8. Probability

Predicting player performance

Using the football fact sheets on pages 6-8, answer the following questions.

> Yellow cards are issued to caution players. If a player is given two yellow cards during the same game then they automatically receive a red card and are required to leave the field.

1. What is the probability that Andrea Jonkheer receives a yellow card in a game?

2/18 = 1/9 = 0.111 = 11.1%

2. What is the probability either Anna Slezák or Will Appleby receive a card in their next game?

Slezák = 3 cards in 20 matches
Appleby = 8 cards in 32 matches

((3/20) + (8/32)) = 2/5 = 0.4 = 40%

3. If Peter Castle's red card was the result of receiving two yellow cards in a game, what is the probability that he receives at least one yellow card in the next game he plays?

Received yellow cards in 2 out of 37 matches (in one match he received two).
2/37 = 0.054 = 5.4%

4. What is the probability that both Benjamin Lange and Andrea Jonkheer receive a card in their next game?

Lange = 6 cards in 36 matches = 1/6
Jonkheer = 2 cards in 18 matches = 1/9
((1/6) x (1/9)) = 1/54 = 0.019 = 1.9%

5. What is the probability that when Lindsey Oakley shoots she scores?

13/43 = 0.302 = 30.2%

6. Rank the midfielders based on the probability that their shots will successfully convert to goals.

1. Strobel = 9/9 = 1
2. Lange = 18/31 = 0.58
3. Okeke = 22/48 = 0.46
4. Weber = 5/13 = 0.38
5. Yoon = 17/45 = 0.38
6. Marley = 0/4 = 0.00

7. Rank the defenders based the probability that they will get a yellow card in their next game.

1. Appleby = 8/32 = 0.25
2. Muñoz = 7/38 = 0.18
3. Slezák = 3/20 = 0.15
4. Jonkheer = 2/18 = 0.11
5. Eaton = 3/32 = 0.09
6. Obando = 0/17 = 0.00

8. If Nathalie Strobel and Amari Okeke both took six shots in a game, how many goals would you expect them to score in total?

Strobel = ((9/12) x 6) = 4.5 = 4 goals
Okeke = ((22/48) x 6) = 2.75 = 2 goals
Total = 6 goals

