



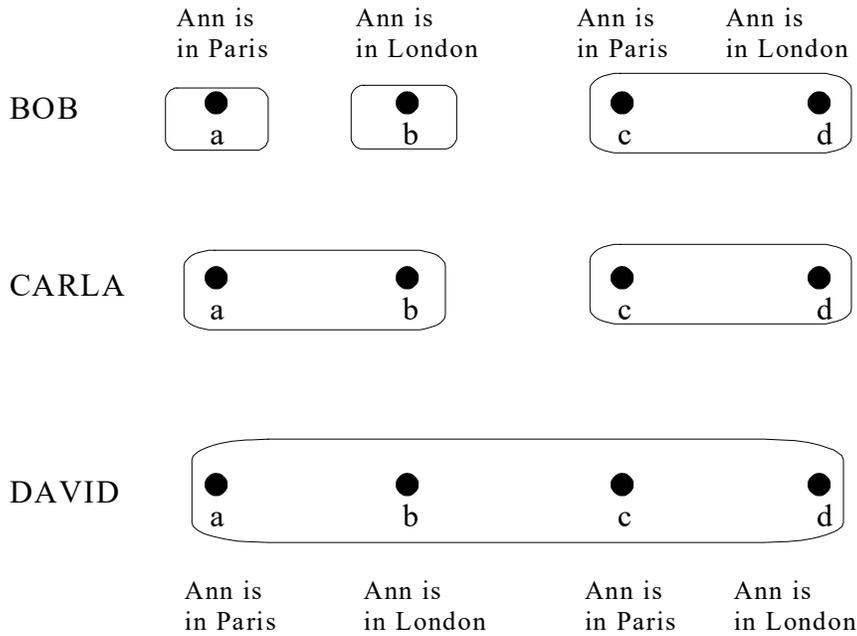
1. With equal probability player 1 is dealt card H (high) or card L (low). Player 2 is not dealt a card, and never gets to look at player 1's card until the end of the game. After looking at his card, player 1 decides whether to play or fold. If he folds, he pays \$1 to the player 2. If he plays, player 2 is informed and must decide whether to fold or see. If she decides to fold, she pays \$1 to player 1. If she sees, the card is shown and if the card is H, player 1 wins \$4 from player 2; if it is L, player 2 wins \$A from player 1.

(a) Draw the extensive form and the corresponding strategic form.

(b) Find the Nash equilibrium of this game as a function of the parameter A, assuming that  $A > 1$ .

2. Recall the following notation from set theory. If  $A$  and  $B$  are sets, then  $A \cup B$  (the union of  $A$  and  $B$ ) is the set of elements that belong to either  $A$  or  $B$  (or both). For example, if  $A = \{1,2,19\}$  and  $B = \{2,3,4\}$  then  $A \cup B = \{1,2,3,4,19\}$ . If  $W$  is the universal set, and  $C$  is a subset of  $W$ , then  $\neg C$  denotes the complement of  $C$  (relative to  $W$ ), that is, the set of elements of  $W$  that are not in  $C$ . For example, if  $W = \{1,2,3,\dots,20\}$  and  $C = \{1,2,8,14,17,19\}$  then  $\neg C = \{3,4,5,6,7,9,10,11,12,13,15,16,18,20\}$ .

Consider the following model of interactive knowledge



(a) Let  $E$  be the event representing the proposition “Ann is in Paris”. What is  $E$ ? Let  $F$  be the event representing the proposition “Ann is in London”. What is  $F$ ?

(b) What is the event  $K_{\text{Bob}}E$ ? (Bob knows that Ann is in Paris)

(c) What is the event  $K_{\text{Carla}}E$ ?

(d) What is the event  $K_{\text{Carla}}(K_{\text{Bob}}E \cup K_{\text{Bob}}F)$ ? (Carla knows that Bob knows where Ann is, that is, Carla knows that either Bob knows that Ann is in Paris or Bob knows that Ann is in London).

(e) The event “The individual considers event  $G$  possible” is  $\neg K\neg G$  where  $\neg$  denotes complement (thus  $\neg G$  is the complement of  $G$ , and  $\neg K\neg G$  is the complement of  $K\neg G$ ). Let  $G$  be the event “Ann is in Paris and Bob does not know that Ann is in Paris”. What is  $G$ ? What is the event “David considers  $G$  possible” (that is, David considers it possible that Ann is in Paris and Bob does not know that she is in Paris)?