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Pistorious at the Olympics: the saga continues

Giuseppe Lippi

The 2012 Summer Olympic Games will take place in London, from 27 July to 12 August. The most important sport competition in the world shapes up to be unprecedented in the overall number of participants, finally including 'the fastest man on no legs', Oscar Pistorious. Oscar Leonard Carl Pistorius was born in 1986 in South Africa with congenital absence of the fibula in both legs that were amputated halfway between his knees and ankles when he was 11 months old. Strongly supported by his family, Pistorious became a keen sportsman during his school years. Accompanying Oscar on his remarkable journey to the very apex of his sport career have been J-shaped, prosthetic running blades made on Cheetah, custom-built, high-performance carbon fibre foots designed primarily for sporting activities. Although declared eligible to compete in the 2008 Summer Olympic Games in Beijing by the Court of Arbitration for Sport, Pistorius did not qualify. Nevertheless, with a time of 45.07 s on 19 July 2011, he lastly achieved the 'A' qualifying standard for the 2012 Olympics in the 400 m discipline. On 8 August 2011 it was announced that he had been selected for the 400 m and the 4×400 m relay South African squad.

The debate around Pistorious is well known to many.[1] The South African athlete has been harshly criticised because of his artificial limbs, which would give him advantage over runners with natural ankles and feet. Now, the discussion is growing louder as we approach the opening ceremonies of the London 2012 Olympics. The major criticism about the potential benefits that the prosthetic running blades would provide over human legs should not be intended as discrimination or 'sport apartheid', but is rather funded on the ethos of sports which intrinsically entails equality, fairness and justice.[2] It is not a matter of establishing whether the 'Blade Runner' is faster or stronger, it is just the case of establishing what kind of athlete Pistorious is. The original aim of projecting and manufacturing carbon fibre prostheses is to try boost performance by reducing the functional disadvantages. Recent evidence attests, however, that these devices not only have overcome most functional disadvantages, but may also provide biomechanical advantages other than for the lower weight, which is itself an essential determinant of running economy.[3] According to Weyand and Bundle, other advantages of running blades include greater stride rate and force due to longer ground contact length-to-leg length ratio, shorter swing times at top speed, lower muscular stress or fatigue and—in turn—lower time of recovery, and, finally, less chance of tendon and muscular injuries.[4] In biomechanical terms, all these aspects would confer a net and undeniable advantages to amputated athletes equipped with carbon prostheses over intact-limb sprinters. On behalf of the International Association of Athletics Federations (IAAF), Potthast and Brueggemann[5] compared the overall Pistorious's kinetics and kinetics at the joints of the lower limb while sprinting at maximum speed with those of five able-bodied sprinters, concluding that the amputated athlete exhibits a smaller vertical displacement in the phase of maximal speed, less deceleration in the first part of the stance phase, and thus generates a smaller propulsion impulse in the second phase of stance. Moreover, the greater part of the labour of Pistorious's lower extremity was attributed to the ankle joint, while the knee joint contributed for less than 5%. Additional data about Pistorious came from a study of Weyand *et al*,[6] who found that the amputee athlete exhibited a 17% lower gross metabolic cost of transport, longer foot-ground contact times, shorter aerial and swing times, as well as lower stance-averaged vertical forces as compared with 400-m specialists and intact-limb sprinters.

So, although we clearly understand where we are now with Pistorious, we have little clues on where technology might bring us in the foreseeable future if clear boundaries of prosthetic technology will not be set. The South African sprinter may just be the tip of the iceberg, whereby a new generation of disabled athletes may be persuaded to start a successful sport career on Pistorious's (carbon) footsteps. If we all agree—as we do, indeed—that whatever artificial addition on athlete's body shall be considered unfair or even illicit (the ban of the bathing suits that enhanced swimmers performance is a paradigmatic case), then, prosthetic technology should follow the same route. Beside the fact that Pistorious's running performance may be higher, the basic dynamics has been definitely proven to be grossly different from that of intact-limb sprinters, and he should not be allowed to race in the Olympics, whereby his natural field remains the Paralympics.

The philosophical and ethical dilemma around Pistorious performance has become somehow pleonastic when the IAAF (ie, the sport's governing body) announced the new restriction that 'Blade Runner' should run the first leg 'to avoid danger to other athletes' if he competes in the 4×400 relay. The claim was based on the background of realistic safety concerns, wherein another runner may hit and get hurt by Pistorius's blades on a crowded relay track. Whether this decision may also be logical or ethical is probably irrelevant. We would all agree that it is psychologically important for all disabled persons to admire Pistorious challenging and even defeating normally able athletes, but still we have to respect the boundaries of loyalty and legality. It may be seen as a paradox, but the moment in athletic history when engineered limbs outperform biological limbs has already passed, and the man without legs has two stronger legs than his contenders.

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