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Homework Assignment 2 - 10 Points
Due at beginning of class, Thursday, 3 February 2011

There are two parts to this homework assignment. Each part counts 5 points. Late homework will receive a grade of zero. Your homework must be typed, not handwritten. Graphs must be prepared with computer software, not hand-drawn.

Part 1:

We have seen in Lab 1 that the relationship between response probability and physical weight is the classic S-shaped psychometric function. But if you measure both hits and false alarms, it is better to compute the detection sensitivity measure, d', using signal detection theory. The relationship between a physical quantity and d' is often a simple, linear, straight line.

Below are five pairs of hits and false alarms based on 100 presentations of two points (target) and 100 presentations of 1 point of stimulation on the skin. Each of the pairs corresponds to the listed separation in mm of the two points. The subject was blindfolded and either one or two points were applied to the surface of the skin in a random order. Each separation was tested in a block of 200 trials (100 with two points and 100 with one point). The subject responded either "one" or "two" to indicate how many points he/she thought had stimulated the skin.

Separation	**2.4**	**6.0**	**9.6**	**14.4**	**18.0**
False Alarms	49	40	34	31	20
Hits	57	54	68	72	80
Sensitivity (d')					

Let's define the two-point threshold as the separation of two points in millimeters that will give a discrimination sensitivity (d') of 1.0. This value corresponds to an ROC curve that has 76% percent of the area under the curve, and can be interpreted as 76% correct performance.

From the hits and false alarms in the table, compute d' for each separation. Make a graph with d' on the ordinate and millimeters of separation on the abscissa. Find the value of separation that gives a d' of 1.0. Hint: use linear regression to find the best relationship between d' and mm. In R you can use the linear model function, lm(): eg, `lm(dp ~ mm).`

Part 2:

Using the data in Figure 3.14 on page 79 of our textbook, which part of the limb is most likely the area of the skin that was measured by the data above? Explain your conclusion.