Chapter 9
Mixed Strategies In Theory And Tennis

We continue our discussion of mixed strategies. First we discuss the payoff to a mixed strategy, pointing out that it must be a weighted average of the payoffs to the pure strategies used in the mix. We note a consequence of this: if a mixed strategy is a best response, then all the pure strategies in the mix must themselves be best responses and hence indifferent. We use this idea to find mixed-strategy Nash equilibria in a game within a game of tennis.

Definition: A mixed strategy pi is a randomization over its pure strategies pi(si) is the probability that pi assigns to the pure strategy si.

- pi(si) could be zero. (½, ½, 0).
- pi(si) could be one. A pure strategy.

Payoffs From Mixed Strategy
The expected payoffs of the mixed strategy pi is the weighted average of the expected payoffs of each of the pure strategies in the mix.

Lesson: If a mixed strategy is a best response then each of the pure strategies in the mix must themselves be a best responses. In particular, each must yield the same expected payoff.

Definition: A mixed strategy profile (p1*, p2*, … ,pn*) is a mixed strategy Nash equilibrium if for each i, pi* is a best response to p-i.

Lesson: If pi*(si) > 0, then si* is a best response to p-i*.