

4. A company is developing a new treatment for gloves worn by gymnasts. The hope is that this treatment will more effectively prevent wear on the gloves than the treatment in use for gloves currently on the market. The company will recruit 50 male gymnasts as volunteers who will wear the gloves as they usually would for six months.

An employee at the company suggests an experimental design whereby the 50 gymnasts would be randomly assigned to two groups of 25. One group would be given gloves with the new treatment and the other would be given gloves with the current treatment. At the end of the study the wear on the gloves with the new treatment would be compared to the wear on the gloves with the current treatment.

- (a) How would you assign the 50 gymnasts to the two groups of 25 for a completely randomized design?

- (b) Why would the groups be assigned randomly rather than, for example, allowing some of the gymnasts to choose which group they would be in?

The company employs a statistician who suggests a different experimental design. Each of the gymnasts will be given a pair of gloves of which one glove has been treated with the new treatment and the other has been treated with the current treatment. For each gymnast it will be randomly decided whether it is the left glove or the right glove that receives the new treatment.

- (c) Explain why this second experimental design is preferable to the first.