

The Good, the Bad, & the Ugly

Interpreting the Results from Your Multiple Choice Test

**The best car on the market today
Is the**

- A. BMW 328i**
- B. Tesla Model 3**
- C. Volvo XC 90**
- D. Ford F150**
- E. Toyota Yaris**

The boiling point of ethanol is

- A. 173.07 degrees C**
- B. 78.37 degrees C**
- C. 100.00 degrees C**
- D. 100.00 degrees F**
- E. not calculable**

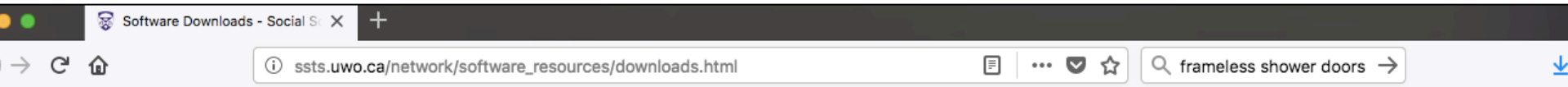
Reliability

- **Is test consistent?**
- **Similar results at different times?**
- **Stairs method of grading...**

Validity

- **Does test measure what it is supposed to measure?**
- **Does test reflect objectives?**
- **Was the test fair?**

ssts.uwo.ca/network/software_resources/downloads.html



Social Science Technology Services



Network

Account Management

Network Connections

Software Resources

List of Software Titles

Adding Programs from the Network

Microsoft Campus Agreement

Pre-installed Software

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Software for Students

Remote Access

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Software Downloads

The Social Science Technology Services (SSTS) provides the software for Scan Exam-II and Marks Management System. We provide an examination scanning service for Faculty of Social Science courses. Other course exams should be taken to the WTS examination services office.

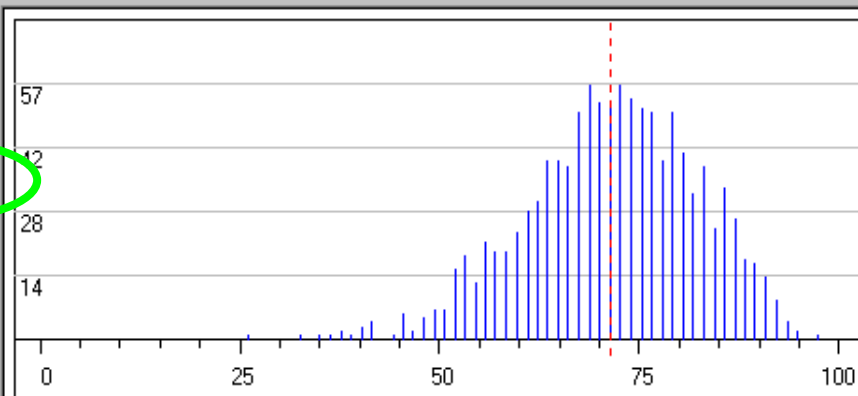
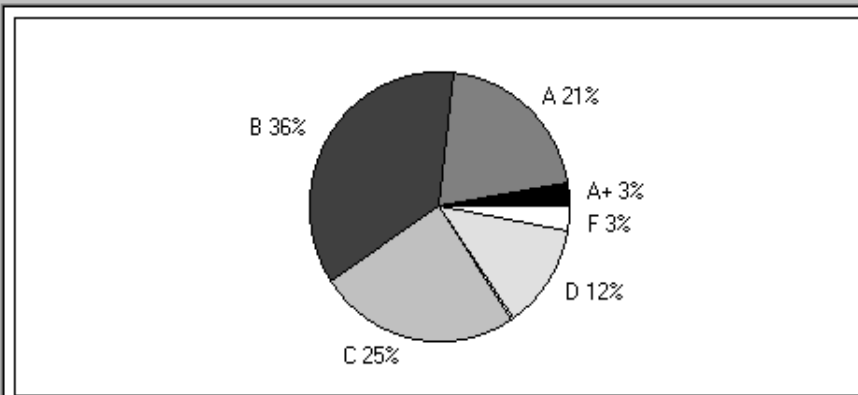
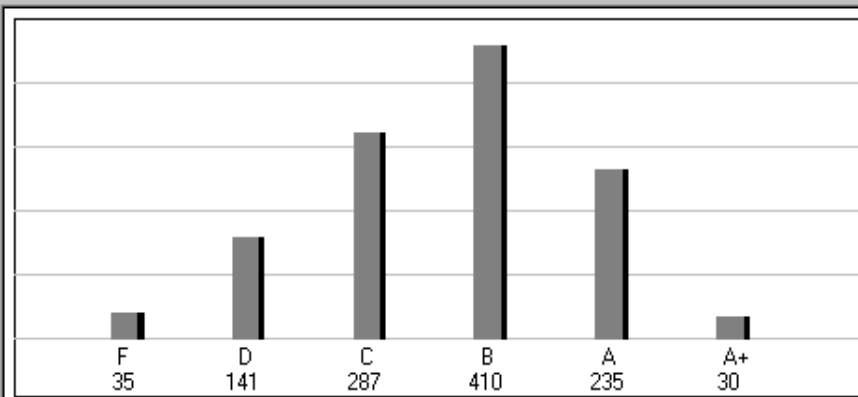
Assistance: Please use the *Usage Notes* and *Frequently Asked Questions* links below. Also note that help for any menu item can be found by pressing the *F1* key while hovering over the menu item. You can print a copy of the course notes previously used in the former introductory course.

▶ Scan Exam-II (SCANEXII)

▶ Marks Management System (MMS)

▶ Other Software

Descriptive Analysis



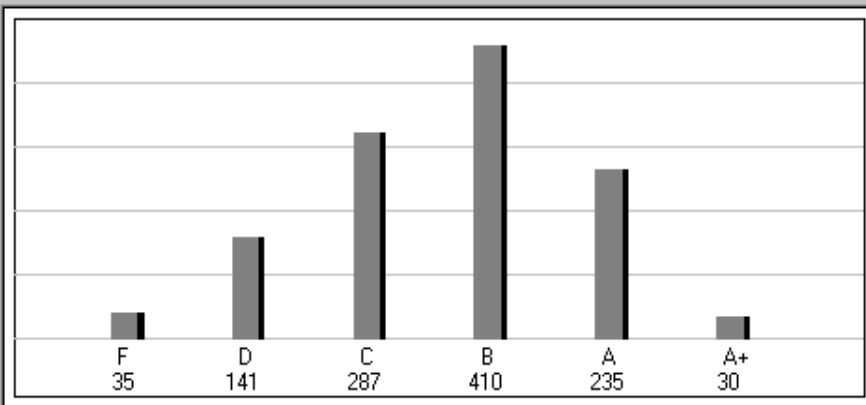
Mean: 71.4
 Standard Deviation: 11.0
 Median: 72.7
 Mode: multi
 Minimum: 26.0
 Maximum: 97.4
 Skew: -0.431
 N of Statistic: 1138
 A+: 30
 A: 235
 B: 410
 C: 287
 D: 141
 F: 35

Student Grade RawScore

000626432	68.8	53.0
001403500	80.5	62.0
001424563	75.3	58.0
001462563	64.9	50.0
001906288	75.3	58.0
001908797	77.9	60.0
002694651	67.5	52.0
002826410	90.9	70.0
003259512	62.3	48.0
005669171	76.6	59.0
150113267	85.7	66.0
250006571	64.9	50.0
250006589	70.1	54.0
250006778	70.1	54.0
250008673	55.8	43.0
250012763	80.5	62.0
250013638	72.7	56.0
250014129	75.3	58.0
250015166	59.7	46.0

