

Norm Referenced Test (NRT)

NRT Test Design

In 2005, the MSA Mathematics tests included the *TerraNova* Mathematics Survey (TN) Form C at Grades 3, 4, 5, 7, and 8 and Form D at Grade 6. The MSA Grade 10 Reading test included the *TerraNova* English Language Arts Survey Form C. CTB's *TerraNova* is an assessment system designed to measure concepts, processes, and skills taught throughout the nation. *TerraNova* Survey consists of SR items only. The number of items and scale score ranges can be found in Table 5. The *TerraNova* English Language Arts Survey for Grade 10 consists of 34 reading items and 26 language items. *TerraNova* Mathematics scale scores based on IRT pattern scoring were reported. Scores on the *TerraNova* English Language Arts Survey were not reported in 2005.¹

Table 5
The Number of Items and Scale Score Range

Content Grade	SR Items	Scale Score Range
MA3	30	385-740
MA4	32	403-770
MA5	32	430-797
MA6	31	477-820
MA7	32	487-850
MA8	31	502-872
RD10	34	Not Reported

MA: Mathematics RD: Reading

Distributions of NRT Scores

NRT summary statistics for raw score (NCS), scale score (SS), national percentile rank (NP), and performance level are presented in Tables 6-9². The NP shows that Maryland students' performance on the NRT was higher (53rd through 61st percentile) than the national average. As can be seen from NCS, SS, and NP in Tables 8 and 9, students' 2005 performance at most grade levels was somewhat higher than in 2004. Note that performance cuts in Table 9 were obtained from the *TerraNova* standard setting, not the Maryland standard setting.

¹ The 2005 Reading assessment included an intact *TerraNova* English Language Arts survey form, and selected *TerraNova* items contributed to the reported CRT Reading scores. However, no separate *TerraNova* scores were reported for Reading examinees in 2005.

² Note that case counts for the NRT are lower than for the CRT because NRT scores were not computed for students who attempted fewer than 5 *TerraNova* items.

Tables 10 and 11 show the scale score statistics (including the mean, standard deviation, minimum and maximum) for ethnicity and gender subgroups on each form. Overall, White students performed better than the other ethnic groups. There was almost one standard deviation (40 points) difference between the scores of white students and African American students in many grades. Note that *TerraNova* scores are vertically scaled so that scale scores across grades can be compared. On average across grades, standard deviations were larger for White and Hispanic students than for African-American students and were larger for males than for females.

Figure 1 shows the 2005 Mathematics mean scale scores by grade level for each ethnic group. The increases in NRT score means from year to year appear to be similar for African-American and Hispanic groups. The year-to-year score increases for African-American and Hispanic students were similar to those for White students overall, but the African-American and Hispanic students showed smaller score increases between Grade 6 and Grade 7 than did White students.

Tables 12 to 18 show the proportion of students answering each NRT item correctly (i.e., item p-values) in 2004 and 2005. Tables 12 to 17 show the performance on the *TerraNova* Mathematics items in Grades 3 through 8; Table 18 shows the performance on *TerraNova* Reading items in Grade 10. For most items in Grades 3 through 6, p-values were higher in 2005 than in 2004, indicating an improvement in student performance. At Grades 7 and above, the 2004 and 2005 the average p-values were approximately the same in 2004 and 2005, with some items showing increases and others showing decreases in p-values between the two years.

Table 6
NRT Summary Statistics based on Number-Correct Scores

Grade	N	Mean	SD	Skewness	Kurtosis	KR20	SEM
3	61366	23.97	4.431	-0.944	0.719	0.817	1.897
4	63183	23.02	5.934	-0.503	-0.489	0.863	2.195
5	64967	24.28	5.768	-0.729	-0.189	0.863	2.134
6	65255	21.34	6.475	-0.487	-0.721	0.875	2.288
7	67261	21.24	7.058	-0.371	-0.886	0.892	2.323
8	67839	20.75	5.937	-0.278	-0.678	0.851	2.291

Table 7
NRT Summary Statistics based on Scale Scores and National Percentile Rank (NP)

Grade	N	Mean	SD	Skewness	Kurtosis	NP
3	61366	619	46.4	0.435	1.461	61
4	63183	636	45.2	0.341	2.756	57
5	64967	662	53.4	0.413	0.882	61
6	65255	673	50.7	-0.097	1.989	58
7	67261	677	53.6	0.312	2.489	53
8	67839	700	51.7	0.316	2.023	58

