Science

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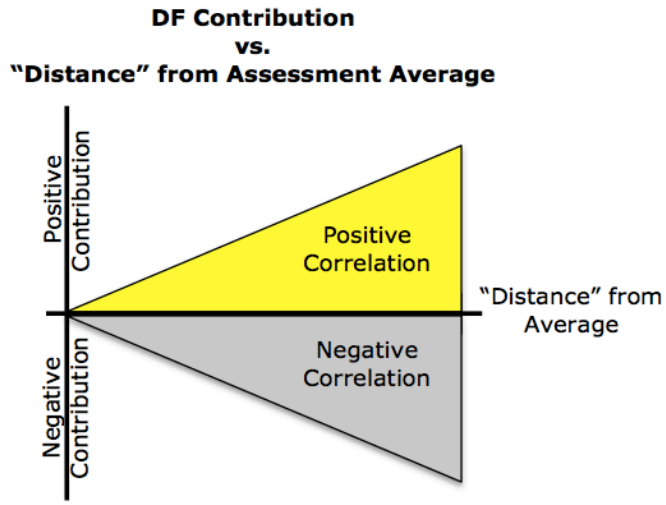
Assessment
Item Analysis
Interpreting the Discrimination Factor

Each student contributes to a question's discrimination factor; however, each student does not contribute equally to the discrimination factor. Students that score near the assessment average contribute less to the DF then students that score near the extremes of the students' performance (highest and lowest marks on the assessment).

First, it must be determined if there is a positive or negative correlation between the student's grade on the assessment and their response to the question. The graphic to the right explains this correlation.

	The student answered the question with a/an	
	Incorrect Answer	Correct Answer
Student's Score on the assessment is ABOVE the ASSESSMENT AVERAGE	Negative Correlation	Positive Correlation
Student's Score on the assessment is BELOW the ASSESSMENT AVERAGE	Positive Correlation	Negative Correlation

The strength of this correlation determines how much each student contributes to the question's DF. The further ("distance from the average") a student's score is from the average the stronger the correlation and in turn the greater the contribution. A simplistic representation of how a student's performance contributes to a question's DF is shown below.



The question's discrimination factor is the sum of each student's contribution. A question's DF is scored between -1 and +1. Questions with a DF above +0.2 are considered acceptable. The question's correlation increases as the DF increases. In other words, students who scored above the assessment average are more likely to answer the question correctly, and students who scored below the assessment average are more likely to answer the question incorrectly. A negative discrimination factor indicates a reverse correlation. Students who scored above the assessment average are more likely to answer the question incorrectly, and student who scored below the assessment average are more likely to answer the question correctly.

Two things to Remember

1. The further a student's score is from the assessment average the greater the question's contribution to the DF.
2. The closer a student's score is to the assessment average the lesser the question's contribution to the DF.

Try this

- Set all student responses to incorrect in the DF Spreadsheet.
  (1 = correct response; 0 = incorrect response)
  Go to http://www.GravityKills.net/DFSpreadsheet.xlxs
- Set one student response to correct.
- Move the one correct response around and see how the DF changes.

P-Value	DF	Explanation
Low	Positive	A small percentage of students answered the question correctly. The larger the question's DF the greater the number of students that scored above and further from the assessment average. **Try this** - Set students A, L, O and P to correct responses; all others are incorrect - Move the 4 responses around to produce a DF between +0.2 and +0.5.
Low	Negative	A small percentage of students answered the question correctly. The larger the question's DF the greater the number of students that scored below and further from the assessment average. **Try this** - Set students K, L, O and Z to correct responses; all others are incorrect - Move the 4 responses around to produce a DF between -0.2 and -0.5.
Any Value	Zero	The sum of all the positive and negative contributions equals zero. **Try this** Scenario #1 - Set students C, H, S and X to correct responses; all others are incorrect. - Add two more correct responses that are equal "distance" from the assessment average. - Continue to add two response at a time until the p-value equals 100% Scenario #2 - Set students H, I and W to correct responses; all others are incorrect. - Add three more correct responses while maintaining a DF equal to zero.
High	Positive	A large percentage of students answered the question correctly. **Try this** - Set all students responses to correct. - Set student S to incorrect. - Add three more incorrect responses to produce a DF between 0 and +0.5.
High	Negative	A large percentage of students answered the question correctly. **Try this** - Set all students responses to correct. - Set student H to incorrect. - Add three more incorrect responses to produce a DF between 0 and -0.5.
You Select	You Select	Select a percentage of students that answered the question correctly. **Try this** - Set the number responses to correct to produce the desired percentage correct. - Move the number of correct response around to produce positive and negative DF. **What p-values and DF's produce revealing questions about student understanding?**

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