The influence of environmental properties and music on walking speed of pedestrians

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Introduction

Typically, walking behavior is studied in a context of traffic and transportation science. Pedestrian traffic flow in various environmental settings had been in the focus of the research. Some studies also investigated socio-psychological factors influencing pedestrian speed in cities. It was found that the walking speed of pedestrians positively correlated with the size of the city (e.g. Bornstein and Bornstein, 1976). Higher walking speed in larger cities is interpreted as a psychological response to stimulatory overload. It was also shown that the walking speed of pedestrians is related to general pace of life (Levine, 1999). Clearly, there are links between pace of life, pedestrian speed and stimulatory overload. Thus, it is important to study environmental properties, which could influence walking speed of inhabitants of large cities.

In our previous experiments (Franěk and Ondráček, 2010) environmental factors influencing walking speed of pedestrians was investigated. We found that participants tended to walk quickly in areas without greenery and with a higher level of traffic, whereas in areas with greenery and with a small level of traffic they walked slightly slower.

The present research had two objectives: (1) to further validate the observed effects of environmental properties on walking speed and (2) to investigated an effect of music listening during walking. It was supposed that background music could mask stressful environmental stimuli, which would result in diminished effect of environmental stimuli on walking speed. It was also predicted that subjects could synchronize their steps with tempo of the listened music.

Method

The participants walked a 2 km long walking track in the town of Hradec Králové in the Czech Republic, once with music and once without. Music was presented via Walkman in two tempi respectively (either 105 or 120 bpm).

The walking track was divided into sixteen sections with different environmental properties. For capturing the environment and the behavior of the subjects, they walked with a very small video camera attached to a belt around their middle. The camera was equipped with a fish-eye lens that could capture the environment in front of the subject and the feet of the subject. The step tempo was determined from the movement of the camera.

The three-day experimental sessions were run in fall of 2010 with 75 subjects.

Results

Pedestrian speed was measured in sixteen sections of the track. Repeated measures ANOVA revealed significant effects of section, gender and interaction between gender and section on walking speed. Environmental properties systematically affected walking speed. Females were affected by environmental properties more than males.

In the music condition, repeated measures ANOVA revealed significant effects of tempo of music and section. Music listening during walking slightly influenced walking speed, faster music made walking speed faster. However, the basic pattern of changes in walking speed within the walking track was preserved. It was also observed that tempo of music influenced pedestrian speed, the fast music speeded up pedestrian tempo.

Conclusion

The results showed that systematic changes in walking speed occurred within particular sections of the walking track. Namely open space, traffic and noise resulted in a slight increase of walking speed. In contrast, greenery and visual coherence of the environmental scene resulted in a decrease of walking speed.