Table 8
NRT Summary Statistics: 2004 and 2005 State Means

Grade	2004			2005		
	NCS	SS	NP	NCS	SS	NP
3	23.522	615	59	23.966	619	61
4	22.400	632	54	23.017	636	57
5	23.646	657	58	24.281	662	61
6	20.665	668	55	21.340	673	58
7	21.152	676	53	21.239	677	53
8	20.719	700	58	20.745	700	58

NCS = number-correct score (i.e., raw score)

SS = scale score

NP = national percentile rank

Table 9
Percentages of Students in Each NRT Performance Level in 2004 and 2005

Grade	2004 Performance Level					2005 Performance Level				
	1	2	3	4	5	1	2	3	4	5
3	35.4	35.3	20.7	4.2	4.5	31.9	35.3	22.4	4.9	5.5
4	19.4	34.8	29.6	10.4	5.8	16.6	33.6	30.9	11.9	7.0
5	11.2	22.2	28.4	20.7	17.5	9.7	20.3	27.1	22.1	20.9
6	31.9	24.9	26.2	12.2	5.0	28.3	24.2	27.3	14.0	6.1
7	27.5	23.5	26.6	15.7	6.8	27.8	22.7	26.1	16.0	7.4
8	12.8	17.3	28.9	25.1	15.9	13.7	17.2	27.7	24.6	16.7

Table 10
NRT Scale Score Descriptive Statistics by Ethnicity

Grade Content	Test Form	White					African American					Hispanic				
		N	Mean	SD	Min	Max	N	Mean	SD	Min	Max	N	Mean	SD	Min	Max
MA3	A	6239	630.99	46.87	385	740	4699	598.57	40.96	385	740	995	604.58	40.72	385	740
	B	6064	632.49	46.24	385	740	4612	600.96	40.46	385	740	1032	604.27	39.81	385	740
	C	6059	633.23	45.87	385	740	4526	601.81	38.98	385	740	971	605.58	39.50	461	740
	D	5876	632.51	44.57	470	740	4554	602.37	40.53	385	740	956	606.88	38.02	496	740
	E	5936	632.33	46.66	385	740	4499	601.12	40.00	385	740	872	610.40	39.48	385	740
	Total	30174	632.30	46.07	385	740	22890	600.95	40.22	385	740	4826	606.22	39.57	385	740
MA4	A	6412	647.09	44.20	403	770	4855	616.10	40.62	403	770	947	621.22	41.53	403	770
	B	6277	649.64	44.17	403	770	4828	618.20	39.01	403	770	962	624.72	42.06	403	770
	C	6150	649.51	43.22	403	770	4831	619.50	38.71	403	770	913	627.29	40.79	403	770
	D	6125	649.86	43.17	403	770	4770	619.65	38.12	403	770	920	625.45	41.91	403	770
	E	6112	649.16	43.04	403	770	4670	617.88	39.28	403	770	906	627.97	41.87	403	770
	Total	31076	649.04	43.58	403	770	23954	618.26	39.18	403	770	4648	625.29	41.69	403	770
MA5	A	6469	676.74	53.46	430	797	5214	636.51	46.42	430	797	901	650.03	50.90	511	797
	B	6393	677.94	51.68	430	797	5053	640.28	45.52	430	797	967	642.60	50.34	430	797
	C	6338	680.46	50.90	430	797	5055	641.23	45.09	430	797	917	646.78	50.44	430	797
	D	6268	679.16	49.87	430	797	5016	640.55	43.57	430	797	911	649.89	50.20	430	797
	E	6114	680.87	51.82	430	797	4985	640.10	44.64	430	797	893	646.26	48.45	430	797
	Total	31582	679.01	51.59	430	797	25323	639.71	45.10	430	797	4589	647.05	50.14	430	797
MA6	A	6432	687.11	47.99	477	820	5273	649.07	46.55	477	820	897	659.20	47.99	477	820
	B	6301	687.45	48.24	477	820	5231	652.38	46.13	477	820	885	658.87	48.13	477	820
	C	6334	689.14	47.32	477	820	5122	654.05	45.12	477	820	847	662.08	46.48	477	820
	D	6339	688.35	46.26	477	820	5088	651.74	47.22	477	820	865	661.79	49.60	477	820
	E	6347	689.06	47.04	477	820	5062	653.30	47.12	477	820	843	657.27	48.12	477	820
	Total	31753	688.22	47.38	477	820	25776	652.09	46.46	477	820	4337	659.84	48.09	477	820