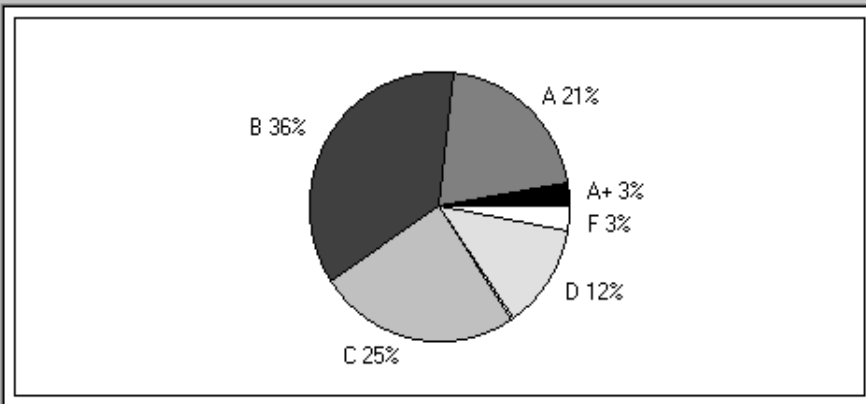
Statistics

- Descriptive
- General Item Analysis
- Distracter Analysis
- Discriminator Analysis
- Inter-Item Correlations

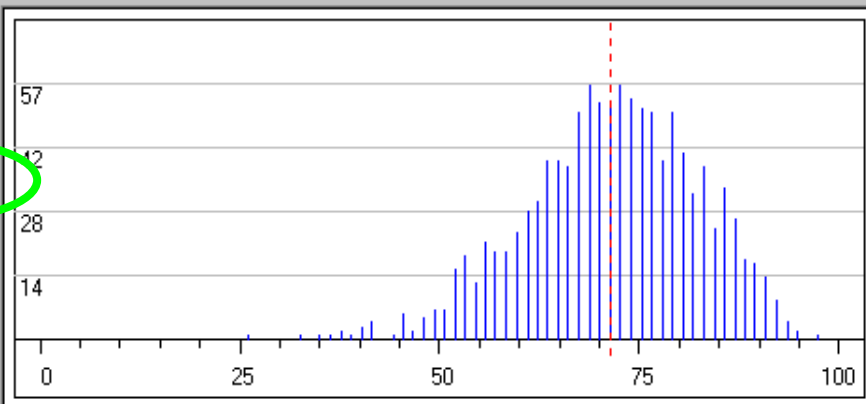


Distribution of Scores

← Frequency chart by letter grade



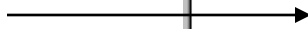
← Pie chart



← Raw frequencies

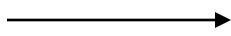
- Statistics
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Summary Statistics
for the exam



Mean: 71.4
Standard Deviation: 11.0
Median: 72.7
Mode: multi
Minimum: 26.0
Maximum: 97.4
Skew: -0.431
N of Statistic: 1138
A+: 30
A: 235
B: 410
C: 287
D: 141
F: 35

Student grades



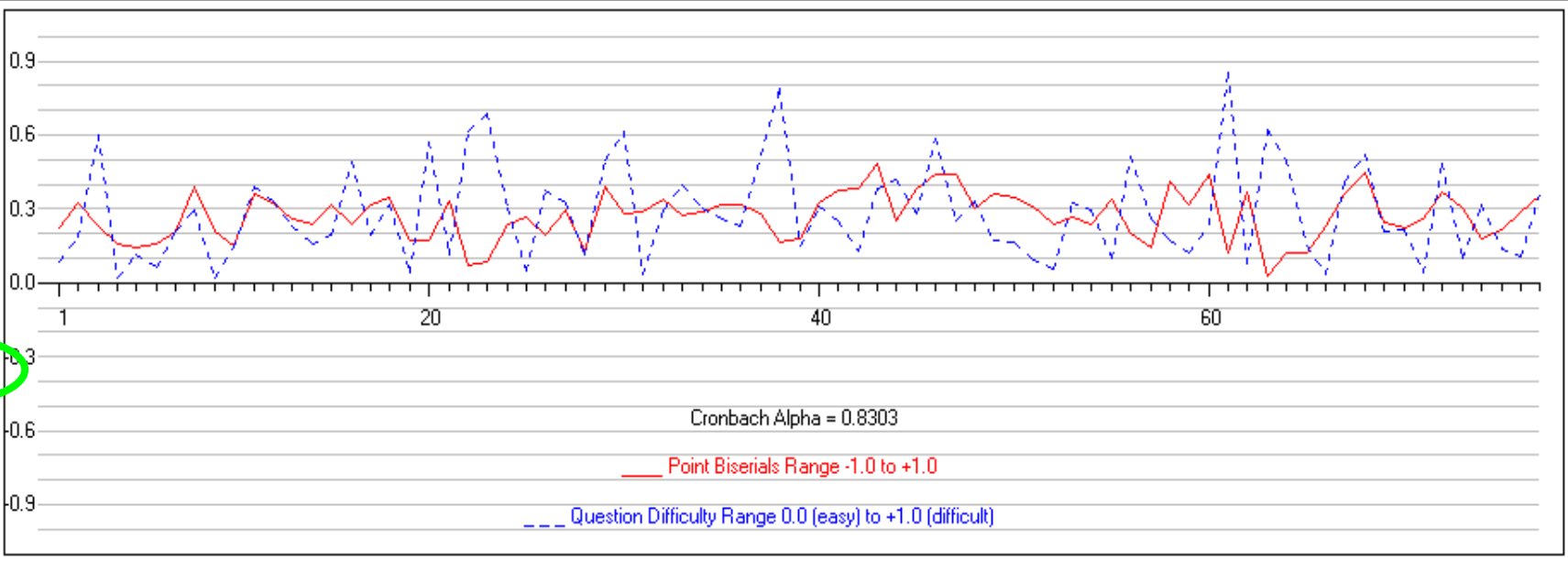
Student Grade RawScore

Student	Grade	RawScore
000626432	68.8	53.0
001403500	80.5	62.0
001424563	75.3	58.0
001462563	64.9	50.0
001906288	75.3	58.0
001908797	77.9	60.0
002694651	67.5	52.0
002826410	90.9	70.0
003259512	62.3	48.0
005669171	76.6	59.0
150113267	85.7	66.0
250006571	64.9	50.0
250006589	70.1	54.0
250006778	70.1	54.0
250008673	55.8	43.0
250012763	80.5	62.0
250013638	72.7	56.0
250014129	75.3	58.0
250015166	59.7	46.0

- Statistics
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General Item Analysis

Ques Num	Diff Rate	Point Biserial	Num Right	Num Wrong	Cor Ans	Distribution of Answers					
						A	B	C	D	E	Blank
001	0.08	0.22	1044	0094	C	0046	0033	1044	0015	0000	0000
002	0.19	0.33	0922	0216	C	0094	0108	0922	0014	0000	0000
003	0.60	0.23	0456	0681	C	0034	0224	0456	0423	0000	0001
004	0.02	0.15	1118	0020	B	0002	1118	0016	0002	0000	0000
005	0.11	0.14	1011	0127	C	0043	0044	1011	0040	0000	0000
006	0.06	0.16	1069	0069	D	0033	0007	0028	1069	0001	0000
007	0.21	0.21	0904	0234	B	0088	0904	0078	0068	0000	0000
008	0.30	0.39	0798	0338	B	0229	0798	0091	0017	0001	0002
009	0.02	0.21	1113	0025	D	0015	0005	0004	1113	0001	0000
010	0.15	0.15	0971	0167	C	0018	0112	0971	0037	0000	0000
011	0.39	0.36	0695	0440	D	0147	0204	0089	0695	0000	0003
012	0.33	0.33	0757	0380	B	0157	0757	0120	0103	0000	0001
013	0.23	0.26	0878	0259	B	0032	0878	0181	0046	0000	0001
014	0.16	0.24	0957	0179	B	0040	0957	0132	0006	0001	0002
015	0.19	0.32	0917	0220	D	0033	0030	0157	0917	0000	0001
016	0.49	0.24	0578	0560	D	0411	0022	0127	0578	0000	0000
017	0.20	0.31	0915	0223	C	0142	0031	0915	0050	0000	0000
018	0.32	0.35	0773	0365	B	0277	0773	0057	0031	0000	0000
019	0.04	0.17	1088	0050	D	0008	0012	0030	1088	0000	0000
020	0.57	0.17	0488	0650	D	0218	0027	0405	0488	0000	0000



