Supplementary Information

Clean air captures attention whereas pollution distracts: Evidence from brain activities

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Figure S1. **Example images used as the cues**. Images in the first row show polluted cityscape photos with low visibility. Images in the second row present landscape photos with clean air.

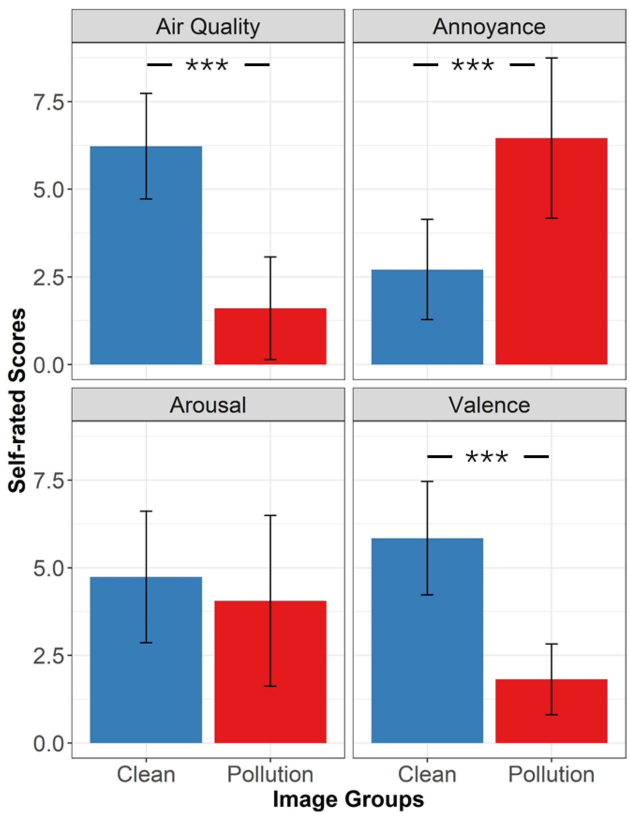

Figure S2. **Self-rated scores on cue images before the experiment by 20 volunteers.** Bar plots show the mean value for perceived air quality, annoyance, arousal, and valence measured by 9-point likert scales. The error bars denote the standard deviations for each measurement. Stars show significant levels of self-rated scores between pollution and clean air images (***, $p<0.01$).

From Figure S2 we could see that self-reported air qualities for clean air images (mean = 6.22, sd = 1.51) are significantly higher than those of pollution images (mean = 1.61, sd = 1.46). Annoyance scores for pollution images (mean = 6.46, sd = 2.29), on the contraty are remarkly higher than clean air images (mean = 2.71, sd = 1.43). Valence scores of pollution images (mean = 1.82, sd = 1.01), indicating levels of pleasantness, are significantly lower than clean air images (mean = 5.84, sd = 1.62). Arousal scores, indicating the excitement or intensity of emotion, have no significant differences between pollution and clean air images. Thoese results together show that participants have very consistent judgement toward images with different air qualities and are able to clearly distinguish the threathening information from pollution images.

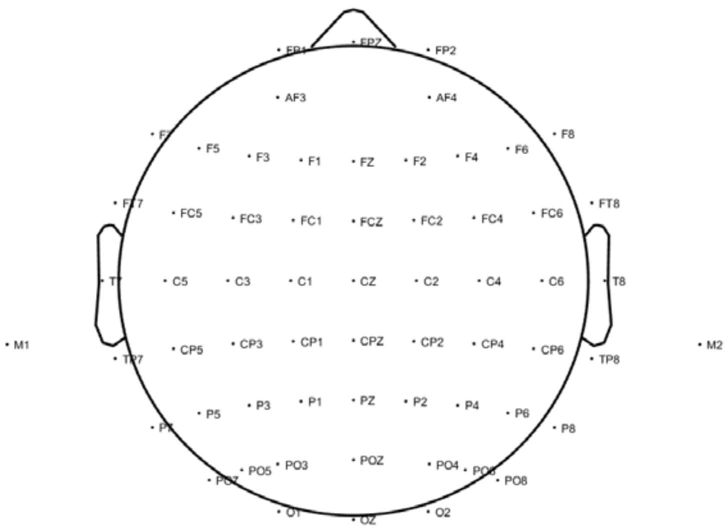

Figure S3. Topographical distribution of channels recorded in this study.

