

The effect of weather and season on travel satisfaction and travel related mood: Evidence from on-line measurements in three Swedish cities

Dick Ettema (Utrecht University), Margareta Friman (Karlstad University), Lars Olsson (Karlstad University), Tommy Gärling (Göteborg University)

d.f.ettema@uu.nl

Research Questions

- How does travel influence mood?
- Is the effect of travel on mood influenced by weather conditions and season?
- To what extent are travel induced changes in mood sustained during the work day?

Theory

Travel satisfaction is the assessment of the quality of a trip expressed in cognitive and affective terms, for instance the Satisfaction with Travel Scale (STS: Friman et al., 2012). It has been found to be influenced by travel mode, trip duration, crowdedness, company and service related factors.

Mood is someone's affective state, influenced by positive and negative experiences, and measured as consisting of two dimensions: **valence** and **activation** (Russel, 2003). Mood is potentially influenced by a large variety of daily events, of which travel is only one. A few studies established that mood can be affected by **travel** circumstances. Other studies found that mood is positively affected by **weather** conditions such as higher temperatures, higher barometric pressure, low humidity, sunshine and low wind speed.

The effect of **weather during travel** on **mood** has not yet been investigated and is addressed in this paper. We assume that mood prior to travel (T0) changes due to experiencing the trip made in a particular weather type, and has changed after the trip (T1). We also investigate whether the effect of travel on mood is maintained while being at the workplace (T2).

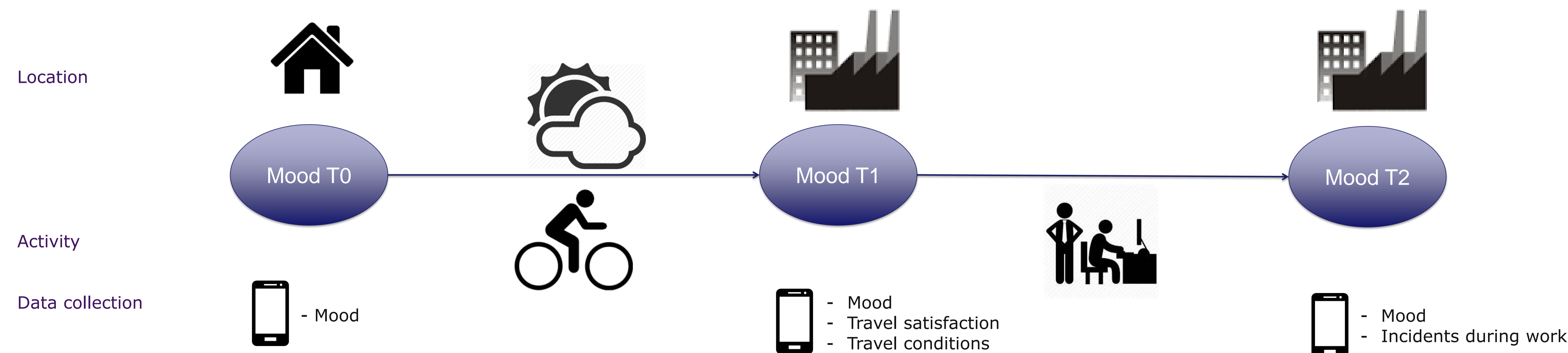


Figure 1: Conceptual model and data collection

Data

Data was collected in winter and summer using a smartphone App for 364 commuters providing data for 562 commute trips (280 in February and 282 in June). Mood and travel satisfaction were measured before the commute (T0) after the commute (T1) and one hour after the commute (T2). Travel conditions were also recorded using the App. These data were enriched with meteorological data for the time of travel for each trip.