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002	0.19	0.33	0922	0216	C	0094	0108	0922	0014	0000	0000
003	0.60	0.23	0456	0681	C	0034	0224	0456	0423	0000	0001
004	0.02	0.15	1118	0020	B	0002	1118	0016	0002	0000	0000
005	0.11	0.14	1011	0127	C	0043	0044	1011	0040	0000	0000
006	0.06	0.16	1069	0069	D	0033	0007	0028	1069	0001	0000
007	0.21	0.21	0904	0234	B	0088	0904	0078	0068	0000	0000
008	0.30	0.39	0798	0338	B	0229	0798	0091	0017	0001	0002
009	0.02	0.21	1113	0025	D	0015	0005	0004	1113	0001	0000
010	0.15	0.15	0971	0167	C	0018	0112	0971	0037	0000	0000
011	0.39	0.36	0695	0440	D	0147	0204	0089	0695	0000	0003
012	0.33	0.33	0757	0380	B	0157	0757	0120	0103	0000	0001
013	0.23	0.26	0878	0259	B	0032	0878	0181	0046	0000	0001
014	0.16	0.24	0957	0179	B	0040	0957	0132	0006	0001	0002
015	0.19	0.32	0917	0220	D	0033	0030	0157	0917	0000	0001
016	0.49	0.24	0578	0560	D	0411	0022	0127	0578	0000	0000
017	0.20	0.31	0915	0223	C	0142	0031	0915	0050	0000	0000
018	0.32	0.35	0773	0365	B	0277	0773	0057	0031	0000	0000
019	0.04	0.17	1088	0050	D	0008	0012	0030	1088	0000	0000
020	0.57	0.17	0488	0650	D	0218	0027	0405	0488	0000	0000

↑
Total number right & wrong

↑
Number of people who choose each alternative

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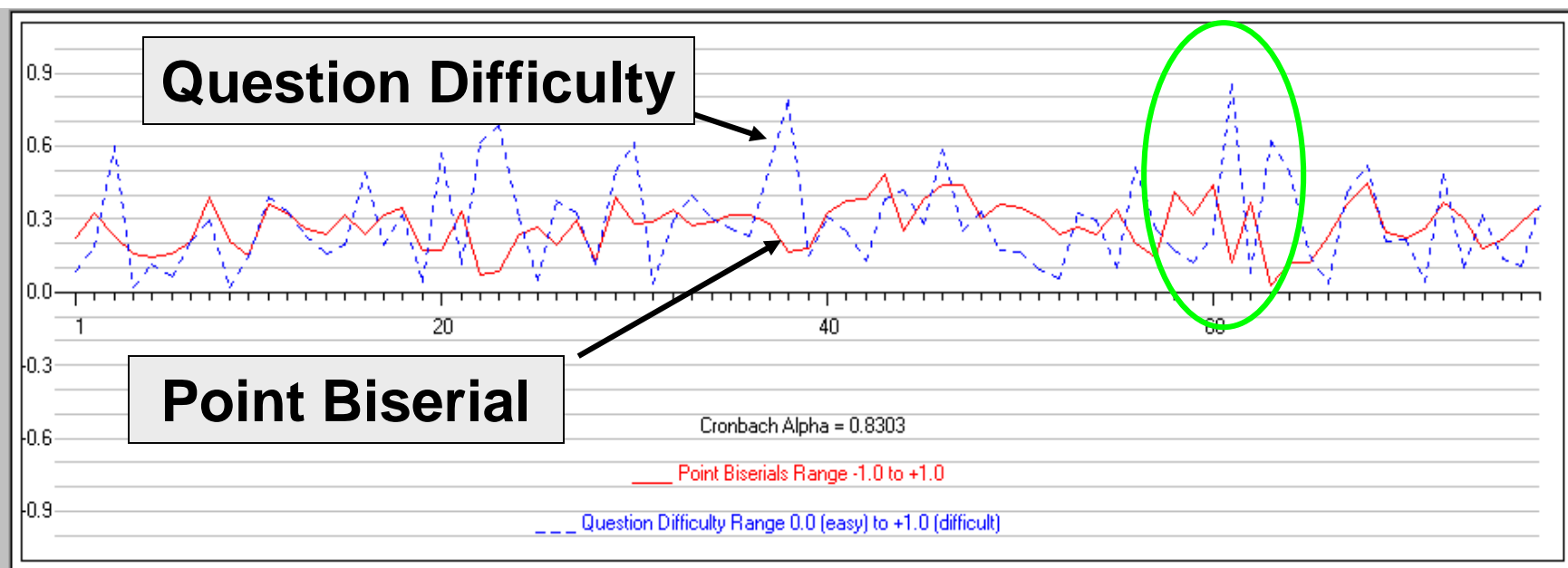
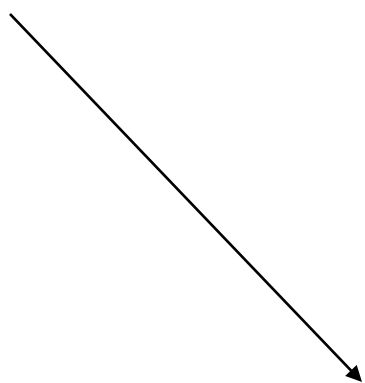
Ques Num	Diff Rate	Point Biserial	Num Right	Num Wrong	Cor Ans	Distribution of Answers					
						A	B	C	D	E	Blank
001	0.08	0.22	1044	0094	C	0046	0033	1044	0015	0000	0000
002	0.19	0.33	0922	0216	C	0094	0108	0922	0014	0000	0000
003	0.60	0.23	0456	0681	C	0034	0224	0456	0423	0000	0001
004	0.02	0.15	1118	0020	B	0002	1118	0016	0002	0000	0000
005	0.11	0.14	1011	0127	C	0043	0044	1011	0040	0000	0000
006	0.06	0.16	1069	0069	D	0033	0007	0028	1069	0001	0000
007	0.21	0.21	0904	0234	B	0088	0904	0078	0068	0000	0000
008	0.30	0.39	0798	0338	B	0229	0798	0091	0017	0001	0002
009	0.02	0.21	1113	0025	D	0015	0005	0004	1113	0001	0000
010	0.15	0.15	0971	0167	C	0018	0112	0971	0037	0000	0000
011	0.39	0.36	0695	0440	D	0147	0204	0089	0695	0000	0003
012	0.33	0.33	0757	0380	B	0157	0757	0120	0103	0000	0001
013	0.23	0.26	0878	0259	B	0032	0878	0181	0046	0000	0001
014	0.16	0.24	0957	0179	B	0040	0957	0132	0006	0001	0002
015	0.19	0.32	0917	0220	D	0033	0030	0157	0917	0000	0001
016	0.49	0.24	0578	0560	D	0411	0022	0127	0578	0000	0000
017	0.20	0.31	0915	0223	C	0142	0031	0915	0050	0000	0000
018	0.32	0.35	0773	0365	B	0277	0773	0057	0031	0000	0000
019	0.04	0.17	1088	0050	D	0008	0012	0030	1088	0000	0000
020	0.57	0.17	0488	0650	D	0218	0027	0405	0488	0000	0000

% wrong answers

Item-total correlation: did the students who did well overall get this item correct? ...as the index approaches +1.0, the best students got it right. As it approaches -1.0, the poorest students got the item correct.

