On Your Mark, Get Set . . .

Tuesday, June 24, 2008 2:50 PM
By Sharon Begley

In Olympic track events, the difference between winning a medal and going home empty-handed is measured in hundredths of a second, so no edge is too small to dismiss—even the advantage you get from proximity to the starter's pistol. Which, it turns out, is greater than anyone realized.

A few years ago Olympics officials tried to equalize things by delivering the sound of the pistol—which is fired on the infield, nearest to lane 1—to speakers positioned behind each runner. That way, the millisecond difference in the time it takes sound to travel to the different lanes would not give the inside lanes an edge. But according to new research, runners in the inside lanes still have an advantage: because they are closest to the gun they hear the sound more loudly than do runners in outside lanes, and louder sounds make runners react more quickly, leaving the starting blocks sooner than if they heard a quieter sound.

The rules say that the runner who posts the fastest time in preliminary heats gets lane 4 for the finals, with the second-faster prelim time earning lane 5 (followed by 3, 6, 2, 7, 1 and 8, the idea being that there is an advantage to being in the middle where you can more easily see the other runners in your peripheral vision). But when scientists led by Dave Collins of the University of Alberta in Edmonton analyzed reaction times for the 100 meter sprints and the 110 meter hurdles at the 2004 Olympics, they found that runners closest to the starter reacted significantly faster than those further away, they report in the June issue of *Medicine & Science in Sports & Exercise*.

For the Athens games the reaction times (in milliseconds) were:

lane 1: 160 ms
lane 2: 171 ms
lane 3: 172
lane 4: 173
lane 5: 177
lane 6: 175
lane 7: 185
lane 8: 175

Some of the reaction times reflect individual variation: the runner in lane 7 was notably slow to react, while lane 8 was notably quick. To control for that, the scientists had four trained sprinters and 12 untrained volunteers run sprints from starting blocks that had been engineered to measure how hard the runners were pushing off. The scientists also fired a (simulated) starter's gun at various volumes, from 80 to 120 decibels. The louder the gunshot, the faster the runners, both trained and novice, reacted, replicating the actual results in Athens: at 80 decibels, the average reaction time was 138 milliseconds, while at 120 it was 120. How strongly the runners pushed out of the starting blocks did not vary with the loudness of the gunshot, however, though how long it took the runners to reach their peak push-off force was significantly lower at a loud 120 dB than at a quieter 80 dB.

Bottom line: the starting procedures at the Olympic sprint events "afford runners closer to the starter the advantage of hearing the 'go' signal louder; consequently, they react sooner," write the scientists.

Collins told me that a fairer way to start a race is the way the world championships do it: "Use the speakers [behind each runner] and a *silent* gun." That way, each runner hears the starter's gun not only at the same time, but at the same volume.