Table 11
NRT Scale Score Descriptive Statistics by Gender

Grade Content	Test Form	Male					Female				
		N	Mean	SD	MIN	MAX	N	Mean	SD	MIN	MAX
MA3	A	6516	617.99	50.06	385	740	6102	616.48	44.37	385	740
	B	6310	620.14	48.36	385	740	6105	617.35	44.49	385	740
	C	6243	621.75	47.94	385	740	5991	618.08	44.04	385	740
	D	6108	621.66	47.65	385	740	5990	617.58	42.96	385	740
	E	6136	621.37	49.30	385	740	5861	618.18	43.60	385	740
	Total	31313	620.55	48.70	385	740	30049	617.53	43.90	385	740
MA4	A	6794	634.57	47.42	403	770	6137	634.34	44.64	403	770
	B	6559	637.19	47.43	403	770	6210	635.81	43.42	403	770
	C	6424	638.02	46.31	403	770	6185	636.65	43.14	403	770
	D	6377	638.77	46.69	403	770	6114	635.74	41.92	403	770
	E	6221	638.68	46.39	403	770	6156	634.52	43.41	403	770
	Total	32375	637.40	46.88	403	770	30802	635.41	43.32	403	770
MA5	A	6971	660.28	56.48	430	797	6316	660.20	53.07	430	797
	B	6721	662.76	55.12	430	797	6399	660.91	51.76	430	797
	C	6694	664.81	54.23	430	797	6326	662.29	51.50	430	797
	D	6568	664.35	52.96	430	797	6264	661.32	50.47	430	797
	E	6570	664.11	54.48	430	797	6132	662.90	52.46	430	797
	Total	33524	663.23	54.71	430	797	31437	661.52	51.86	430	797
MA6	A	6929	669.88	52.99	477	820	6335	672.20	49.76	477	820
	B	6735	672.38	52.14	477	820	6363	672.03	49.11	477	820
	C	6577	675.06	50.99	477	820	6403	673.44	48.90	477	820
	D	6619	672.83	52.41	477	820	6355	673.06	48.97	477	820
	E	6622	674.16	51.61	477	820	6309	673.20	49.60	477	820
	Total	33482	672.83	52.07	477	820	31765	672.79	49.27	477	820
MA7	A	7159	674.24	55.13	487	850	6455	675.79	52.87	487	850
	B	6976	676.86	55.22	487	850	6500	674.76	51.05	487	850
	C	6850	677.49	55.09	487	850	6626	677.02	53.16	487	850
	D	6813	677.65	54.41	487	850	6559	677.40	52.06	487	850
	E	6816	678.52	55.21	487	850	6502	677.71	51.33	487	850
	Total	34614	676.93	55.03	487	850	32642	676.54	52.11	487	850
MA8	A	5926	697.73	56.44	502	872	5577	696.22	49.61	502	872
	B	5807	701.07	54.82	502	872	5545	697.55	48.27	502	872
	C	5743	703.05	53.60	502	872	5601	697.10	46.37	502	872
	D	5734	702.21	54.36	502	872	5555	698.58	47.74	502	872
	E	5675	702.82	55.42	502	872	5530	698.15	48.04	502	872
	F	5656	703.26	53.68	502	872	5484	697.92	49.01	502	872
	Total	34541	701.66	54.77	502	872	33292	697.58	48.18	502	872
RD10	A	Not Reported									