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Plot of question difficulty against the point biserial
→ **look for items with high difficulty and a near-zero or negative point biserial**

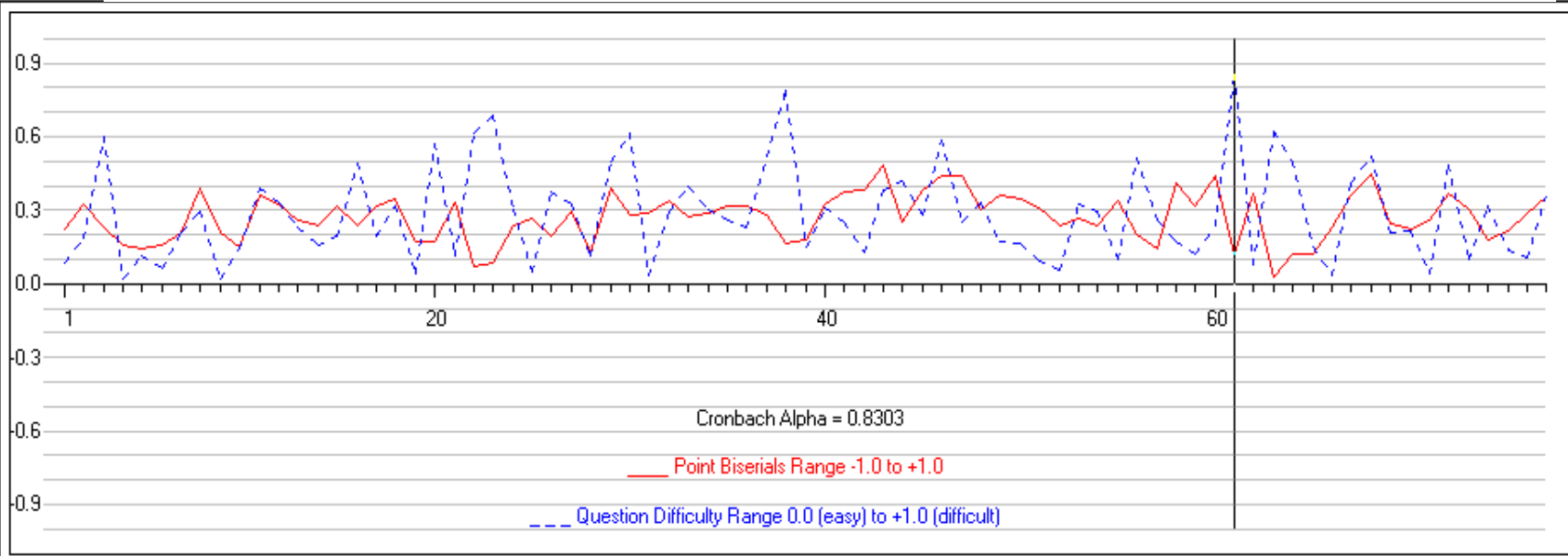


- Statistics
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On one of my exams, item #61 had high difficulty and a low correlation. Here is the distribution for this item.

Ques Num	Diff Rate	Point Biserial	Num Right	Num Wrong	Cor Ans	Distribution of Answers					
						A	B	C	D	E	Blank
047											
048											
049											
050											
051											
052											
053											
054						A	B	C	D		
055											
056	.86	.12	162	976	D	105	17	854	162		
057											
058											
059											
060											
061											
062											
063											
064											
065											
066											


- Descriptive
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The actual item from the exam is shown in the next slide.

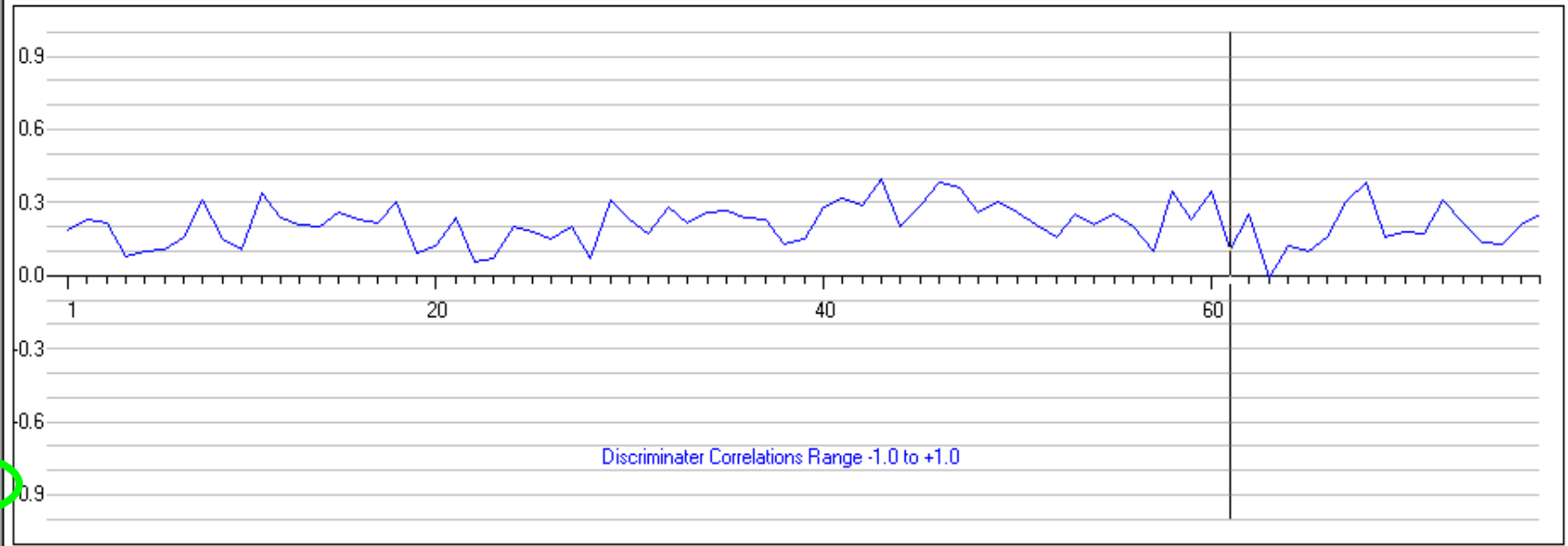
Correct answer is D

The Reverend Rickey finds that when she publishes the annual contributions of church members by name, people give more than they would otherwise. This phenomenon is best thought of as an example of

- A. the low-ball technique**
- B. burnout**
- C. social facilitation**
- D. social loafing** 

We can examine this item further by looking at the **Discriminator Analysis. On the following slide, we compare the performance of the top 50% of the class to the bottom 50% on this item only. We then look at the top 30% and finally at the top 10%**

Ques Num	Diff. Rate	Discriminator Coeff		Cor Ans	Distribution of Answers					
		Upper 50%	Lower 50%		A	B	C	D	E	Blank
055	0.10	.25		D	0127	0345	0044	0051	0000	0002
056	0.51	.20		C	0008	0001	0004	0556	0000	0000
057	0.26	.10		B	0061	0023	0015	0470	0000	0000
058	0.17	.35		D	0035	0047	0332	0155	0000	0000
059	0.12	.23		A	0048	0112	0221	0187	0000	0001
060	0.24	.35		B	0097	0444	0027	0001	0000	0000
061	0.86	.11		D	0083	0396	0073	0016	0000	0001
062	0.08	.25		A	0008	0010	0005	0546	0000	0000
063	0.62	-.01		D	0053	0083	0039	0394	0000	0000
064	0.50	.12		D	0544	0002	0007	0016	0000	0000



