In [6]:
```python
import pandas as pd
from scipy.stats import chi2_contingency, chisquare
from itertools import combinations

df = pd.read_csv("Lab05Data.csv")

# Frequency counts per face (1-6) for each die
freq = {col: df[col].value_counts().reindex(range(1, 7), fill_value=0) for col in df.columns}

print("=== Goodness-of-Fit vs Fair d6 ===")
for col, counts in freq.items():
    stat, p = chisquare(counts)
    print(f"{col}: chi2={stat:.3f}, p={p:.4f} {'UNFAIR' if p < 0.05 else 'fair'}")

print("\n=== Pairwise Comparison ===")
for a, b in combinations(freq.keys(), 2):
    table = pd.DataFrame({a: freq[a], b: freq[b]})
    stat, p, _, _ = chi2_contingency(table)
    print(f"{a} vs {b}: chi2={stat:.3f}, p={p:.4f} {'DIFFERENT' if p < 0.05 else 'similar'}")
```

```
=== Goodness-of-Fit vs Fair d6 ===
Polymer: chi2=5.360, p=0.3735 fair
Metal: chi2=4.040, p=0.5437 fair
Polymer.1: chi2=3.800, p=0.5786 fair
Metal.1: chi2=4.400, p=0.4934 fair

=== Pairwise Comparison ===
Polymer vs Metal: chi2=3.280, p=0.6570 similar
Polymer vs Polymer.1: chi2=5.017, p=0.4138 similar
Polymer vs Metal.1: chi2=2.940, p=0.7093 similar
Metal vs Polymer.1: chi2=5.935, p=0.3126 similar
Metal vs Metal.1: chi2=3.288, p=0.6557 similar
Polymer.1 vs Metal.1: chi2=1.567, p=0.9053 similar
```

In [ ]: