Race Tactic Differences Between Elite East African and Caucasian Male 800m Runners

by Zsolt Gyimes

ABSTRACT

Previous studies have shown genetic, cultural, and dietetic differences between athletes from East Africa and Caucasian athletes from Europe and North America that effect performance in endurance races. To date, no study has made a comparative analysis of race tactics in elite competition between the two groups. In contrast to the longer distance races where male East African athletes have clearly dominated international-level competitions in recent decades, there has been a relatively high number of successful Caucasian 800m runners, providing enough data to draw valid conclusions. The author studied major event finals and other international 800m races to try to identify statistically verifiable ethno-typical differences in tactics. He found that on average East African runners are keener to make fast starts and get closer to the lead in both championship and record-attempt situations while Caucasian athletes are more aggressive in the 400 to 600m segment of the race. Among the athletes studied, the mean average velocity in the final 200m of the race in both championship and record-attempt situations is approximately the same for both groups or slightly better for the Caucasian athletes.

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Introduction

Since the publication nearly twenty years ago of the famous study by SALTIN et al, (1995)[1] revealing some causal factors of Kenya's success in athletics' endurance events, further research has helped to increased our understanding of this subject[2,3,4,5]. However, although analyses have been made of genetic, cultural, and dietetic differences between athletes from East Africa and Caucasian athletes from Europe and North America[6,7,8,9], to our knowledge no study has focused on race tactic differences between these two groups. With the present examination, we seek to fill this gap, believing firmly that the numerous anatomical, physiological, muscle-structural differences identified by others can manifest themselves in how the athletes choose to run their races.

We decided to study the 800m because, in contrast to the longer distance races where East African athletes clearly dominate international-level competitions, there is a relatively high number of successful Caucasian 800m (and 1500m) runners, providing enough data to draw valid conclusions. Additionally, success in this event is notably determined by tactical skill, as the pace, especially in men's races, is normally much too fast to allow for correction of mistakes committed at an early or middle stage of the race.

Men's 800m finals from the Olympic Games and IAAF World Championships in Athletics, plus other international 800m races that included top-level performances, were studied to see if there were any variances in tactical behaviour between the East African (mostly Kenyan) and Caucasian (mostly European and North-American) runners participating. In other words, we were looking for any statistically verifiable ethno-typical differences in race tactics. Both winning and record-setting tactics were included in the study. Since tactical behaviour is best described by pace and positioning during the race, these two variables were scanned. Importantly, both these parameters can easy be transposed into numeric form, thereby allowing for objective statistical analysis.

Methods

The examination covered the period between the 1968 and the 2012 Olympic Games and included all the IAAF World Championships in Athletics finals plus races producing all-time best performances that took place during this space of time.

To study the tactics employed to win important races, we analysed the men's 800m finals at the 12 Olympic Games and 13 IAAF World Championships in Athletics during the period, classifying the East African (EA) and Caucasian (C) athletes. Only the medallists in each race (n=57: EA 33; C 24) were scanned. Two cases were found where no EA athletes (Moscow, 1980, and Montreal, 1976) and one case where

no C athletes (Beijing, 2008) participated in the final at the Olympic Games. In all the other cases studied, both EA and C athletes participated. To study record-attempt tactics, the all-time best 15 performances, most of which took place in Grand Prix/Golden League/Diamond League races, where there are often financial inducements and ideal conditions for fast times, were analysed (n=30: EA 15; C 15).

Instantaneous positions at 200, 400, 500, 600, and 700m and time splits at 200, 400, and 600m of the subjects (n=83: EA 46; C 37) were monitored with a simple video analysis method. The time splits were detected with the help of the official electric timing, running on the screen, or from published data, and/or with a hand stopwatch.

In some cases, where the positions or split time were not available or determinable, due to unsatisfactory video of the races, the data were not considered. Runners from other parts of the world, like Asians South Americans or North Africans were not included in the study because of their insignificant presence in the top three positions of the major championships or on the all-time lists.

Basic statistical analysis (mean, standard deviation-SD) and Student t-tests for independent samples in parametric and Wilcoxon-test in non-parametric data were used to compare the mean values of the time split and position data between the two groups.

Results

Winning tactics

The proportion of subjects (n=57: EA 33; C 24) revealed that EA runners were superior in numbers in the top three places at the major international event finals compared to C athletes (60 / 40%). The mean of winning performances included in the study is 1:44.43 ± 1.2 sec, indicating that the major event 800m finals of the last decades have not been characterised by slow tactical races. The mean velocity curves in the finals for the two groups of studied runners are plotted in Figure 1. Mean velocity, hence the mean final performance, was found

Mean speed curve during the finals in groups
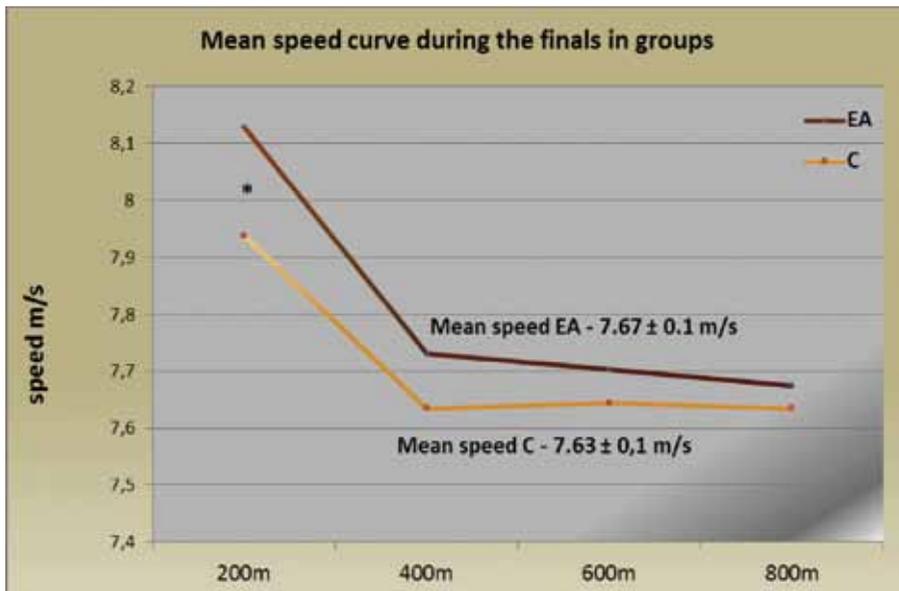
= significant difference between groups (p<0.05)

Figure 1: Mean velocity (speed) curves for elite male East African (EA) and Caucasian (C) runners (n=57) in major event 800m finals

to be slightly, but not significantly better in the EA group (EA 7.67 ± 0.09 m/s; 1:44.21 ± 1.2 sec vs. C 7.63 ± 0.07 m/s; 1:44.75 ± 1.0 sec). A significantly (p<0.005) faster mean split time at 200m was detected in the EA runners compared to the C athletes (EA 24.60 ± 0.6 sec vs. C 25.18 ± 0.6 sec). The fastest first 200m in all subjects was performed by Wilson Kipketer (EA but representing Denmark) with a 23.47 sec time in the 1997 IAAF World Championships in Athletics.

After a fast 200m, a steep drop in velocity until the 400m point can be observed in both groups. This is followed by a meagre increase in pace until 800m in the C group and a slight decrease to the finish in the EA group. As a consequence, after the initial pace gap between the groups, a slight convergence in mean velocity was found for the second lap (Figure 1.).

Mean 400m split times in the two groups are illustrated in Figure 2. The mean 400m split time was found to be slightly but not significantly faster in the EA group (EA 51.75 ± 1.6 sec vs. C 52.38 ± 1.4 sec), but the mean times of the second 400m were found to be nearly equal (EA 52.46 ± 0.8 sec vs. C 52.37 ± 0.6 sec). The average difference between the two 400m segments of the race was found to be non-significantly greater in EA runners than C athletes, and nearly no difference in the time gap between the two 400m was found (EA 0.72 ± 2.2 sec vs. C -0.01 ± 2.0 sec). However, a high standard deviation in both groups reveals that faster second laps were performed in several cases by athletics in both groups (EA 12 cases out of 33 – 35.5% vs. C 8 cases out of 24 – 33.3 %). The greatest negative split in all subjects was by Yuriy Borzakovskiy (RUS) with a value of 4.07 sec (1st lap 55.78 sec, 2nd lap 51.71 sec) at the 2007 IAAF World Championships in Athletics.
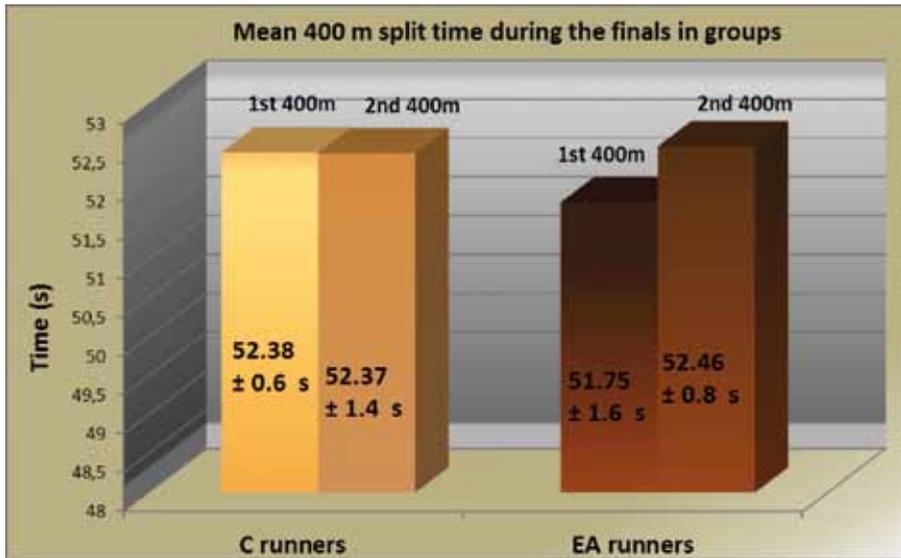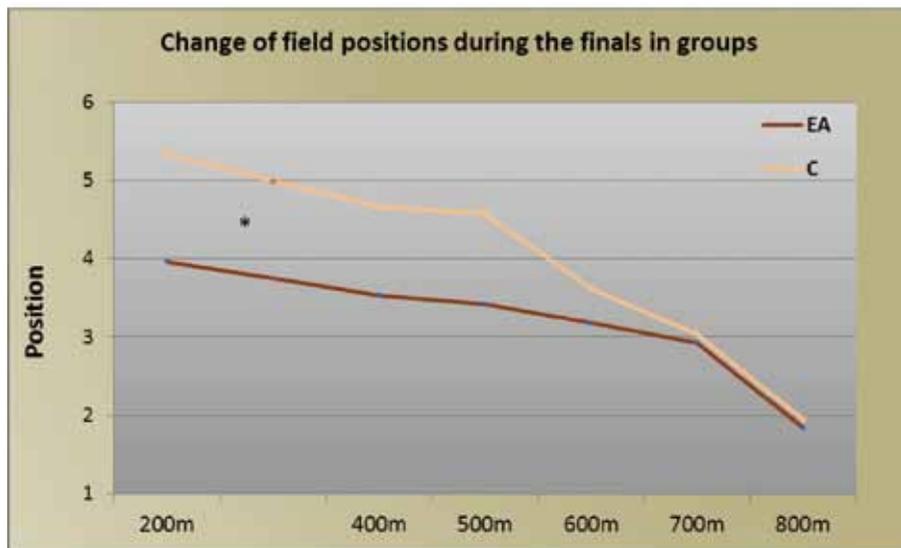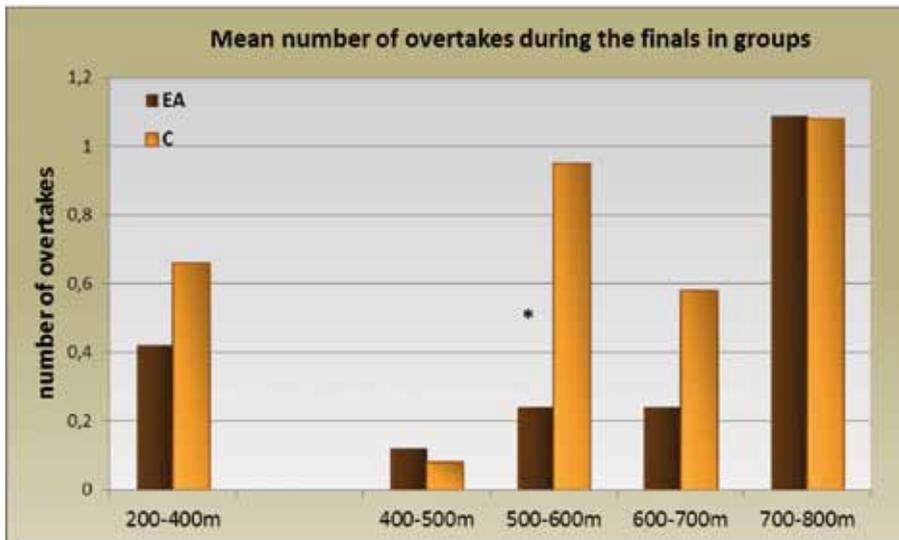
Figure 2: Mean 400m split times for elite male East African (EA) and Caucasian (C) runners (n=57) in major event 800m finals