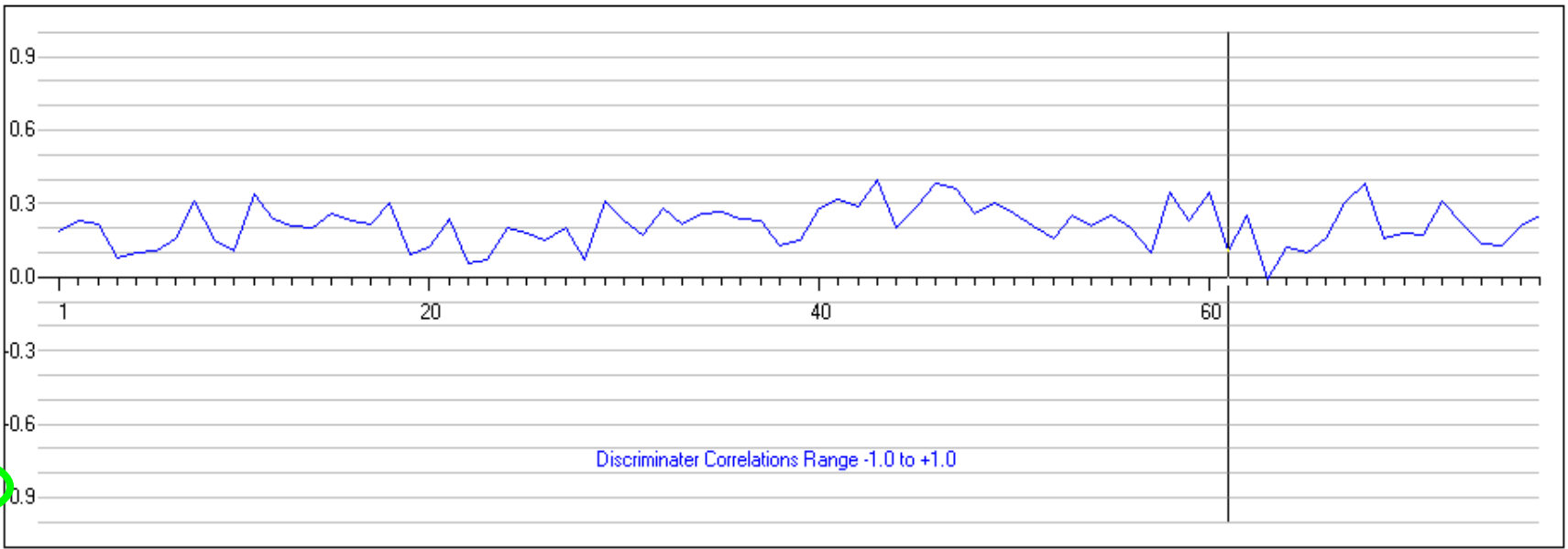
- Descriptive
- General Item Analysis
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Ques Num	Diff Rate	Discriminator Coeff		Cor Ans	Distribution of Answers					
		Upper 50%	Lower 50%		A	B	C	D	E	Blank

055
056
057
058
059
060
061
062
063
064

	A	B	C	D
Top 50%	33	10	424	102
	72	7	430	60

- Descriptive
- General Item Analysis
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- Inter-Item Correlations

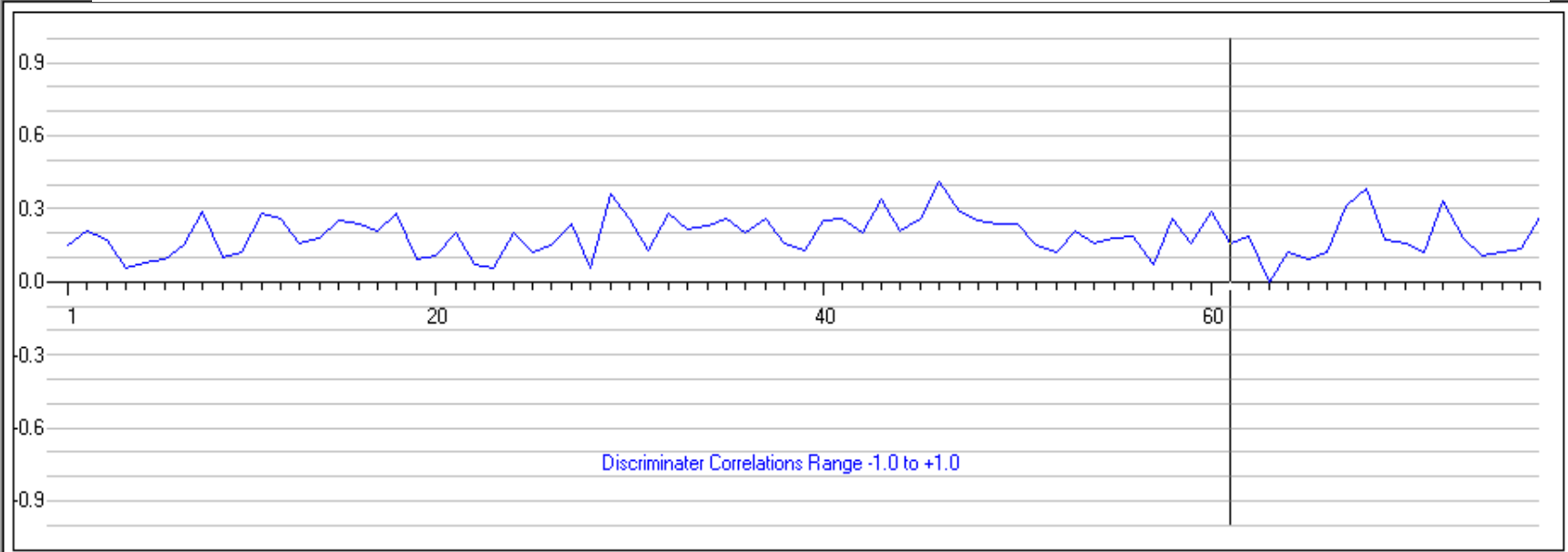


Ques Num	Diff Rate	Discriminator Coeff		Cor Ans	Distribution of Answers					
		Upper 30%	Lower 70%		A	B	C	D	E	Blank

