Reconocimiento Facial

In [5]:
```
from sklearn.datasets import fetch_lfw_people
import matplotlib.pyplot as plt
```

In [2]:
```
faces = fetch_lfw_people(min_faces_per_person=60)#Descargamos fotos
```

In [3]:
```
print(faces.target_names)
```

```
['Ariel Sharon' 'Colin Powell' 'Donald Rumsfeld' 'George W Bush'
 'Gerhard Schroeder' 'Hugo Chavez' 'Junichiro Koizumi' 'Tony Blair']
```

In [4]:
```
print(faces.images.shape)
```

```
(1348, 62, 47)
```

Cada imágen tiene 62 x 47 de tamaño, o sea 2914 píxeles en total.

In [77]:
```
fig, ax = plt.subplots(5,5, figsize=(16,9))
for i, ax_i in enumerate(ax.flat):
    ax_i.imshow(faces.images[i], cmap="bone")
    ax_i.set(xticks=[], yticks=[], xlabel=faces.target_names[faces.target[i]])
#xticks e yticks son la medidas de los costados, las colocamos vacías.
#xlabel, será el nombre de la actual foto
```

In [14]:
```
from sklearn.svm import SVC
from sklearn.decomposition import PCA as RandomizedPCA
from sklearn.pipeline import make_pipeline
```

El pipeline es el sistema que utilizan las consolas de desarrollador para ir encadenando instrucciones una tras otra entonces se hace un análisis de componentes principales para las imágenes y luego aplicarle un

SVC. Para ello se puede combinar ambas operaciones con una pipeline las puedo llevar a cabo con un proceso de modelización único.

In [15]:
```
pca = RandomizedPCA(n_components=150, whiten=True, random_state=42)
svc = SVC(kernel="rbf", class_weight="balanced")
model = make_pipeline(pca, svc)
```

In [16]:
```
from sklearn.model_selection import train_test_split
```

In [29]:
```
Xtrain, Xtest, Ytrain, Ytest = train_test_split(faces.data, faces.target, random_state = 42)
```

In [30]:
```
from sklearn.model_selection import GridSearchCV
```

In [61]:
```
param_grid = {
    "svc__C":range(1,50,1),
    "svc__gamma":[0.0001, 0.0005, 0.001, 0.005, 0.01]
}
```

In [62]:
```
grid = GridSearchCV(model, param_grid)
```

In [63]:
```
%time grid.fit(Xtrain, Ytrain)
```

```
Wall time: 4min 10s
GridSearchCV(estimator=Pipeline(steps=[('pca',
                                        PCA(n_components=150, random_state=42,
                                            whiten=True)),
                                       ('svc', SVC(class_weight='balanced'))]),
             param_grid={'svc__C': range(1, 50),
                         'svc__gamma': [0.0001, 0.0005, 0.001, 0.005, 0.01]})
```

Out[63]:

In [65]:
```
print(grid.best_params_)
```

```
{'svc__C': 9, 'svc__gamma': 0.001}
```

In [66]:
```
classifier = grid.best_estimator_
yfit = classifier.predict(Xtest)
```

In [67]:
```
fig, ax = plt.subplots(10,8, figsize=(16,9))
for i, ax_i in enumerate(ax.flat):
    ax_i.imshow(Xtest[i].reshape(62,47), cmap="bone")
    ax_i.set(xticks=[], yticks=[])
    ax_i.set_ylabel(faces.target_names[yfit[i]].split()[-1],
                    color = "black" if yfit[i]==Ytest[i] else "red")
fig.suptitle("Predicciones de las imágenes (incorrectas en rojo)", size = 15)
```

```
Text(0.5, 0.98, 'Predicciones de las imágenes (incorrectas en rojo)')
```

Out[67]:

In [68]:
```
from sklearn.metrics import classification_report
```

In [69]:
```
print(classification_report(Ytest, yfit, target_names=faces.target_names))
```

```
                   precision    recall  f1-score   support

     Ariel Sharon       0.65      0.73      0.69        15
     Colin Powell       0.80      0.87      0.83        68
  Donald Rumsfeld       0.74      0.84      0.79        31
    George W Bush       0.92      0.83      0.88       126
Gerhard Schroeder       0.86      0.83      0.84        23
      Hugo Chavez       0.93      0.70      0.80        20
Junichiro Koizumi       0.92      1.00      0.96        12
       Tony Blair       0.85      0.95      0.90        42

         accuracy                           0.85       337
        macro avg       0.83      0.84      0.84       337
     weighted avg       0.86      0.85      0.85       337
```

In [70]:
```
from sklearn.metrics import confusion_matrix
import seaborn as sns; sns.set()
```

In [72]:
```
mat = confusion_matrix(Ytest, yfit)
mat
```

Out[72]:
```
array([[ 11,   1,   2,   1,   0,   0,   0,   0],
       [  2,  59,   2,   3,   0,   0,   0,   2],
       [  1,   2,  26,   1,   0,   0,   0,   1],
       [  2,  11,   3, 105,   2,   1,   0,   2],
       [  0,   0,   1,   1,  19,   0,   1,   1],
       [  1,   1,   0,   2,   1,  14,   0,   1],
```

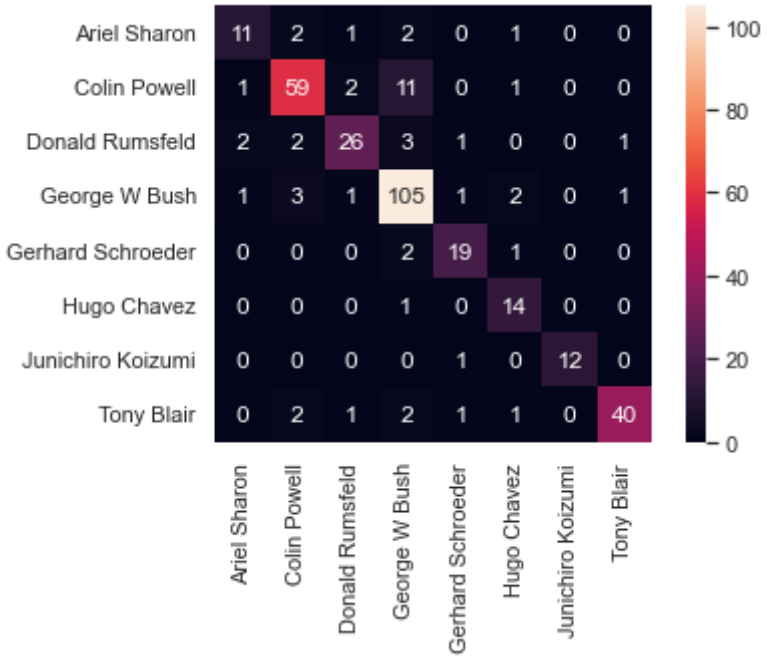
```
       [  0,   0,   0,   0,   0,   0,  12,   0],
       [  0,   0,   1,   1,   0,   0,   0,  40]], dtype=int64)
```

In [75]:

```
sns.heatmap(mat.T, square=True, annot=True, fmt='d', cbar=True, xticklabels=faces.target_name
            yticklabels=faces.target_names)#La barra cbar puede estar o no
```

Out[75]:

```
<AxesSubplot:>
```



In [ ]: