

# How to adapt two tests so they have the same difficulty level?

---

*Source:* <http://sci.tech-archive.net/Archive/sci.stat.edu/2006-12/msg00027.html>

---

- *From:* [c.i.hosea@xxxxxxxxxx](mailto:c.i.hosea@xxxxxxxxxx)
  - *Date:* 5 Dec 2006 10:33:41 -0800
- 

I am a student of linguistics working on my thesis experiment and I have a problem analyzing my data. I hope there's somebody out there who knows more about this subject than I do and can help me with some advice.

I designed an experiment testing around 250 subjects in two listening conditions (X & Y). I used a within-subjects design: so each subject did two listening tests, one in condition X and one in condition Y. The conditions, order of the tests and test versions (A&B) were crossed so there were basically 4 versions, each subject taking one of these versions:

- 1: first test – test version A – condition X  
second test – test version B – condition Y
- 2: first test – test version B – condition Y  
second test – test version A – condition X
- 3: first test – test version A – condition Y  
second test – test version B – condition X
- 4: first test – test version B – condition X  
second test – test version A – condition Y

However, after the tests had been administered I found out that test version A & B are not of the same difficulty which is essential to my analysis since I am concerned with finding out if there's any difference between condition X and condition Y and not between the two tests versions A & B: they are supposed to test exactly the same thing. When I analyze different kinds of groups of subjects, the amount of subjects taking one of the 4 ways of administering the tests is not the same so the difference between test version A & B will interfere with my results.

I have to be able to do calculate the difference between the scores a person had for condition X and Y and use that to conduct further statistical testing.

My question: how can I make test version A & B more similar regarding their level of difficulty after the tests have been administered?

I think I can use z-scores, but I am not sure what implication that has for the rest of my analyses. Can I still calculate the difference

## How to adapt two tests so they have the same difficulty level?

between condition X and Y using  $z$ -scores and use this value as the basis for further analysis?

Are there any other ways of adapting two tests so they will become more similar?

It would be great if you can spare the time to help me out. I know some of the basis of statistics but it would help me if you can explain your answer in layman terms so I can follow it.

Thanks!

–Chrissy