

## Human locomotion on “natural” and “unnatural” substrates.

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Humans have evolved on a substrate that was, from a locomotor point of view, much more varied than the typical urban substrate we typically walk and run on nowadays. Unfortunately, nearly all our insights into human locomotion are from lab-based studies. In these studies, gait is usually along a straight line, at a constant speed, and on a very simple, flat substrate. In addition, subjects tend to vary little as well (notwithstanding patients).

We have recently set out to explore variation in human gait and more specifically how gait is influenced (or not?) by the substrate. We will present examples from recent and ongoing research. The first example deals with the characterisation of “natural” substrates, both at the level of landscapes (topology) and at the level of mechanical substrate properties. The second example deals with impact (and impact coping strategies) on natural (softer) and artificial (harder) flat substrates, and with gait adjustments to substrate complexity. The third example deals with the effects of different types of footwear – a “wearable substrate” – on gait.

All data suggest that we have evolved on terrains much more complex than we habitually use currently, and we suggest that the level of compliance in the modern human foot, which has recently been found to be substantial, might allow us to deal with this complexity.