EFFECTS OF WEATHER AND AIR POLLUTION ON MOOD: AN INDIVIDUAL DIFFERENCE APPROACH

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Abstract

Within a time sampling study of the effects on unemployment of subjective well-being (Kirchler, 1985) 14 men and 12 women recorded their mood several times a day over a period of 40 days according to the time sampling diary of Brandstätter (1977). For the present study each subject's sensitivity to air pollution and weather changes has been assessed by calculating the multiple regression (auto-regressive model) of his/her time series of mood scores on the time series of air pollution and weather indicators (SO$_2$, dust, temperature, steam pressure, visibility, cloudiness, wind speed, precipitation, barometric pressure). The standard partial regression coefficients were conceived of as indicators of a subject's sensitivity to weather changes and used as dependent variables in ANOVAs with emotional stability (low-high) and extroversion (low-high) as factors. The sensitivity to air pollution, temperature, steam pressure, wind speed, precipitation and barometric pressure turned out to be partly interaction effects, partly main effects of emotional stability and extroversion. Only interdisciplinary cooperation in studying the physiological and psychological processes causing the influence of weather on mood can lead to appropriate theoretical explanations of the observed effects.

Introduction

People like talking about the weather, a favoured topic to begin a conversation with a stranger or casual acquaintance. It is easy to agree that it is too hot or too cold, too dry or too wet, occasionally that one can really enjoy it just as it is. When meeting with friends and relatives, people also seem quite often to talk about the weather, this time blaming it for a headache, fatigue, or ill temper.

Many people (up to 70% of survey samples; Faust 1977, p 61) are convinced that the weather has some impact on their well-being, but how can we be sure that they don't just express a stereotype (inferring a certain mood state from a certain type of weather) or blame the weather as cause for their health problems or emotional discomfort which actually may have other causes unknown to them?

On the collective level, there is ample evidence that the incidence of health problems, psychosomatic grievances, violence, and suicide is in some way tied to changing weather conditions (Baron & Ransberger, 1978; Belek & Klein, 1983; Charry & Hawkinshire, 1981; Faust, 1977; Muecher & Ungeheuer, 1961; Rotton & Frey, 1985; Rotton et al, 1979). No doubt the weather has some real disturbing effects on some of the people.

Gensler (1973; quoted by Faust, 1977, p 77f) performed a study with a personality inventory (FPI; Freiburger Persönlichkeitsinventar) and a checklist of self-reported sensitivity to weather changes ("Wetterfähigkeit") and found weather sensitivity related to several subscales of neuroticism. People who describe themselves as nervous, depressed,
excitable, tense, and restrained, report also many symptoms of weather sensitivity. However, this could be, at least in part, a reflection of a person's general negative affectivity (Watson & Clark, 1984). That people who perceive themselves as sensitive to weather conditions actually differ in some measures of a standard blood test has been shown by Jenkner (1983). This means that self-reported weather sensitivity has at least something to do with body functions. Nevertheless, whether high neuroticism really predisposes people to fluctuations of psychosomatic well-being depending on the weather conditions needs a more direct test. What we need are longitudinal studies on the individual level with a method allowing causal inferences less contaminated by the subjects' prejudices and misattributions than common interviews and questionnaires (cf Evans & Jacobs, 1981, for questionnaire studies on air pollution).

There are a few time series studies on weather and mood which take individual differences into account. Unfortunately, Goldstein's (1972) brief report on individual differences in time series dependence of semantic differential mood scores (evaluation, activity, and potency) on weather variables (temperature, humidity, barometric pressure, clearness, temperature deviation from normal for the date, and wind speed) is so incomplete and ambiguous that little can be learned from his study.

Persinger (1975) had 10 students rate their mood four times per day (within one hour of awakening in the morning, before lunch, before dinner, and before sleep) from 9 January to 8 April (90 days). For each day an average mood score was calculated. He selected the following weather variables: the day's mean barometric pressure, greatest change of barometric pressure within 24 hours, greatest change in barometric pressure for any period of two hours, daily mean wind speed, number of sunshine hours, mean daily temperature, range of daily temperature, mean relative humidity, range of daily relative humidity, and a measure of daily global geomagnetic activity.

There were more significant individual time series correlations than expected by chance. Again, the report does not give a clear idea of the meaning of the individual differences which were found in the data. Over the three periods of 30 days each, the correlations of a person's mood scores with weather variables were rather unstable. The greatest percentages of significant (p<.05) correlations (about 20%) were found for mood at day n related to weather at days n-1 and n-2. Generally, mood scores were positively correlated with the number of sunshine hours and humidity range but negatively related with mean humidity, all weather variables taken into consideration with a time lag of one or two days.

Clear experimental evidence of differential effects of negative ions on aggressive behaviour depending on personality is provided by Baron, Russel & Arms (1985). Unexpectedly, Type A persons (classified according to Jenkins Activity Survey and generally described as being irritable and aggressive) were more aggressive with increasing concentration of negative ions, whereas Type B subjects were not affected. The authors assume that negative ions increase the activation level and therefore intensify whatever responses are prevalent.

Using Lacey's (1956) autonomic liability score (ALS), Charry & Hawkinson (1981) were able to predict differential effects of positive ions on mood, skin conductance, and simple reaction time.

Sanders & Brizzolara (1982) did not find significant one- and two-day lag correlations between weather variables (relative humidity, temperature, and barometric pressure) and mood measures (mood adjective checklist; Nowlis, 1965). However, a canonical correlation between weather and mood variables was significant. In particular, over the observed ranges of temperature and barometric pressure, relative humidity was negatively related to the weighted linear combination of three mood variables (vigor, social affection,