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## TEST BIAS

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### ITEM DEVELOPMENT PROCEDURES FOR PLACEMENT TEST

The item development procedures for the Pre-Algebra and Algebra placement test as reported by the test publisher in their technical manual are as follows.

Items submitted by item writers were internally reviewed for fairness, content, accuracy and general quality of composition by ACT staff. This was followed by an external review for soundness and fairness (sensitivity) by ACT commissioned consultants. This involved content review of each item by experts, who were mostly teachers in Mathematics. Thereafter, ACT formed a five-member panel made up of one person each from five ethnic groups and interests, namely, African Americans, Asian Americans, Latino/Latina Americans, Native Americans, and Women. The panel also examined the items for fairness and soundness. After a review of the items by individual panel members, a teleconference was organized by ACT to enable the panelists to discuss their findings. On this basis, some items were chosen for further consideration.

Following this was the formation of five panels (made up of five members each), consisting of the same ethnic groups, to judge the items chosen. Each of the panels reviewed 234 items for the Pre-Algebra test and 235 items for the Algebra test. On the panels' recommendations, some items were edited, while the ones found extremely unsound and /or biased were dropped. The resulting changes left users with the revised item pool.

Differential Item Functioning (DIF) analyses were also performed for each of the items. These were to compare the performance of a focal (minority) group against a matched base or referent (majority) group. Here, ACT used the Mantel-Haenzel Common-Odds ratio (MH or MH index) as the statistical index for performing the DIF analyses.

The results of the DIF for Pre-Algebra are summarized in the table below.

Comparison Group		Items Reviewed	Mantel-Haenzel Values*			Focal Group Sample Size		
Focal Group	Referent Group		A	B	C	Min.	Max.	Med.
Female	Male	122	1	120	1	424	56,552	14,866
African Americans/Black	Caucasian	117	1	114	2	150	17,335	2,835
Mexican American/Chicano American/Latino/Puerto-Rican/Cuban, Other Hispanics	Caucasian	107	0	106	1	150	5,563	1,518
Asian Americans/pacific Islanders/Filipinos	Caucasian	105	2	99	4	218	2,349	881

**\* Legend:**

A = Items with Mantel-Haenzel values of less than .5, therefore favoring the focal group.

B = Items with Mantel-Haenzel values between .5 and 2.0, therefore judged to favor no group.

C = Items with Mantel-Haenzel values exceeding 2.0, therefore judged as favoring the referent group

A total of 451 comparisons were made, of which 12 (3%) were flagged with MH values that exceeded the criteria. Eight of the flagged comparisons favored the base group and the other 4 favored the focal group. Although a precise confidence level for the Mantel-Haenszel statistic is not known, experience led them to expect that chance alone will dictate that roughly 5% of all items will fall into the A and C categories even when no DIF is present.

The 12 flagged comparisons (involving 12 items) were reviewed. Three items received at least one comment and were submitted to additional examination and discussion. For 1 of the 3 items, the possibility of bias was deemed sufficient for one or more groups, and the determination was made to delete this item (and any related stimulus materials as appropriate) from the pool.

The results of the DIF for Algebra are summarized in the table below.

Comparison Group		Items Reviewed	Mantel-Haenzel Values*			Focal Group Sample Size		
Focal Group	Referent Group		A	B	C	Min.	Max.	Med.
Female	Male	98	0	98	0	227	55,251	10,335
African Americans/Black	Caucasian	84	0	84	0	185	18,520	1,683
Mexican American/Chicano American/Latino/Puerto-Rican/Cuban, Other Hispanics	Caucasian	74	0	74	0	167	5,652	1,288
Asian Americans/pacific Islanders/Filipinos	Caucasian	77	1	75	1	162	3,616	1,161

A total of 333 comparisons were made, of which 2 (1%) were flagged with MH values that exceeded the criteria. One of the flagged items favored the focal group, and the other item favored the base group. These results are consistent with chance. The 2 flagged items were reviewed and no plausible rationale was found for the pattern of results obtained and the items were allowed to remain in the Algebra item pool.

In view of the foregoing, we are not in doubt that ACT followed acceptable procedures to ensure that the items in the placement test pool are sound and free of cultural bias.