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ENVIRONMENTAL PSYCHOLOGY

Climatic imprints on personality

No plant, animal or human is impervious to the problems posed by bitter winters and scorching summers. Two large studies suggest that many Chinese and US inhabitants have adapted their personality to the temperatures at the place where they grew up.

Evert Van de Vliert

Naturally, all living species would freeze to death in the cold or burn to death in the heat if the Sun were to start shining from farther away or closer up, or if the Earth were to stop rotating around the Sun and around its own tilted axis. Indeed, the Sun and the Earth in conjunction sustain livability, and shape life, through alternating solar radiation patterns between winter and summer. A consequential question is whether different climatic habitats produce different kinds of inhabitants with different habits. Ever since the ancient Greeks started to debate this fundamental issue, thinkers have speculated about the link between thermal climate and human personality. Now a research team led by Lei Wang from Peking University in Beijing has competently started to turn these speculations into knowledge.

Writing in *Nature Human Behaviour*, Wenqi Wei, Jackson Lu and 24 co-authors report two studies that relate local temperatures to local personality traits¹. In both studies, climatic temperatures were measured with a recently invented thermometer that uses 22 °C (~72 °F) as a basic point of reference for mild temperatures² (Fig. 1). Downward cold deviations and upward heat deviations from 22 °C are thought to reduce a climate's livability for humans, who are in continuous need of thermal comfort, nutritional flora and fauna, and a healthy environment. Also, both studies used extensive self-report inventories to measure personality in terms of agreeableness, conscientiousness, emotional stability, extraversion and openness to experience. In the first study, 5,587 inhabitants of 59 Chinese cities completed the personality questionnaire online. In the second study, data were likewise gathered from 1,660,638 inhabitants of 12,499 ZIP-code areas in the United States.

Advanced analyses showed that both Chinese and US inhabitants who grew up in climates with milder temperatures score higher on each of the five personality traits and their underlying dimensions. Impressively, among Chinese inhabitants,

the effect sizes of milder temperatures consistently outweighed the effects of gender, age and acquiescence at the individual level, and of influenza incidence, population density, prevalence of rice and wheat farming, and average income at the city level. Among US inhabitants, the mild-temperature effects survived controlling for gender, age, education and acquiescence at the individual level, and for humidity, wind speed, population density, economic sector sizes and average income at the ZIP-code level. Surprisingly negligible evidence surfaced of selective adaptation — that is, specifically relying more on some traits for handling the problems of boring and uninspiring temperatures, and on other traits for handling the problems of threatening or challenging cold or heat demands. However, even if further research fails to support these counterintuitive findings, the two studies still ignite a breakthrough towards new research opportunities concentrating on three contrasting conditions discussed below: cold versus heat, poor versus rich, and north versus south.

First, cold versus heat. Wang's research team highlights imprints of undifferentiated thermal demands on personality, making no distinction between the impacts of cold and heat deviations from the optimal environmental livability around 22 °C. A less-parsimonious yet more-refined approach, advocated by Murray³, is to look at adaptations to the differential threats and challenges posed by downward cold deviations and upward heat deviations from 22 °C. A convenience test of Murray's idea² revealed negative impacts of heat demands on freedom from discrimination and repression, especially so in continental climates where seasonal cold demands reinforce the negative impacts of seasonal heat demands. Similarly, one could examine whether agreeableness, conscientiousness, emotional stability, extraversion and open-mindedness all decrease to the largest extent — or to a different extent — in areas with bitter winters and scorching summers.

Fig. 1 | Thermometer for measuring livability (°L).

Second, poor versus rich. The results reported by Wei et al. generalize from the inhabitants of a relatively poor country (China) to the inhabitants of a rich country (United States), raising the question of how this cross-national generalizability relates to climato-economic theorizing in general⁴ and to the following climato-economic discovery in particular². Inhabitants of habitats with milder winters and summers closer to 22 °C appear to have evolved more-independent self-construals in relatively poor regions (Chinese provinces: $r = 0.86$, $P < 0.001$), but more-interdependent self-construals in rich regions (United States: $r = 0.72$, $P < 0.001$). Does the combined evidence of all climate effects on personal identity

imply that increases in agreeableness, conscientiousness, emotional stability, extraversion and open-mindedness are driven by more-interdependent self-construals among predominantly poor and collectivist Chinese inhabitants, but by more-interdependent self-construals among predominantly rich and individualistic US inhabitants?

Third, north versus south. Climate-induced differences between northerners and southerners are well-documented in human biogeography⁵ and planetary psychology⁶. It is therefore a missed opportunity that the associations between local temperatures and local personality traits have not been analysed in relation to geographic latitude. A latitudinal perspective offers the psychometric tool of reverse replication across the Northern and Southern hemispheres⁷. Given that the north–south gradients of cold demands and heat demands reverse their direction at the Equator^{6,7}, valid climate-induced north–south gradients

of personality should also reverse their direction at the Equator. In consequence, the counterintuitive results in the Wei et al. studies can be validated by testing the following hypothesis: compared with northerners, southerners are more agreeable, conscientious, emotionally stable, extraverted and open-minded in Northern Hemisphere countries such as China and the United States, but less agreeable, conscientious, emotionally stable, extraverted and open-minded in Southern Hemisphere countries such as Argentina and Australia.

The above three contrasting conditions should be regarded not as mutually exclusive, but as distinct parts of a planetary machinery driving human functioning. The north–south dimension covaries monotonically with the cold–heat and poor–rich dimensions, and oppositely so in the opposite hemispheres above and below the Equator^{6,7}. This integrated set of conditions seems to have the explanatory potential to complement more proximate roots of genes,

traits and behaviours (for example, parasite stress and subsistence stress) with the ultimate roots of genes, traits and behaviours (cold stress and heat stress). □

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