Figure 1
NRT Mathematics Mean Scale Scores by Grade and Ethnicity

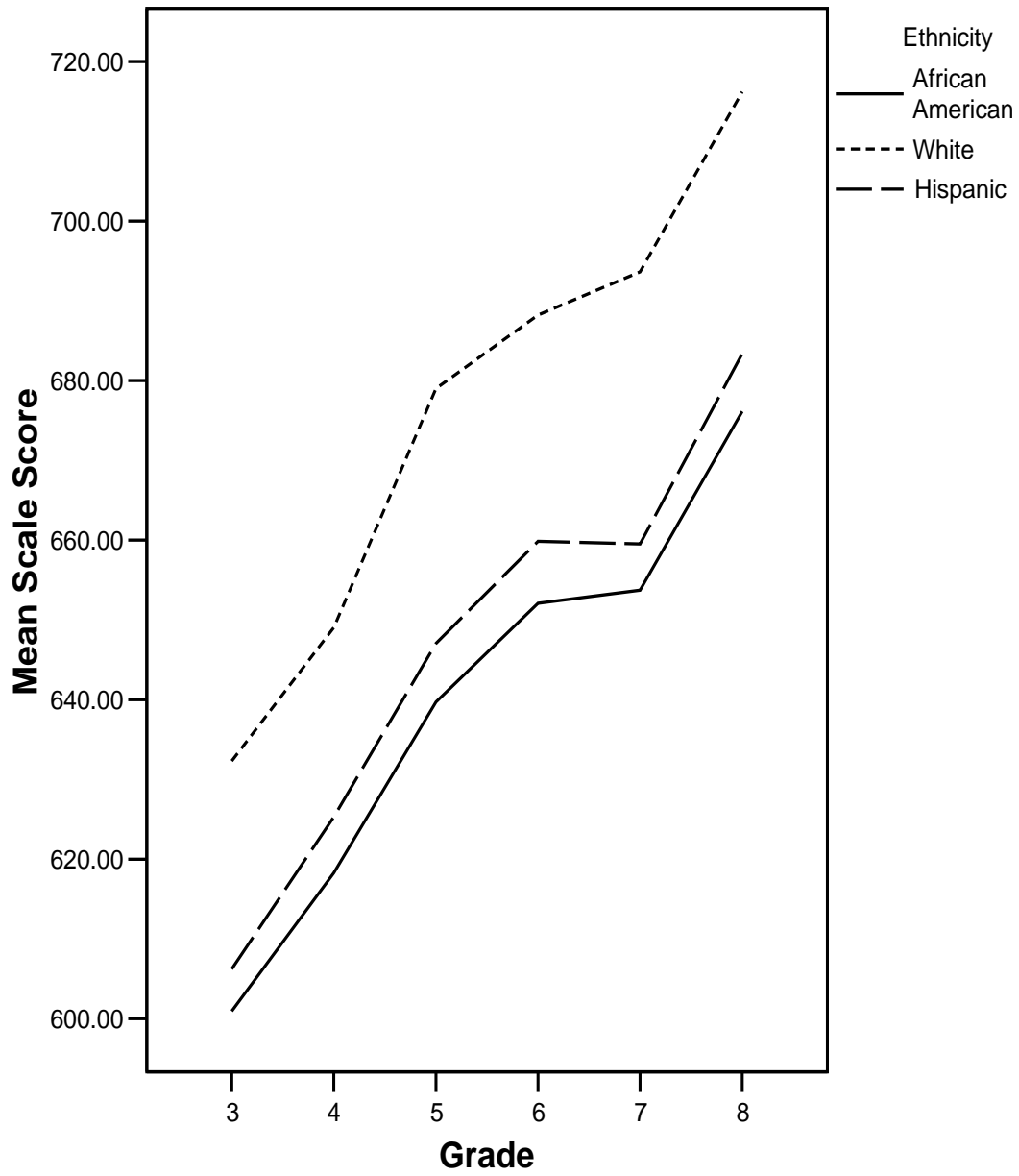


Table 12
Grade 3 Mathematics NRT Item p-values

Item	2004 (N=62961)	2005 (N=61509)	Difference
1	0.85	0.86	0.02
2	0.91	0.92	0.01
3	0.91	0.91	0.01
4	0.88	0.89	0.01
5	0.74	0.76	0.02
6	0.95	0.96	0.00
7	0.67	0.69	0.02
8	0.69	0.72	0.03
9	0.82	0.83	0.01
10	0.88	0.90	0.01
11	0.90	0.91	0.01
12	0.89	0.90	0.01
13	0.86	0.88	0.02
14	0.86	0.88	0.02
15	0.83	0.86	0.03
16	0.95	0.96	0.01
17	0.90	0.91	0.01
18	0.97	0.97	0.00
19	0.64	0.68	0.03
20	0.62	0.63	0.01
21	0.56	0.57	0.01
22	0.74	0.75	0.02
23	0.86	0.88	0.02
24	0.97	0.97	0.01
25	0.90	0.91	0.02
26	0.72	0.73	0.01
27	0.69	0.71	0.02
28	0.50	0.51	0.02
29	0.38	0.41	0.03
30	0.44	0.46	0.02
Average	0.78	0.80	0.01

