Do a chi-squared test. What does the result say? What's the chance of there being a correlation between the two columns?

In [1]:

```
import pandas as pd
import seaborn as sns
from scipy.stats import chi2_contingency
pokemons = pd.read_csv('../Pokemon.csv')
```

In [2]:

```
contingencyTable = pokemons.groupby(['Type 1','Type 2']).size().unstack('Type 1', fill_valu
contingencyTable
```

Out[2]:

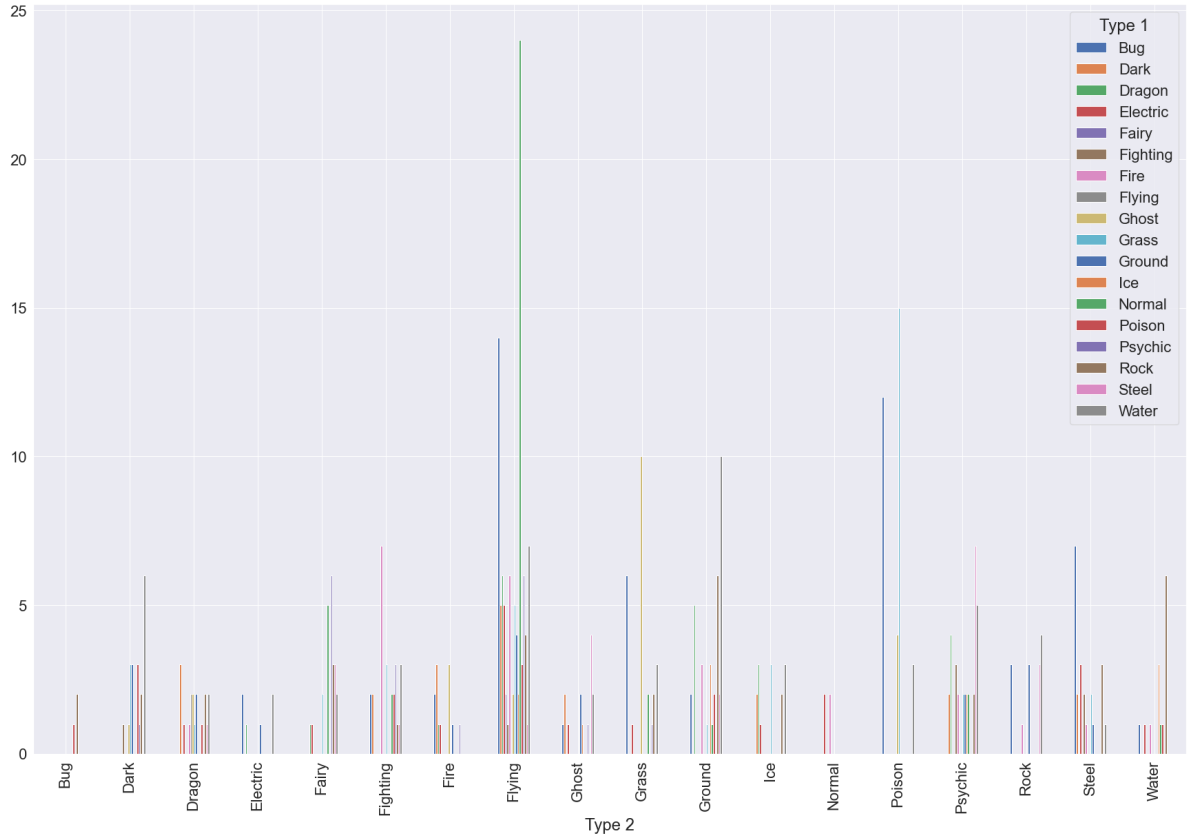
Type 1 Type 2	Bug	Dark	Dragon	Electric	Fairy	Fighting	Fire	Flying	Ghost	Grass	Ground	Ic
Bug	0	0	0	0	0	0	0	0	0	0	0	(
Dark	0	0	0	0	0	1	0	0	1	3	3	(
Dragon	0	3	0	1	0	0	1	2	2	1	2	(
Electric	2	0	1	0	0	0	0	0	0	0	1	(
Fairy	0	0	1	1	0	0	0	0	0	2	0	(
Fighting	2	2	0	0	0	0	7	0	0	3	0	(
Fire	2	3	1	1	0	0	0	0	3	0	1	(
Flying	14	5	6	5	2	1	6	0	2	5	4	2
Ghost	1	2	0	1	0	0	0	0	0	0	2	1
Grass	6	0	0	1	0	0	0	0	10	0	0	(
Ground	2	0	5	0	0	0	3	0	0	1	0	3
Ice	0	2	3	1	0	0	0	0	0	3	0	(
Normal	0	0	0	2	0	0	2	0	0	0	0	(
Poison	12	0	0	0	0	0	0	0	4	15	0	(
Psychic	0	2	4	0	0	3	2	0	0	2	2	2
Rock	3	0	0	0	0	0	1	0	0	0	3	(
Steel	7	2	0	3	0	2	1	0	0	2	1	(
Water	1	0	0	1	0	0	1	0	0	0	0	3

In [3]:

```
sns.set(rc={'figure.figsize':(30,20)})
sns.set(font_scale = 2)
contingencyTable.plot(kind='bar')
```

Out[3]:

```
<AxesSubplot:xlabel='Type 2'>
```



There are a few types that might have a bigger correlation between each other, by the count of pokemons who exist in that group, an example is: Flying & Normal, Flying & Dragon. Normal types tend to have a bigger correlation between every other type, but other than that, there is no correlation between them.