= significant difference between groups (p<0.05)

Figure 3: Change of mean field positions in elite male East African (EA) and Caucasian (C) runners (n=57) in major event 800m finals

= significant difference between groups (p<0.05)

Figure 4: Mean number of overtakes for elite male East African (EA) and Caucasian (C) runners (n=57) in major event 800m finals

The mean positions with in the race field of the two groups are graphed in Figure 3. A significant difference (p<0.05) in position until the 500m point was found, with an EA advantage in all cases. The largest difference in position between the groups was measured at 200m (EA 3.9th ± 1.17 vs. C 5.3rd ± 0.9), and nearly the same gap was found to remain until 500m. An intense attempt to equalise the positions between 500 and 700m can be observed in C runners, and this appeared to ease up between 600m and the finish. No difference in final position at 800m was found between the groups (EA 1.8th ± 0.8 vs. C 1.9th ± 0.8), which means that if a C runner was in the top three places he had the same chance for victory as an EA athlete.

The mean number of overtakes during the race by the runners studied is shown in Figure 4. A significantly higher mean number of overtakes (p<0.05) was made by the C runners between 500 and 600m compared to the EA runners (EA 0.24 ± 0.7 vs. C 0.95 ± 1.4), confirming our earlier findings that top-level C runners tend to increase the pace after 500m.

The most numerous overtakes were performed in the final straight with no difference in value between the groups (EA 1.09 ± 0.4 vs. C 1.08 ± 0.6).

Record-attempt tactics

The 15 *a*ll-time best performances in the EA group were measured significantly faster compared to the C athletes (EA 1:42.27 ± 0.58 sec vs. C 1:43.04 ± 0.53 sec). The mean velocity curves of the groups are represented in Figure 5. A significantly (p<0.05) higher mean velocity was found in the EA group over the course of the whole race, especially at the 200, 600, and 800m points. The largest difference in split times was measured at 200m (EA 23.90 ± 0.35 sec vs. C 24.43 ± 0.39 sec) and this is followed by a massive fall in speed to the 400m point, especially in EA athletes. As a result, the smallest velocity difference between the groups was detected at 400m (Figure 5). From 400 to 600m, contrary to the trend found in the analysis of winning tactics, EA runners were measured slightly but non-significantly faster (EA 25.46 ± 0.49 sec vs. C 26.21 ± 0.75
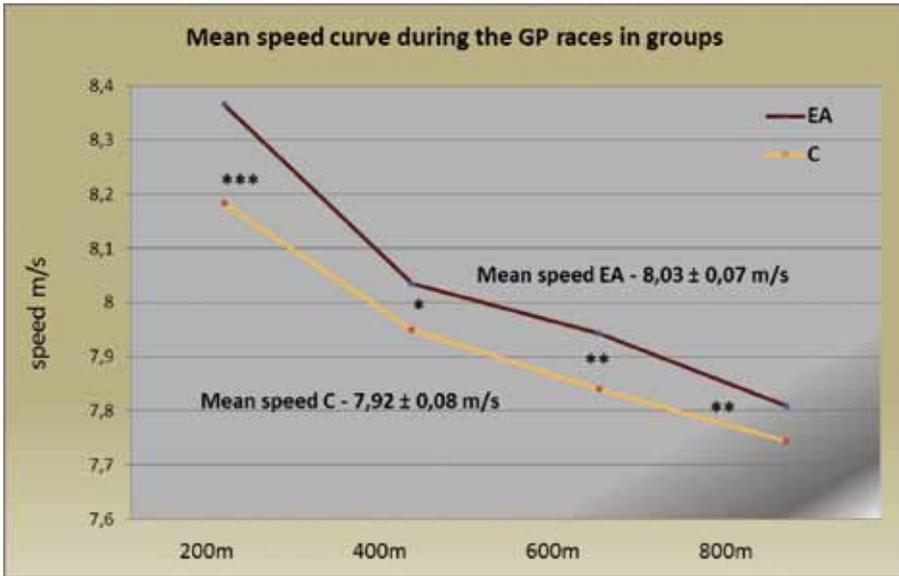
* = significant difference between groups (p<0.05); * * = significant difference between groups (p<0.005); ***
= significant difference between groups (p<0.001)

Figure 5: Mean velocity curves for elite male East African (EA) and Caucasian (C) runners (n=30) in 800m races producing the 15 best ever performances
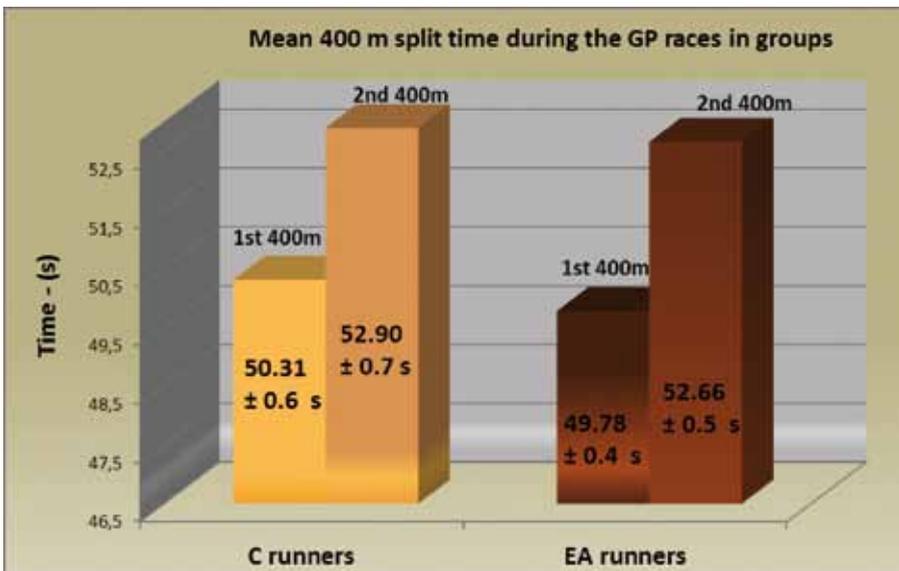

Figure 6: Mean 400m split times for elite male East African (EA) and Caucasian (C) runners (n=30) in 800m races producing the 15 best ever performances

sec). However, the last 200m was found to be faster, but not significantly, in the C group (EA 26.90 ± 0.53 sec vs. C 26.69 ± 0.56 sec).

A positive split with a similar rate was measured in both groups between the two 400m segments (EA 2.88 ± 0.7 sec vs. C 2.58 ± 1.1 sec) (Figure 6.). The differences were found to be significantly (p<0.05) greater in both groups compared to the same index in winning tactic analysis, which demonstrates that record-attempt tactics in male 800m are characterised by a fast first lap.

The mean field positions of the groups during the races are plotted in Figure 7 (pacemakers were not considered). Similar to what was found in the winning tactics analysis, for the mean position until 500m EA athletes are significantly (p<0.05) further up the field (EA 2.8th ± 0.56 vs. C 4.3rd ± 1.07). After 500m, the gap between the groups was found to decrease, but to a lesser extent than what was found in the winning tactic analysis. Surprisingly, the EA athletes were found to be losing places in field in the home straight, which is contrary to our findings in the winning tactic analysis. The mean numbers of overtakes are shown in Figure 8. It was found, that EA athletes tend to make some overtakes during the whole race, except the final straight, whilst significantly more overtakes were found in C group between 500-600m and 700-800m.

Conclusion

Acknowledging the rapidly changing, pulsating pace of top-level men's 800m races, we are convinced that tactical behaviour in this event is a matter to take into consideration and that it is valuable to understand differences between identifiable groups of successful athletes. The frequent presence of Caucasian middle distance runners in top-level events has allowed us to make a comparative analysis of the tactical manoeuvres used in winning and record-attempt race tactics by them and elite
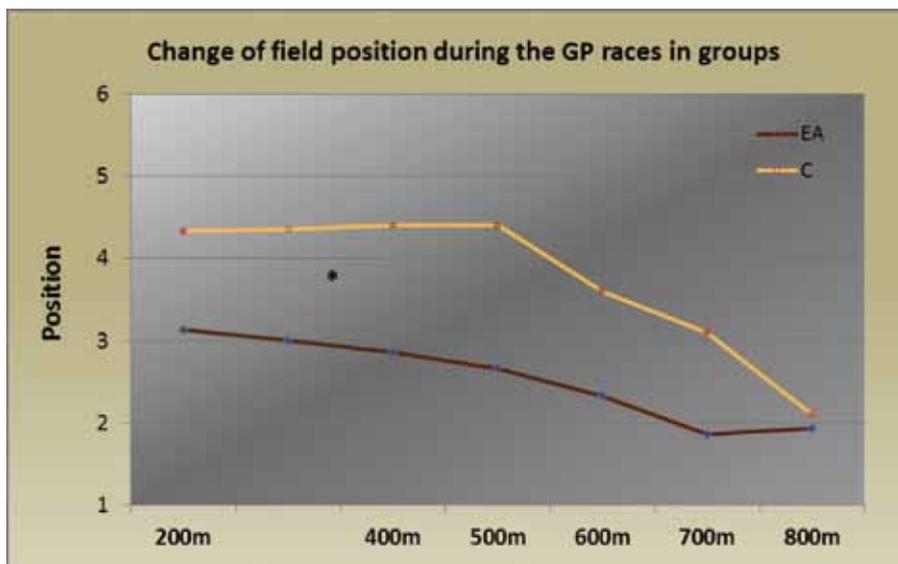
= significant difference between groups (p<0.05)

Figure 7: Change of mean field positions in elite male East African (EA) and Caucasian (C) runners (n=30) in 800m races producing the 15 best ever performances
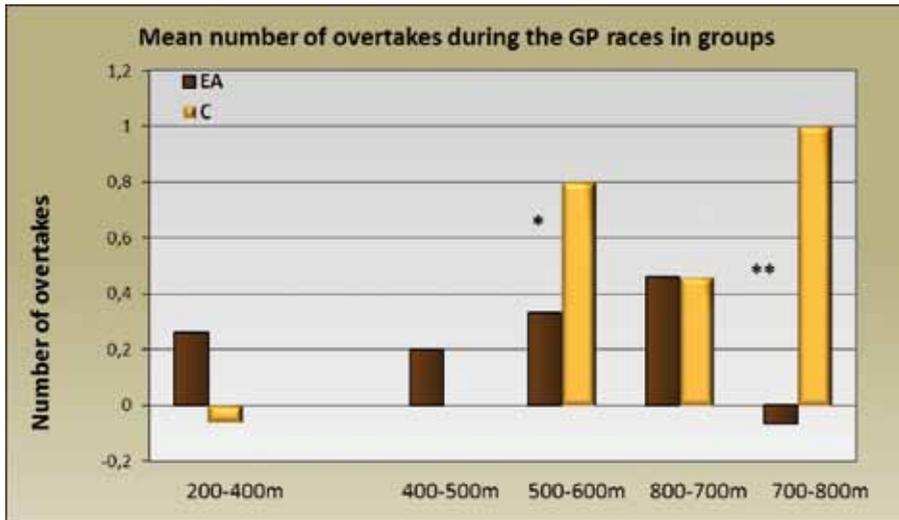
*= significant difference between groups (p<0.05); * * = significant difference between groups (p<0.005);*

Figure 8: Mean number of overtakes for elite male East African (EA) and Caucasian (C) runners (n=30) in 800m races producing the 15 best ever performances

East African runners. To our knowledge, no other statistical comparison on this topic has yet been published.

We found that East African runners are keener than Caucasian runners on making a fast start and getting a leading position in both championship and record-attempt races. We must add that the absolute lead position in the early stage of the race was avoided by both groups in both tactical forms, indicating that elite 800m runners tend not to make an effort to have early control of the pace. There are, of course, a few exceptions, including Wilson Kipketer (DEN) and David Rudisha (KEN). Interestingly, an equal or slightly higher mean velocity in the last 200m was found in Caucasian athletes in both types of races. Since no differences in final positions were found between the groups, it is suggested that in championship finals both an early lead position and an early back of the pack position can ultimately be successful.

Further investigation is required to determine whether the reason for the mean early race down-the-field position of Caucasian runners is coming as a result of a conscious tactical intention, or because of the fast first lap of the other (mostly EA) participants. Another myth to clear up is whether the swift start of the East African runners is instinctive, or coming from a conscious intention to benefit from identified genetic advantages (e.g. lower lactate accumulation[10]).

As far as Grand Prix/Golden League/Diamond League races are concerned, we can see a higher mean velocity and significantly better mean final performance in the East African runners group. Since much more even velocity and positioning curves were found in both groups, we can suggest that these high-speed or record-attempt races are characterised by fewer tactical manoeuvres.

The most notable variances in velocity and positioning between the two groups were found in major event finals, especially between 400 and 600m. There is a considerable speeding up and moving forward in the field during this part of the race by the Caucasian runners and a relatively passive 200m by the East African athletes. This stage of the race was found to be the only one in the whole study where the Caucasian athletes were racing more vigorously and aggressively than the East African runners. It seems that after their moderate first 500m, the Caucasian runners are trying to get into proper position for the final dash, whilst the East African athletes are having a breather before going into the final 200m. Both groups seemed to be successful in their effort, as the mean position at 600m is nearly the same.

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