Table 13
Grade 4 Mathematics NRT Item p-values

Item	2004 (N=65013)	2005 (N=63330)	Difference
1	0.79	0.81	0.02
2	0.63	0.66	0.04
3	0.78	0.83	0.05
4	0.58	0.60	0.02
5	0.55	0.55	0.00
6	0.81	0.82	0.01
7	0.69	0.70	0.02
8	0.51	0.52	0.02
9	0.54	0.56	0.02
10	0.52	0.53	0.01
11	0.97	0.98	0.00
12	0.95	0.95	0.01
13	0.35	0.38	0.03
14	0.72	0.73	0.01
15	0.80	0.82	0.02
16	0.83	0.85	0.02
17	0.89	0.91	0.01
18	0.53	0.56	0.03
19	0.87	0.89	0.02
20	0.74	0.74	0.01
21	0.65	0.66	0.01
22	0.82	0.84	0.02
23	0.64	0.68	0.04
24	0.84	0.86	0.02
25	0.82	0.85	0.03
26	0.68	0.71	0.03
27	0.57	0.61	0.03
28	0.85	0.87	0.01
29	0.62	0.64	0.02
30	0.80	0.82	0.02
31	0.48	0.51	0.03
32	0.50	0.53	0.03
Average	0.70	0.72	0.02

Table 14
Grade 5 Mathematics NRT Item p-values

Item	2004 (N=66176)	2005 (N=65123)	Difference
1	0.84	0.85	0.01
2	0.71	0.74	0.03
3	0.73	0.78	0.06
4	0.65	0.69	0.03
5	0.71	0.73	0.01
6	0.80	0.81	0.02
7	0.74	0.77	0.03
8	0.60	0.63	0.03
9	0.91	0.92	0.01
10	0.91	0.92	0.01
11	0.93	0.94	0.01
12	0.72	0.75	0.03
13	0.80	0.81	0.00
14	0.70	0.71	0.01
15	0.81	0.82	0.01
16	0.90	0.91	0.01
17	0.66	0.67	0.00
18	0.97	0.98	0.00
19	0.60	0.62	0.02
20	0.95	0.95	0.00
21	0.81	0.82	0.01
22	0.73	0.75	0.01
23	0.66	0.68	0.02
24	0.53	0.58	0.05
25	0.54	0.56	0.02
26	0.51	0.55	0.05
27	0.62	0.66	0.04
28	0.64	0.66	0.02
29	0.81	0.81	0.00
30	0.70	0.73	0.03
31	0.59	0.61	0.02
32	0.78	0.84	0.05
Average	0.74	0.76	0.02

Table 15
Grade 6 Mathematics NRT Item p-values

Item	2004 (N=68229)	2005 (N=65846)	Difference
1	0.75	0.74	0.00
2	0.76	0.78	0.03
3	0.70	0.70	0.00
4	0.73	0.75	0.02
5	0.79	0.81	0.01
6	0.69	0.71	0.02
7	0.54	0.56	0.03
8	0.74	0.75	0.01
9	0.92	0.92	0.00
10	0.81	0.83	0.01
11	0.54	0.56	0.02
12	0.61	0.65	0.04
13	0.73	0.79	0.06
14	0.76	0.78	0.01
15	0.73	0.76	0.03
16	0.69	0.71	0.02
17	0.69	0.74	0.05
18	0.74	0.75	0.01
19	0.67	0.69	0.02
20	0.66	0.70	0.03
21	0.50	0.53	0.03
22	0.56	0.58	0.02
23	0.58	0.58	0.01
24	0.67	0.69	0.02
25	0.61	0.63	0.02
26	0.57	0.61	0.03
27	0.62	0.64	0.01
28	0.55	0.56	0.01
29	0.47	0.52	0.05
30	0.52	0.58	0.05
31	0.54	0.56	0.02
Average	0.66	0.68	0.02

