# Nervous Presidents — State-Transition Diagram

Note Title 01/10/2008

Suppose there are N couples.

A state is fully defined by

- the position of the boat (2 possibilities)
- $\ell B$ the number of bodyguards on the left bank
- $\ell P$ the number of presidents on the left bank.

The requirement on $\ell B$ and $\ell P$ is

$$(\ell B = 0 \vee \ell B = N) \vee (\ell B = \ell P).$$

The number of states satisfying $(\ell B = \ell P)$ is $N+1$.

The number of states satisfying

$$(\ell B = 0 \vee \ell B = N) \wedge \neg(\ell B = \ell P)$$ is $2 \times N$.

Hence, total no. of states $= 2 \times (N+1+2 \times N) = 6 \times N + 2$.