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RESEARCH REPORT

## PEDESTRIAN VELOCITIES: A MULTIVARIATE STUDY OF SOCIAL AND ENVIRONMENTAL EFFECTS

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### Abstract

Multivariate investigations of typical pedestrian velocities, particularly involving groups, have been lacking. Walking speeds on two major walkways of a university campus were studied. In one study, group size (singles faster), sex (males faster), and a 9 per cent incline (downhill faster) were significantly related to speed. In another study, group size and sex were similarly related to speed, and in rain walkers paced faster than in dry conditions. Speed decrements associated with each significant variable appear additive, resulting in some categories' speeds differing by  $\pm 30$  per cent from the grand mean of 1.2 meters/second. The order of importance of variables determining velocity appears to be incline, group, sex and weather. The grand mean speed corroborates that predicted by Bornstein and Bornstein's previous work on city size and pace of life.

Pedestrian velocity has been shown to be related to a number of variables. Older men walk slower than younger ones (Murray, 1966), men walk faster than women (Fruin, 1971), morning speeds are faster than afternoon speeds, and purpose of the walk (going to eat, shopping) can increase speeds (Hoel, 1968). In addition, increasing pedestrian density (Fruin, 1971) and inclines over 6 per cent (MacDorman, 1957; Wayne, 1962) reduce pedestrian velocity. However, carrying parcels weighing up to 10 kg does not seem to slow walkers significantly (MacDorman, 1957).

Unfortunately, these studies have not typically investigated more than one variable at a time, compared the influence of variables or assessed their interactions. Nor have the effects of walking in groups or

under different weather conditions received much attention. The present studies attempted to assess the relative weight and interactional effects of these factors, to determine the role of social walking and weather conditions on walking speeds, and to confirm or disconfirm previous work.

### Method

Since there were only minor methodological differences in the two studies, they are reported together.

Subjects include all those who traversed, without stopping, the whole length of two prescribed outdoor walkways on the campus of a medium-sized university (9,000) in a semi-rural setting (population 65,000). Most walkers appeared to be students. In the first