Table 16
Grade 7 Mathematics NRT Item p-values

Item	2004 (N=69237)	2005 (N=68130)	Difference
1	0.71	0.73	0.01
2	0.69	0.65	-0.04
3	0.53	0.52	-0.01
4	0.82	0.81	-0.01
5	0.74	0.73	-0.01
6	0.82	0.82	0.00
7	0.54	0.50	-0.04
8	0.63	0.63	0.00
9	0.69	0.69	0.00
10	0.90	0.90	0.00
11	0.68	0.67	-0.01
12	0.73	0.74	0.00
13	0.61	0.62	0.01
14	0.57	0.57	0.00
15	0.88	0.89	0.01
16	0.53	0.57	0.04
17	0.74	0.72	-0.02
18	0.68	0.67	-0.01
19	0.68	0.68	0.00
20	0.66	0.68	0.02
21	0.80	0.81	0.01
22	0.73	0.72	-0.01
23	0.72	0.74	0.02
24	0.59	0.59	0.01
25	0.63	0.63	0.00
26	0.51	0.52	0.02
27	0.65	0.67	0.02
28	0.55	0.54	0.00
29	0.50	0.51	0.01
30	0.35	0.38	0.02
31	0.52	0.55	0.04
32	0.52	0.52	0.00
Average	0.65	0.66	0.00

Table 17
Grade 8 Mathematics NRT Item p-values

Item	2004 (N=68659)	2005 (N=68696)	Difference
1	0.82	0.81	-0.01
2	0.55	0.57	0.02
3	0.34	0.32	-0.02
4	0.86	0.84	-0.03
5	0.77	0.76	-0.02
6	0.60	0.65	0.05
7	0.65	0.64	-0.02
8	0.84	0.83	-0.01
9	0.67	0.66	-0.01
10	0.89	0.89	-0.01
11	0.89	0.90	0.01
12	0.80	0.79	-0.01
13	0.89	0.88	-0.01
14	0.78	0.76	-0.02
15	0.64	0.64	0.00
16	0.87	0.87	0.00
17	0.74	0.75	0.02
18	0.58	0.58	0.00
19	0.66	0.63	-0.03
20	0.38	0.42	0.04
21	0.72	0.74	0.02
22	0.68	0.70	0.02
23	0.75	0.72	-0.03
24	0.52	0.52	0.00
25	0.63	0.63	0.00
26	0.42	0.42	0.00
27	0.53	0.59	0.06
28	0.55	0.53	-0.01
29	0.54	0.55	0.01
30	0.42	0.43	0.00
31	0.47	0.49	0.02
Average	0.66	0.66	0.00

Table 18
Grade 10 Reading NRT Item p-values

Item	2004 (N=62958)	2005 (N=6934)	Difference	Item	2004 (N=62958)	2005 (N=6934)	Difference
1	0.71	0.71	0.00	31	0.71	0.74	0.03
2	0.56	0.57	0.01	32	0.53	0.49	-0.04
3	0.77	0.80	0.03	33	0.53	0.54	0.01
4	0.86	0.87	0.01	34	0.54	0.51	-0.03
5	0.42	0.40	-0.02	35	0.73	0.73	0.01
6	0.75	0.76	0.01	36	0.69	0.68	-0.01
7	0.82	0.82	0.00	37	0.61	0.59	-0.02
8	0.60	0.58	-0.03	38	0.64	0.64	0.00
9	0.39	0.39	0.01	39	0.66	0.66	0.00
10	0.66	0.65	-0.01	40	0.68	0.68	0.00
11	0.64	0.63	-0.01	41	0.54	0.51	-0.02
12	0.84	0.85	0.01	42	0.60	0.59	-0.02
13	0.78	0.78	0.00	43	0.78	0.79	0.01
14	0.66	0.64	-0.02	44	0.74	0.74	-0.01
15	0.52	0.50	-0.01	45	0.79	0.80	0.01
16	0.42	0.44	0.02	46	0.42	0.38	-0.03
17	0.56	0.54	-0.02	47	0.72	0.71	-0.01
18	0.69	0.70	0.02	48	0.61	0.59	-0.02
19	0.67	0.64	-0.02	49	0.57	0.58	0.01
20	0.57	0.57	0.00	50	0.68	0.66	-0.03
21	0.69	0.70	0.02	51	0.70	0.70	0.00
22	0.54	0.55	0.01	52	0.58	0.58	0.00
23	0.71	0.72	0.01	53	0.42	0.40	-0.02
24	0.56	0.57	0.00	54	0.57	0.58	0.01
25	0.54	0.55	0.00	55	0.47	0.46	-0.02
26	0.72	0.73	0.01	56	0.59	0.58	-0.01
27	0.53	0.52	-0.01	57	0.72	0.72	-0.01
28	0.65	0.66	0.01	58	0.45	0.45	0.00
29	0.56	0.57	0.01	59	0.52	0.53	0.01
30	0.46	0.46	0.00	60	0.71	0.72	0.01
Average					0.62	0.62	0.00