Re: Correlation Between Mean and Standard Deviation

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- *From*: Paul Rubin <rubin@xxxxxxx>
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Graham Ashe wrote:

> I'm not very familiar with statistical jargon. I just need to interpret the data in a meaningful way (statistics seems to be the only way to actually do this).
>
> Basically, I simply need to know if, in principle, a greater standard deviation (of the mean) in one set of data implies there is a wider range of scores there than another set (with a smaller standard deviation) of the same type of data. Is has to be, doesn't it? Or is too obvious to be worth mentioning?

Not necessarily. Consider two samples. Sample A contains N−2 zeros, one observation with value 1000, and one with value −1000. The mean is zero and the variance is 2*10^6/(N−1). Sample B (same sample size) contains N/2 observations with value 100 and N/2 with value −100. The mean is again zero and the variance this time is 10^4*N/(N−1). As N −> infinity the first variance −> 0 and the second variance −> 10^4, so clearly for decent size N the second sample will have a higher variance (potentially much higher). On the other hand, the first sample has a range (2000) that is 10 times greater than that of the second sample (200).

If, for instance, you have two samples of equal size, both drawn from Gaussian (normal) populations, then you are likely (not guaranteed) to find a larger range in the sample with larger variance. You also have to factor sample size itself into the discussion. Suppose I draw two samples from the same population (lets say it's normal), but sample A is much bigger than sample B. The expected value of both standard deviations is the same (and equals the standard deviation of the population), but the expected range of A is greater than the expected range of B, in essence because the larger sample size gives you more opportunity to get observations from the tails of the distribution.

HTH,
Paul
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