9. In one of their next three games, what is the probability that Benjamin Lange and Lina Weber will both get a yellow card?
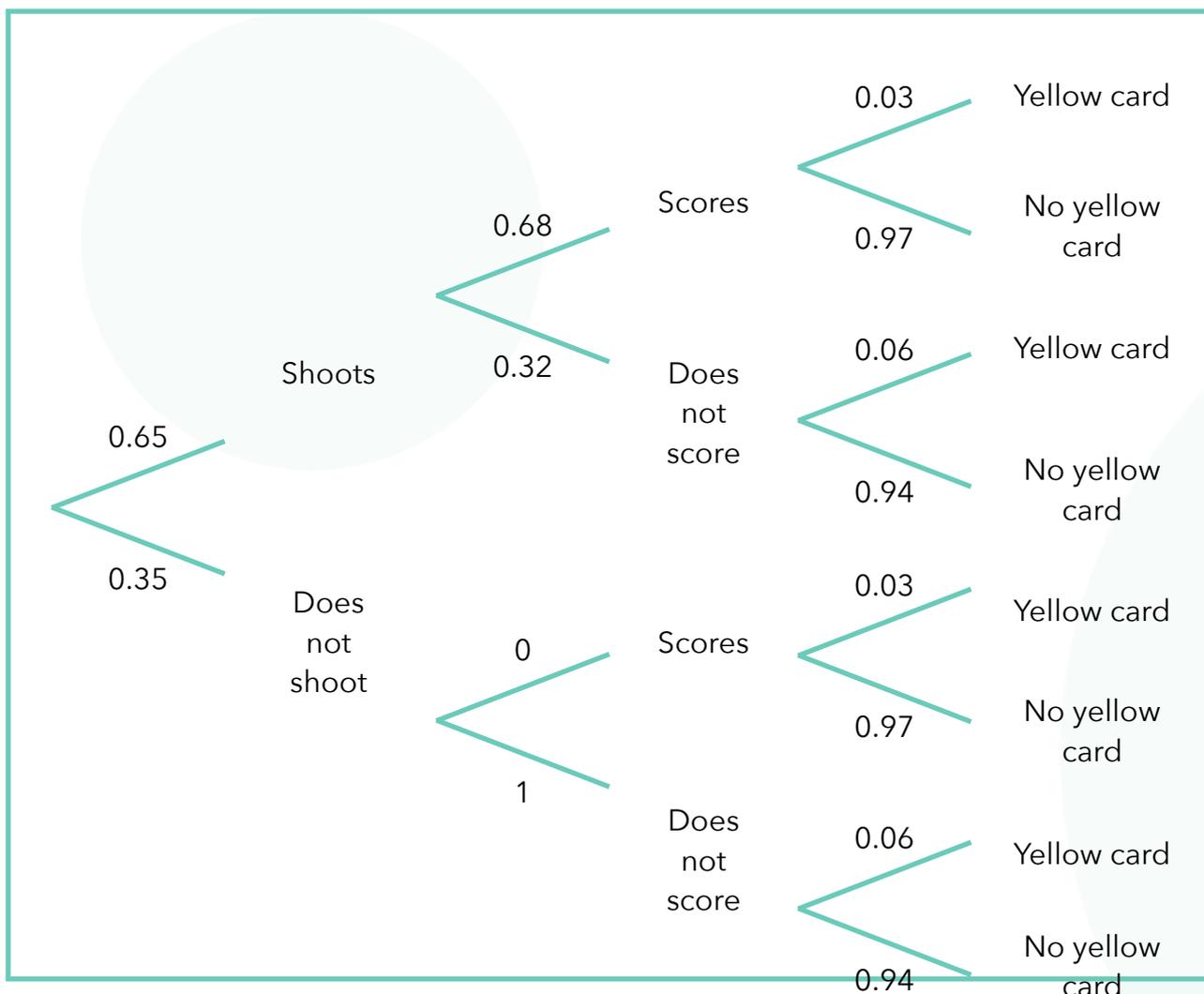
Lange = 6 cards in 36 matches
Weber = 2 cards in 22 matches
(6/36 x 3) x (2/22 x 3) = 0.1364 = 13.64%

10. What is the probability that Lindsey Oakley gets three consecutive yellow cards over her next three games?

((1/15) x (1/15) x (1/15)) = 1/3375 = 0.0296%

11. Create a tree diagram based on the statistics on Declan Fitzroy's player card as well as the following additional information:
    - In any given game the probability that he shoots is 65%.
    - Declan Fitzroy is twice as likely (compared to normal) to get a yellow card in games where he doesn't score.

		0.03	Yellow card
	Scores		
0.68		0.97	No yellow card
Shoots	0.32	0.06	Yellow card
	Does not score		
0.65		0.94	No yellow card
		0.03	Yellow card
0.35	Scores		
Does not shoot	0	0.97	No yellow card
	1	0.06	Yellow card
	Does not score		
		0.94	No yellow card

a. Given that Declan Fitzroy takes a shot, what is the probability that Declan Fitzroy **both** misses and gets a yellow card in a game?

Does not score = 7/22 = 0.32
Gets a yellow card after not scoring = ((1/34) x 2) = 0.06
0.32 x 0.06 = 0.0192 = 1.92%

b. Given that Declan Fitzroy takes at least one shot, what is the probability that Declan Fitzroy **either** scores or gets a yellow card in a game?