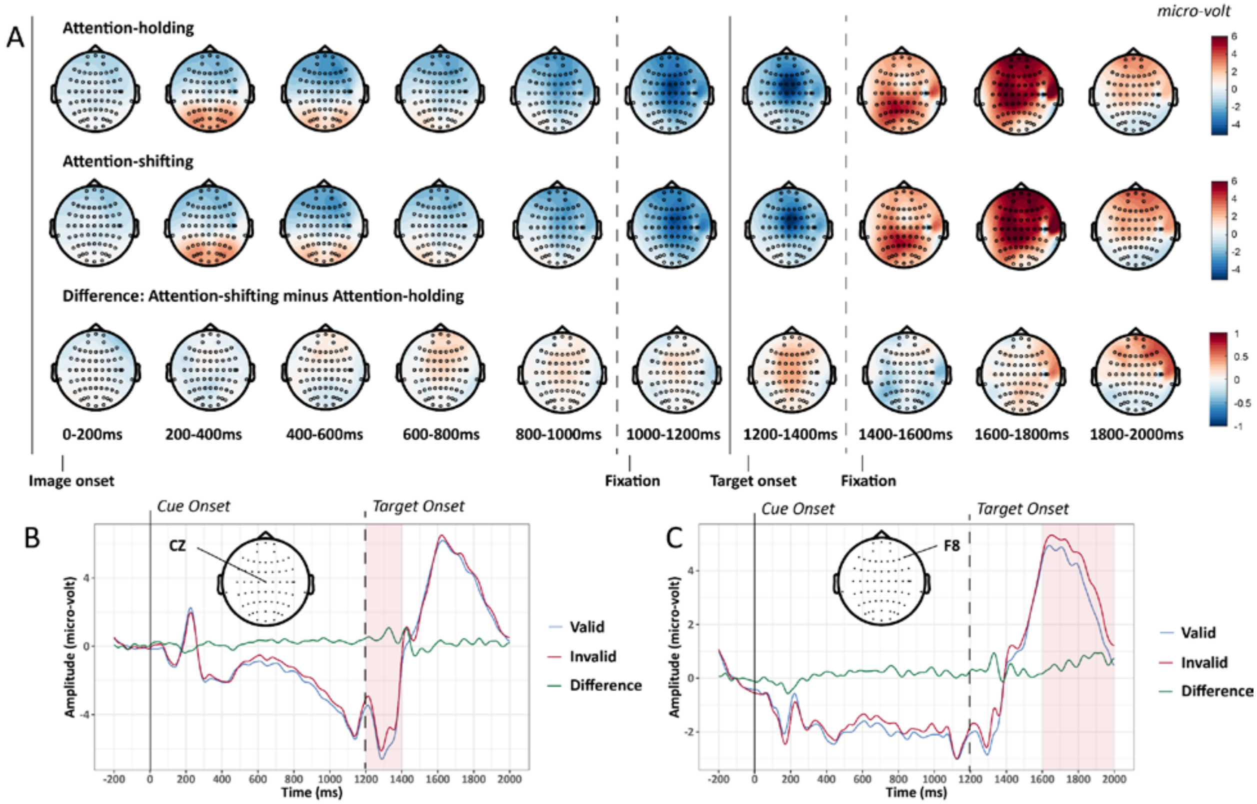

Figure S4. ERP comparison between the attention-holding and attention-shifting trials. (A) Topographic plots of ERP show the brain activities in the attention-holding (the first panel) and attention-shifting trials (the second panel) per 200ms. The third panel shows the ERP differences between the two conditions. (B) ERP waveforms at the channel of CZ. (C) ERP waveforms at the channel of F8.

We also compared ERP waves between the attention-holding and attention-shifting trials without considering the cue types. The third panel in Figure S3A shows that during the image cueing stimulation (0-1000ms), the difference in the amplitude of N300 between attention-holding and attention-shifting trials is marginal. Instead, we find larger differences in P300 amplitudes at the central sulcus (1200-1400ms) and prefrontal lobes (1600-2000ms) when performing cognitive tasks.

To further investigate the ERP waveforms at the higher temporal resolution, we extract ERP waveforms at the channel of CZ and F8, respectively, as examples. Figure S3B shows that when the target is onset (1200-1400ms), the P300 component in the attention-holding trials has a higher absolute amplitude than in attention-shifting trials. Paired-wise statistical tests across multiple time points show that the differences are statistically significant ($p = 0.007$). The results reflect that more cognitive resources have been allocated to prepare for the upcoming cognitive tasks in the attention-holding trials where cue and target are presented on the same side of the screen. On the contrary, Figure S3C illustrates that when the subject makes behavioral responses (1600-2000ms), the P300 component in attention-shifting trials has much higher absolute amplitudes. It suggests that subjects take more cognitive resources to disengage their attention from the cue to the target when they are on the opposite side of the screen. The findings may explain why subjects tend to have lower accuracy and longer response time in attention-shifting trials.

Table S1. Comparison of epoch rejection rates across conditions.

	Attention-holding		Attention-shifting	
	Pollution	Clean air	Pollution	Clean air
Number of epochs per subject	192	192	128	128
Number of rejected epochs (mean of 32 subjects)	26	22	17	15
Epoch rejection rates (% mean of 32 subjects)	13.5%	11.4%	14.1%	12.4%