054
055
056
057
058
059
060
061
062
063

	A	B	C	D
Top 30%	14	6	243	78
	91	11	611	84

- Statistics
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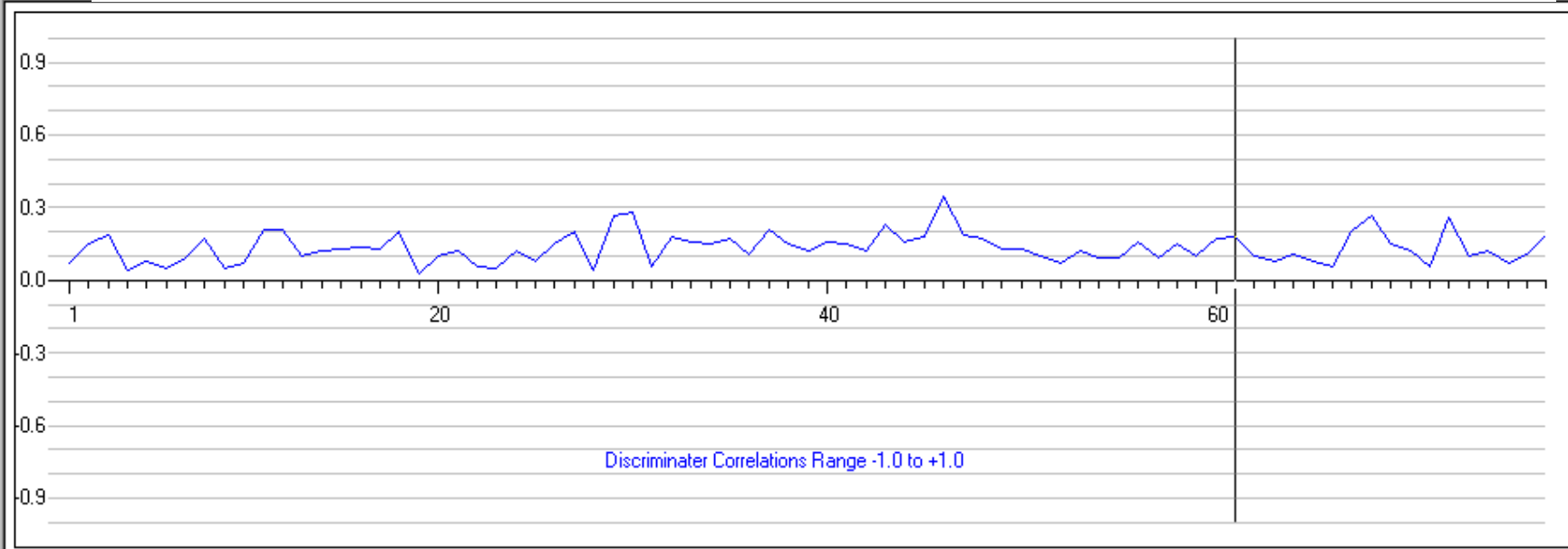


Ques Num	Diff Rate	Discriminator Coeff		Cor Ans	Distribution of Answers					
		Upper 10%	Lower 90%		A	B	C	D	E	Blank

056
057
058
059
060
061
062
063
064
065

Top 10%	A	B	C	D
	4	2	70	38
	101	15	784	124

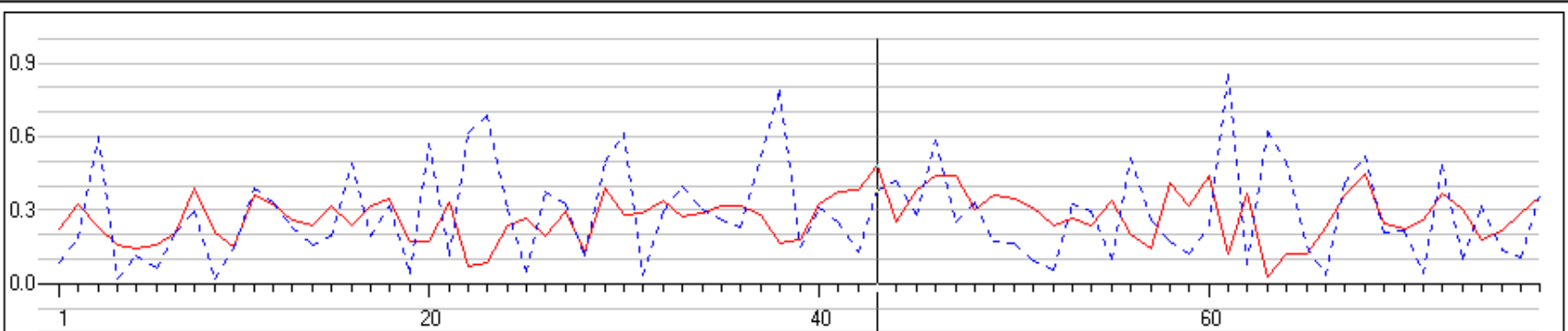
- Statistics**
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In each case, more people choose alternative “C” than the correct answer, “D”. Even for the top 10%, twice as many choose “C”. Most likely, there is a problem with this item. You should delete the item, or re-score.

In this second example, we see that almost everyone in the top 30% of the class gets the item correct. Note that the point-biserial correlation is positive and not near zero.

Ques Num	Diff Rate	Point Biserial	Num Right	Num Wrong	Cor Ans	Distribution of Answers					
						A	B	C	D	E	Blank
029	0.50	0.39	0571	0567	D	0131	0126	0310	0571	0000	0000
030	0.62	0.28	0437	0701	B	0365	0437	0134	0202	0000	0000
031	0.04	0.29	1097	0041	C	0012	0013	1097	0016	0000	0000
032	0.30	0.34	0802	0336	D	0191	0137	0008	0802	0000	0000
033	0.40	0.27	0684	0454	C	0148	0108	0684	0198	0000	0000
034	0.30	0.29	0794	0344	A	0794	0132	0105	0107	0000	0000
035	0.26	0.32	0846	0292	A	0846	0054	0012	0226	0000	0000
036	0.23	0.32	0877	0261	B	0036	0877	0013	0212	0000	0000
037	0.52	0.28	0546	0592	C	0131	0348	0546	0113	0000	0000
038	0.79	0.16	0243	0894	A	0243	0178	0583	0133	0000	0001
039	0.15	0.18	0969	0169	D	0158	0004	0007	0969	0000	0000
040	0.31	0.33	0787	0351	D	0134	0072	0145	0787	0000	0000
041	0.25	0.38	0852	0285	B	0152	0852	0097	0036	0000	0001
042	0.13	0.38	0990	0148	B	0099	0990	0014	0035	0000	0000
043	0.38	0.48	0703	0435	A	0703	0093	0083	0258	0000	0000
044	0.42	0.25	0660	0478	A	0660	0278	0037	0163	0000	0000
045	0.28	0.38	0817	0321	D	0240	0034	0045	0817	0002	0000
046	0.59	0.44	0468	0670	C	0442	0083	0468	0145	0000	0000
047	0.25	0.44	0851	0287	C	0013	0236	0851	0038	0000	0000
048	0.34	0.30	0756	0382	B	0051	0756	0095	0236	0000	0000



Difficulty = .38
 Point Biserial = + .40

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Recent research indicates that cognitive dissonance tends to arise only when the

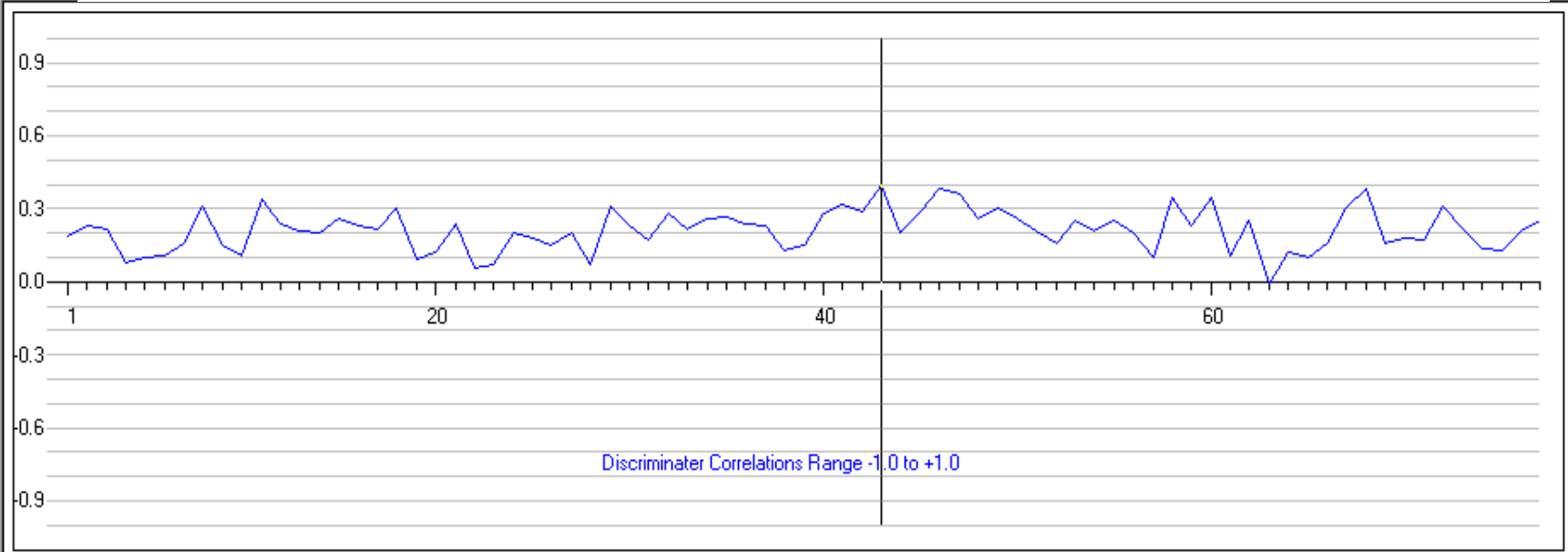
- A. person's behaviour is voluntary ←**
- B. person does not feel responsible for his or her actions**
- C. person does not feel guilty or anxious about his or her actions**
- D. person is coerced into performing some behaviour**