Probability that Fitzroy scores and does not get a yellow card
0.68 x 0.97 = 0.6596
Probability that Fitzroy does not score and does get a yellow card
0.32 x 0.06 = 0.0192
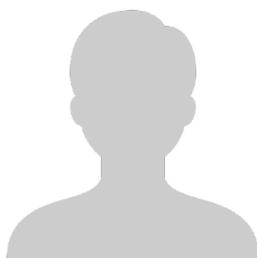
0.6596 + 0.0192 = 0.6788 = 67.88%

Football fact sheet

Forwards:

Eleonora Markov

Matches	4
Shots	3
Goals	1
Assists	5
Yellow cards	0
Red cards	0

Declan Fitzroy

Matches	34
Shots	22
Goals	15
Assists	9
Yellow cards	1
Red cards	0

Peter Castle

Matches	37
Shots	97
Goals	14
Assists	5
Yellow cards	3
Red cards	1

Lindsey Oakley
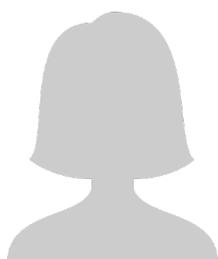
Matches	15
Shots	43
Goals	13
Assists	3
Yellow cards	1
Red cards	0

Football fact sheet

Midfielders:

Wendy Marley
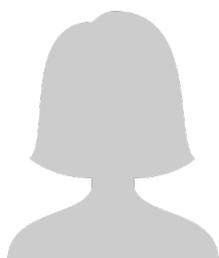
Matches	10
Shots	4
Goals	0
Assists	1
Yellow cards	0
Red cards	0

Amari Okeke
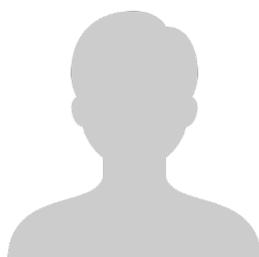
Matches	37
Shots	48
Goals	22
Assists	5
Yellow cards	0
Red cards	0

Benjamin Lange

Matches	36
Shots	31
Goals	18
Assists	12
Yellow cards	6
Red cards	0

Nathalie Strobel
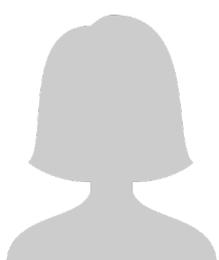
Matches	13
Shots	12
Goals	9
Assists	9
Yellow cards	0
Red cards	0

Young-Ho Yoon

Matches	37
Shots	45
Goals	17
Assists	10
Yellow cards	0
Red cards	0

Lina Weber
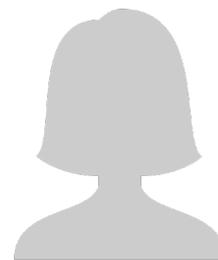
Matches	22
Shots	13
Goals	5
Assists	15
Yellow cards	2
Red cards	0

Football fact sheet

Defenders:

Andrea Jonkheer

Matches	18
Goals	3
Assists	3
Yellow cards	2
Red cards	0

Ferdinand Eaton
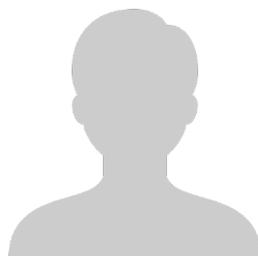
Matches	32
Goals	1
Assists	2
Yellow cards	3
Red cards	0

Emilia Obando
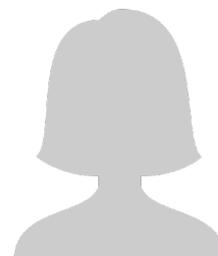
Matches	17
Goals	12
Assists	8
Yellow cards	0
Red cards	0

Eduardo Muñoz

Matches	38
Goals	8
Assists	2
Yellow cards	7
Red cards	0

Anna Slezák
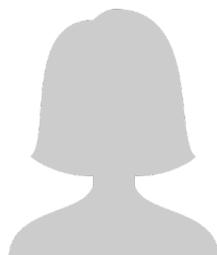
Matches	20
Goals	10
Assists	2
Yellow cards	3
Red cards	0

Will Appleby

Matches	32
Goals	1
Assists	5
Yellow cards	8
Red cards	0