## Supplementary method 1: Sex differences of the odor-color responses.

We used Bayesian multilevel regression models to estimate the sex differences of color responses using odor-level effects. The response value of a\*-axis for the associated colors was modeled by each odor as a normal distribution as follows:

> 0

> 0

where *i* indicates the odor ID and *j* denotes the data index. indicates the responses from male participants, and were from female participants. Each coefficient followed a normal distribution with mean coefficients as follows:

> 0

> 0

where and indicates the average coefficients across all odorants in male and female participants.

The differences between sex were calculated from the estimated parameters as follows:

with indicating the coefficient differences in *i*th odor, and indicating the main effect of sex across all odors.

Regarding the model for a\* value estimation, we modeled the b\*- axis values as follows:

> 0

> 0

> 0

> 0

Similar to the steps with a\* and b\*, we model the L-axis values as follows.

> 0

> 0

> 0

> 0

The models were fitted using the R environment (ver.3.4.0) and RStan (ver.2.2.1) with the Markov chain Monte Carlo (MCMC) method. All estimates were made with 3,000 samplings, running four chains to generate random numbers, and a burn-in period of 1,000. We used the Gelman-Rubin statistics to determine if the MCMC estimation converged for all estimation parameters. is generally considered to converge as it approaches 1.10, and each model fit produces <1.10.

The mean differences and their 95% CI of main effects and odor-level differences were estimated using these multilevel models. The posterior distribution and its 95% CI for sex differences did not include 0. These results indicated that the color responses were not significantly fluctuated between sex groups in response to any odorant.