Ques Num	Diff Rate	Discriminator Coeff		Cor Ans	Distribution of Answers					
		Upper 50%	Lower 50%		A	B	C	D	E	Blank

039
040
041
042
043
044
045
046
047
048

Top 50%	A	B	C	D
	462	10	3	94
	241	83	80	164

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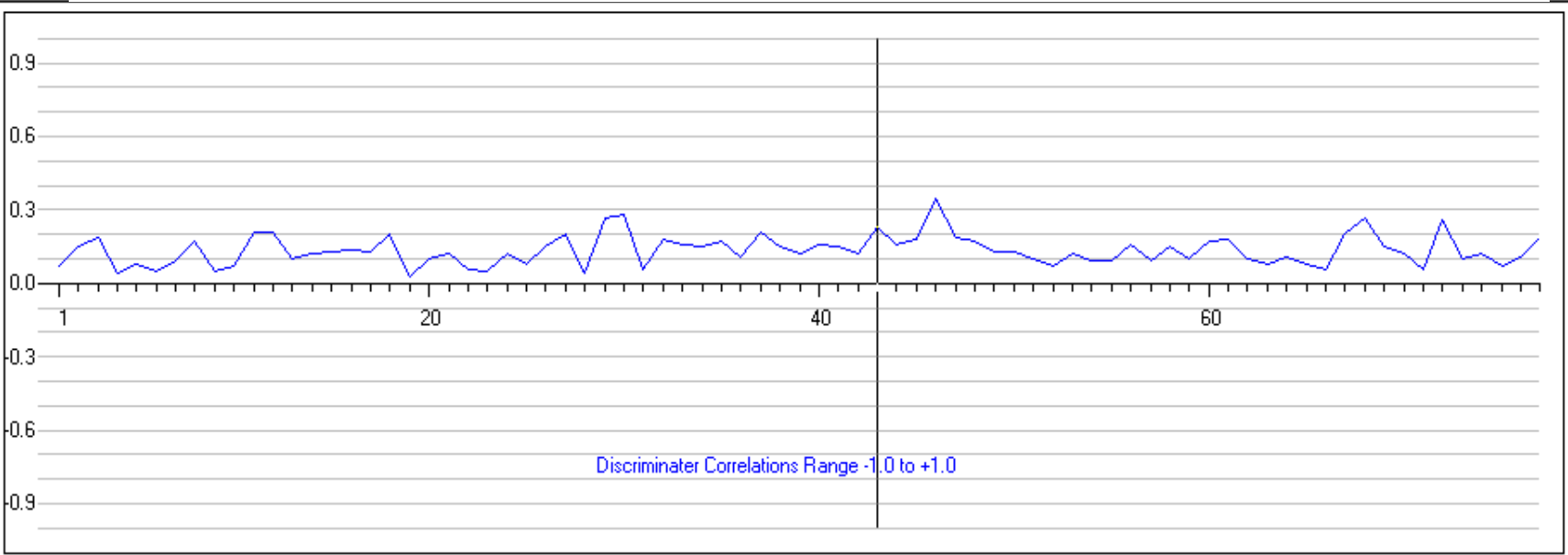


Ques Num	Diff Rate	Discriminator Coeff		Cor Ans	Distribution of Answers					
		Upper 10%	Lower 90%		A	B	C	D	E	Blank

038
039
040
041
042
043
044
045
046
047

Top 10%	A	B	C	D
	108	0	0	6
	595	93	83	252

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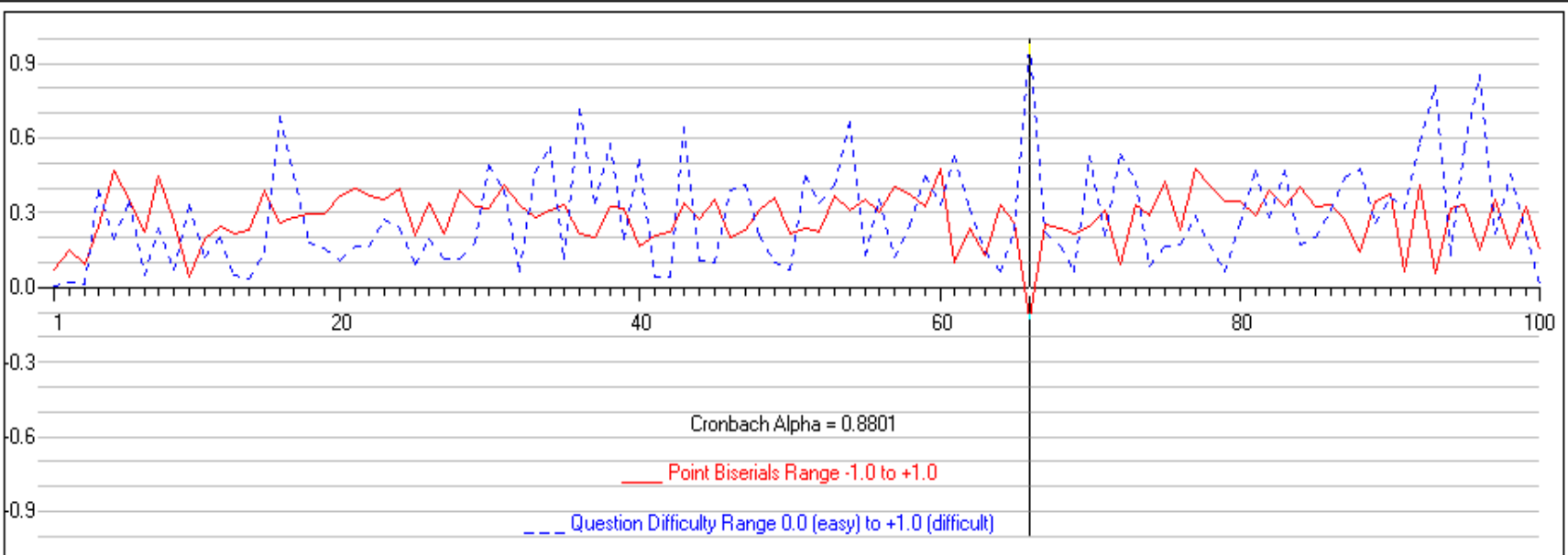


