CONTEST

A Real Challenger of a Puzzle

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The following 10 data points could have been found in a data collector's log:

5.643517
5.721843
5.718105
5.837939
5.780754
5.851633
5.781989
5.836783
5.783540
1.863323

The challenge is to determine the origins of these data points, explain how the solution is obtained (using the hints), and make a graph to communicate the meaning of the data points.

Hints

1. Order matters.
2. The data have been transformed.
3. The first nine points may differ slightly, depending on the source.
4. The tenth observation is famous (before its transformation).
5. A major hint is hidden in Edward Tufte's 1997 book.
6. This puzzle should have been sent on 1/28/09.
7. The data represent the entire population.

Submissions should be sent electronically to *CHANCE* editor, Mike Larsen, at *mlarsen@bsc.gwu.edu* by January 28, 2010. From among entries that correctly identify the origins of these data points, explain how the solution is obtained (using the hints), and provide a clear graphical interpretation of the data, one winner will be selected to receive a one-year (extension of his or her) subscription to *CHANCE*. As an added incentive, a picture and short biography of the winner will be published in a subsequent issue.

Faculty, students, and recent graduates (since 1/1/2009) from Utah State University and winners of the Goodness of Wit puzzles or graphics contest from any of the three previous issues are not eligible to win this contest.

The optimal strategy may have been to aim for the center of that space, but the post—a clearly defined target—may have been a more efficient proxy. Better players in better scoring positions, however, would do well to ignore my coach's advice.

Limitations and Future Directions

Shooting a soccer ball is a complex process. Due to limitations in the data set, we employed a range of simplifying assumptions. The most fundamental are symmetry and that the only defensive strategy is the goalkeeper reacting to the shot taken. The two are connected. For example, a goalkeeper may deliberately leave one side of the goal more open and be ready to dive in that direction. The optimal shooting strategy in such a situation may be to aim at the less-exposed side of the goal or the keeper. Such gamesmanship is not common in the ordinary run of play—there isn't time for much thought on either side of the ball—but higher-order strategy plays a significant role in dead-ball situations such as penalty kicks. Again, penalty kicks generate a small fraction of goals, but future analysis of shot targeting would do well to isolate them (and perhaps other dead-ball situations).

Beyond goalkeeping strategy, a host of other variables also are relevant to shot targeting. The location and movement of the shooter and ball, including its spin, the positions of other players, and weather and field conditions. Simple geometry and one statistic not commonly reported—the miss-to-save ratio—may go some distance in explaining which players score on a high percentage of shots. Other factors will have to await future examination with richer data.

Further Reading

Buxton, Ted. 2007. *Soccer skills for young players*. Ontario: Firefly Books.

Chiappori, P.A., S. Levitt, and T. Groseclose. 2002. Testing mixed-strategy equilibria when players are heterogeneous: the case of penalty kicks in soccer. *American Economic Review* 92(4):1138.

MLSnet.com. 2008 MLS Standings. *http://web.mlsnet.com/stats/index.jsp?club=mls&year=2008*.