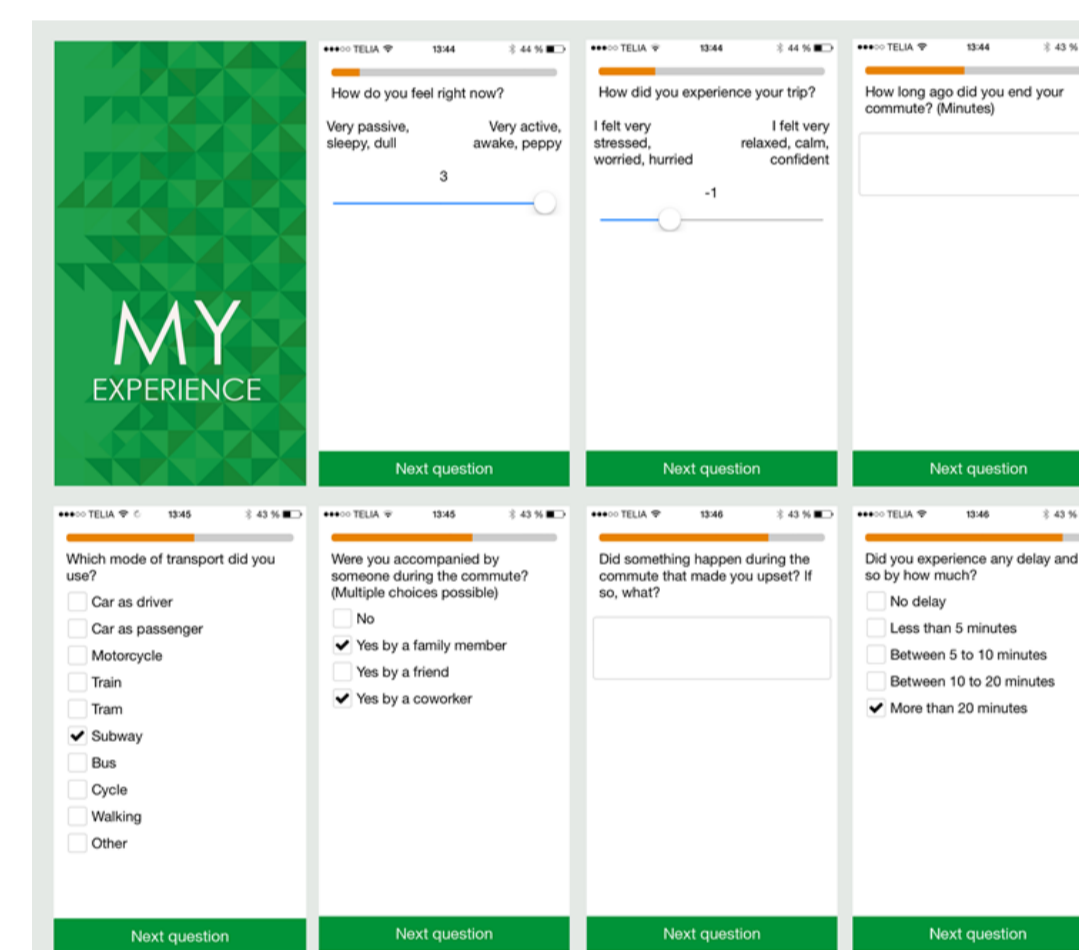


Figure 2: Screenshots of data collection App

Methods

- Descriptive analyses were carried out of the changes in valence and activation due to travel in different seasons.
- Multilevel regression models of valence and activation at T1 and T2 were estimated with season, weather and trip characteristics as explanatory variables.

Results

Table 1: Descriptive analyses

	February	June	Total
Valence T0	0.82	1.00	0.91
Valence T1	1.15	1.21	1.18
Valence T2	1.31	1.43	1.37
Increase Valence (T1-T0)	0.33	0.21	0.27
Increase Valence (T2-T0)	0.50	0.43	0.44
Activation T0	0.26	0.28	0.27
Activation T1	1.09	1.10	1.09
Activation T2	1.29	1.36	1.32
Increase Activation (T1-T0)	0.83	0.81	0.82
Increase Activation (T2-T0)	1.03	1.05	1.04
Positive de-activation	1.20	1.23	1.21
Positive activation	0.63	0.71	0.67
Cognitive evaluation	1.43	1.47	1.45

- Travel leads to increased valence and activation, but no significant differences are observed between winter (February) and summer (June).
- Travel satisfaction was positive, but did not differ between seasons either

Table 2: Results multilevel regression analyses

	Valence T1	Activation T1	Valence T2	Activation T2
Intercept	0,391	0,134	-0,152	0,489
Valence T0	0,420**		0,127**	
Activation T0		0,427**		0,028
Valence T1			0,462**	
Activation T1				0,478**
Stockholm	-0,073	-0,021	-0,091	-0,211^
Goteborg	-0,147	0,043	-0,098	-0,176
Male	-0,078	-0,016	-0,080	-0,125
Car	-0,110	-0,147	0,002	-0,158
Public Transport	-0,269*	-0,484**	-0,093	-0,173
Alone	0,007	-0,051	0,032	0,009
Negative Incidents	-0,268*	-0,187	-0,138	-0,165
Positive incidents	0,220**	0,263**	0,084	0,142
Delay	-0,054	0,128	0,057	-0,032
Trip duration Time	0,001	0,001	0,003	0,007**
Age	-0,016	0,041	0,026	-0,001
Age_square	0,000	0,000	0,000	0,000
Daily trip	-0,253**	-0,178	-0,041	-0,149
February	0,410^	0,225	0,202	0,123
Rain	-0,180^	-0,109	-0,002	0,019
Temperature	0,042*	0,019	0,023	0,017
Variance component	0,094*	0,179	0,167*	0,111*

- The positive effect of travel on mood is larger if positive incidents occur during travel, and is reduced when travelling by public transport, negative incidents occur and for daily trips.
- Higher temperatures increase the positive effect of travel on mood, while rain has a marginally significant negative effect.