**The worst case would be to
have the correlation go
negative.**

**When this happens, you
almost always should delete
or re-score.**

Ques Num	Diff Rate	Point Biserial	Num Right	Num Wrong	Cor Ans	Distribution of Answers					
						A	B	C	D	E	Blank
066	0.97	-0.13	0030	1148	D	0001	0006	0002	0030	1139	0001
067	0.23	0.25	0912	0267	D	0006	0123	0121	0912	0017	0000
068	0.16	0.24	0984	0194	C	0004	0066	0984	0122	0002	0001
069	0.06	0.21	1103	0076	E	0052	0001	0016	0007	1103	0000
070	0.53	0.25	0557	0622	B	0053	0557	0541	0010	0018	0000
071	0.21	0.31	0929	0250	D	0004	0014	0200	0929	0032	0000
072	0.53	0.09	0551	0627	C	0007	0022	0551	0006	0592	0001
073	0.43	0.33	0677	0502	B	0018	0677	0209	0031	0244	0000
074	0.09	0.29	1076	0103	B	0005	1076	0019	0027	0052	0000
075	0.17	0.42	0981	0198	D	0009	0139	0023	0981	0027	0000
076	0.17	0.23	0974	0204	D	0004	0026	0043	0974	0131	0001
077	0.29	0.48	0838	0340	B	0303	0838	0003	0008	0025	0001
078	0.17	0.41	0978	0201	C	0015	0029	0978	0118	0039	0000
079	0.06	0.34	1107	0072	C	0008	0033	1107	0026	0005	0000
080	0.26	0.34	0874	0305	A	0874	0066	0115	0119	0005	0000
081	0.47	0.29	0629	0550	B	0205	0629	0020	0029	0296	0000
082	0.28	0.39	0848	0331	B	0017	0848	0017	0024	0273	0000
083	0.47	0.32	0622	0557	A	0622	0050	0048	0007	0452	0000
084	0.17	0.40	0979	0200	D	0091	0021	0057	0979	0031	0000
085	0.20	0.32	0936	0241	C	0045	0134	0936	0031	0031	0002

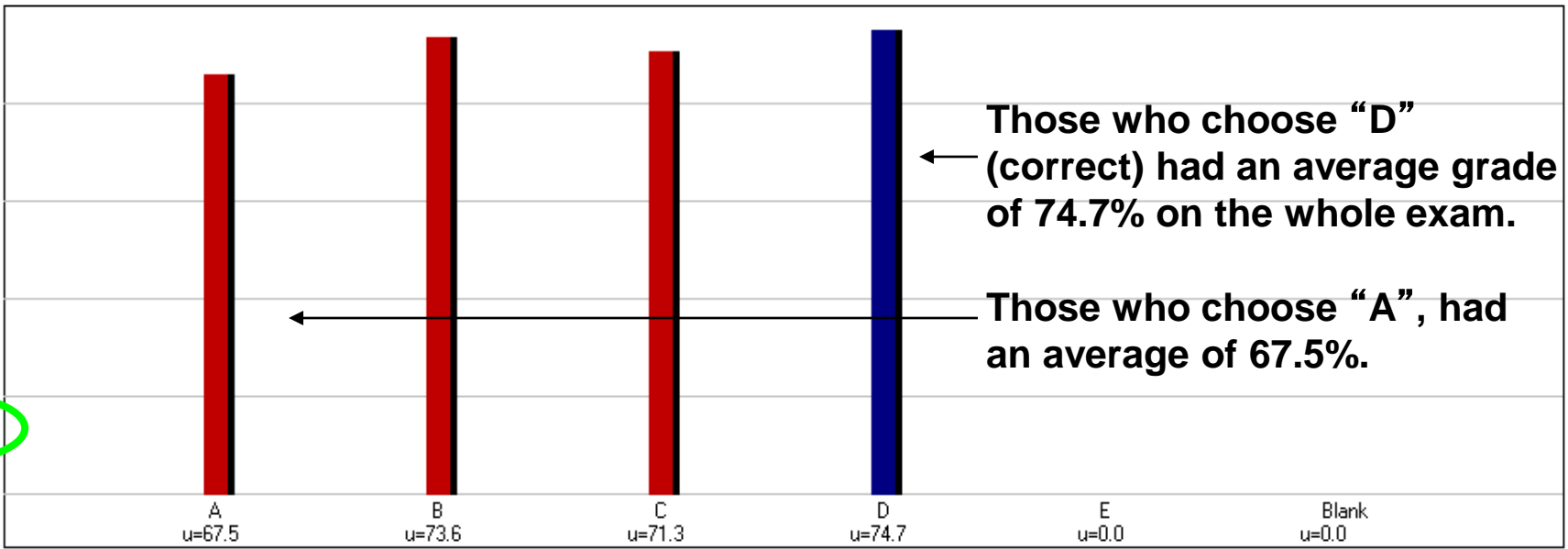
Right = 30
Wrong = 1148
1139 choose E



- Statistics
- Descriptive
- General Item Analysis
- Distracter Analysis
- Discriminator Analysis
- Inter-Item Correlations

Finally, it is useful to look at the Distractor Analysis. For any item, this will show you the average grade on the exam for those students who choose each alternative. This can help you to decide if you should re-score an item.

Ques Num	Diff Rate	Point Biserial	Num Right	Num Wrong	Cor Ans	Mean Grade Distribution					
						A	B	C	D	E	Blank
046	0.59	0.44	0468	0670	C	68.3	65.6	77.3	65.6	00.0	00.0
047	0.25	0.44	0851	0287	C	65.0	63.8	74.2	58.6	00.0	00.0
048	0.34	0.30	0756	0382	B	73.0	73.8	65.6	65.9	00.0	00.0
049	0.17	0.36	0944	0194	C	62.4	60.2	73.2	67.0	00.0	00.0
050	0.16	0.35	0952	0186	D	55.8	64.2	57.6	73.1	00.0	00.0
051	0.09	0.31	1034	0104	A	72.5	61.7	61.2	58.5	00.0	00.0
052	0.06	0.24	1075	0063	C	60.7	61.7	72.1	60.5	00.0	00.0
053	0.32	0.26	0770	0368	A	73.4	66.5	68.9	62.7	77.9	00.0
054	0.30	0.24	0797	0339	B	68.4	73.2	68.1	63.9	00.0	63.6
055	0.10	0.34	1026	0112	D	60.5	58.9	60.8	72.7	00.0	00.0
056	0.51	0.20	0553	0584	C	70.2	66.7	73.7	70.3	00.0	63.6
057	0.26	0.14	0840	0297	B	71.7	72.4	64.7	62.3	00.0	68.8
058	0.17	0.41	0940	0198	D	61.2	62.1	61.2	73.5	00.0	00.0
059	0.12	0.32	1003	0135	A	72.7	61.0	61.5	62.4	00.0	00.0
060	0.24	0.44	0865	0273	B	63.7	74.2	62.3	60.7	00.0	00.0
061	0.86	0.12	0162	0976	D	67.5	73.6	71.3	74.7	00.0	00.0
062	0.08	0.37	1047	0091	A	72.6	58.4	54.7	59.4	00.0	00.0
063	0.62	0.03	0432	0706	D	71.1	68.1	74.2	71.8	00.0	00.0
064	0.50	0.12	0567	0570	D	67.5	67.4	70.9	72.8	00.0	72.7
065	0.15	0.13	0966	0172	B	69.8	72.0	68.7	67.8	00.0	00.0



- Statistics
- Descriptive
- General Item Analysis
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Issues

- 1. Delete or re-score?**
- 2. Tolerance levels**
- 3. Item construction**
- 4. Grade inflation?**

The Good, the Bad, & the Ugly

Interpreting the Results from Your Multiple Choice Test

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