In [4]:

```
chi2_contingency(contingencyTable)
```

Out[4]:

```
(691.3117031288136,
 5.567690217754264e-35,
 289,
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          0.13768116,  0.07971014,  0.26811594,  0.0942029 ,  0.13768116,
          0.25362319,  0.15942029,  0.38405797],
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          0.9178744 ,  0.53140097,  1.78743961,  0.62801932,  0.9178744 ,
          1.69082126,  1.06280193,  2.56038647],
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          1.52173913,  0.95652174,  2.30434783],
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          0.27536232,  0.15942029,  0.53623188,  0.1884058 ,  0.27536232,
          0.50724638,  0.31884058,  0.76811594],
        [ 2.88888889,  1.16666667,  1.16666667,  0.94444444,  0.11111111,
          0.38888889,  1.33333333,  0.11111111,  1.22222222,  2.05555556,
          1.05555556,  0.61111111,  2.05555556,  0.72222222,  1.05555556,
          1.94444444,  1.22222222,  2.94444444],
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          2.19806763,  1.38164251,  3.32850242],
        [ 1.50724638,  0.60869565,  0.60869565,  0.49275362,  0.05797101,
          0.20289855,  0.69565217,  0.05797101,  0.63768116,  1.07246377,
          0.55072464,  0.31884058,  1.07246377,  0.37681159,  0.55072464,
          1.01449275,  0.63768116,  1.53623188],
        [12.18357488,  4.92028986,  4.92028986,  3.98309179,  0.46859903,
          1.64009662,  5.62318841,  0.46859903,  5.15458937,  8.66908213,
          4.45169082,  2.57729469,  8.66908213,  3.04589372,  4.45169082,
          8.20048309,  5.15458937, 12.4178744 ],
        [ 1.75845411,  0.71014493,  0.71014493,  0.57487923,  0.06763285,
          0.23671498,  0.8115942 ,  0.06763285,  0.74396135,  1.25120773,
          0.64251208,  0.37198068,  1.25120773,  0.43961353,  0.64251208,
          1.18357488,  0.74396135,  1.79227053],
        [ 3.14009662,  1.26811594,  1.26811594,  1.02657005,  0.12077295,
          0.42270531,  1.44927536,  0.12077295,  1.32850242,  2.23429952,
          1.147343  ,  0.66425121,  2.23429952,  0.78502415,  1.147343  ,
          2.11352657,  1.32850242,  3.20048309],
        [ 4.39613527,  1.77536232,  1.77536232,  1.43719807,  0.16908213,
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          2.9589372 ,  1.85990338,  4.48067633],
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          0.23671498,  0.8115942 ,  0.06763285,  0.74396135,  1.25120773,
          0.64251208,  0.37198068,  1.25120773,  0.43961353,  0.64251208,
          1.18357488,  0.74396135,  1.79227053],
        [ 0.50241546,  0.20289855,  0.20289855,  0.16425121,  0.01932367,
          0.06763285,  0.23188406,  0.01932367,  0.21256039,  0.35748792,
          0.18357488,  0.10628019,  0.35748792,  0.12560386,  0.18357488,
          0.33816425,  0.21256039,  0.51207729],
```

```
[ 4.2705314 ,  1.72463768,  1.72463768,  1.39613527,  0.16425121,
  0.57487923,  1.97101449,  0.16425121,  1.80676329,  3.03864734,
  1.56038647,  0.90338164,  3.03864734,  1.06763285,  1.56038647,
  2.87439614,  1.80676329,  4.352657  ],
[ 4.14492754,  1.67391304,  1.67391304,  1.35507246,  0.15942029,
  0.55797101,  1.91304348,  0.15942029,  1.75362319,  2.94927536,
  1.51449275,  0.87681159,  2.94927536,  1.03623188,  1.51449275,
  2.78985507,  1.75362319,  4.22463768],
[ 1.75845411,  0.71014493,  0.71014493,  0.57487923,  0.06763285,
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  0.64251208,  0.37198068,  1.25120773,  0.43961353,  0.64251208,
  1.18357488,  0.74396135,  1.79227053],
[ 2.76328502,  1.11594203,  1.11594203,  0.90338164,  0.10628019,
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  0.23671498,  0.8115942 ,  0.06763285,  0.74396135,  1.25120773,
  0.64251208,  0.37198068,  1.25120773,  0.43961353,  0.64251208,
  1.18357488,  0.74396135,  1.79227053]]))
```

There is not a significant correlation between the types of pokemon