Total Effects and Direct Effects Calculation

Question

How are **Total Effects on Target** and **Direct Effects on Target** calculated in BayesiaLab?

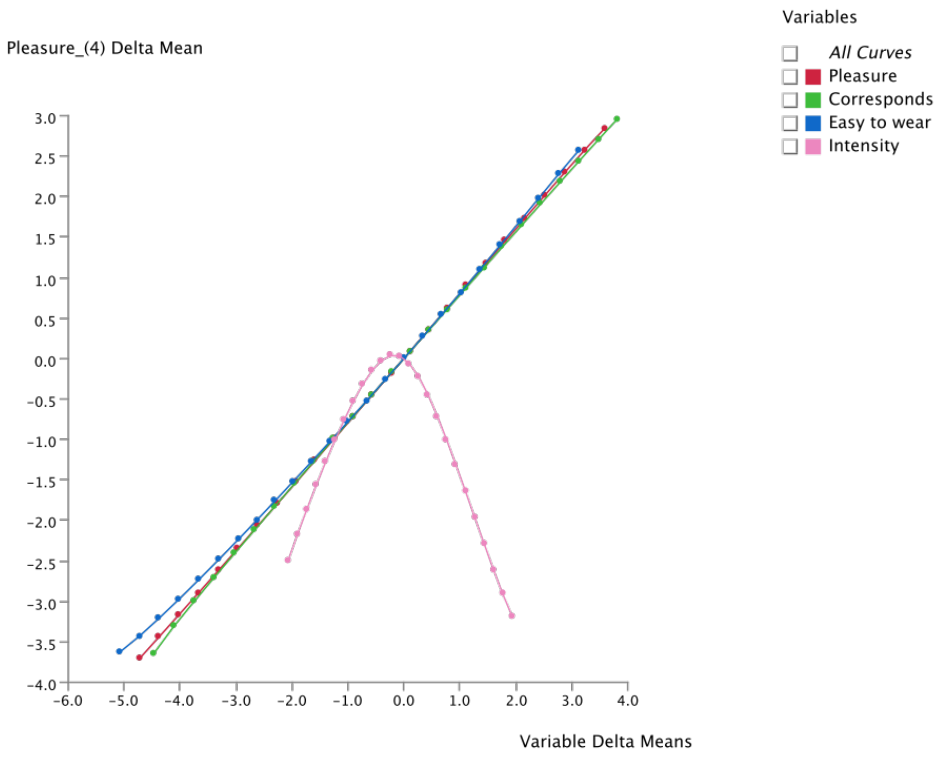
Answer

Both the Total and Direct Effects are the derivative of their corresponding Effect Function computed at the a-priori mean value (delta = 0).

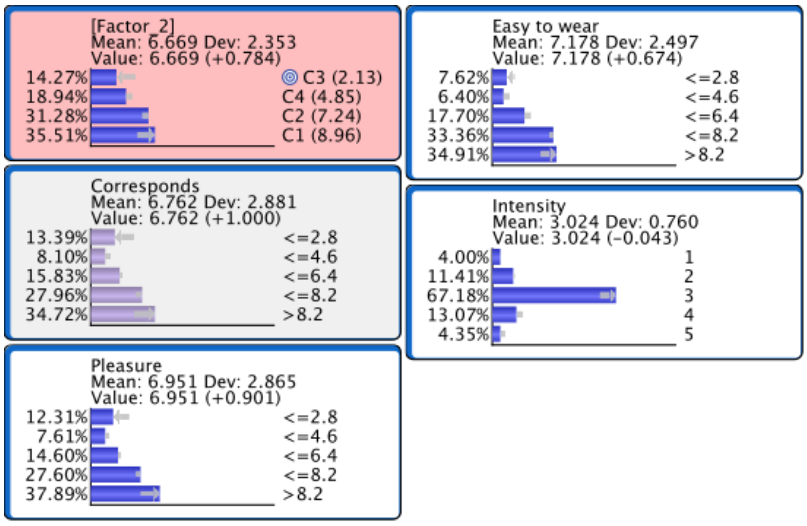
Total Effect Function

The Total Effect Function is estimated by using the Mean Value Analysis (based in the MinXEnt) to go through the variation domain of a variable in order to measure its impact on the Target mean.

Example



Adding 1 to the mean value of ***Corresponds*** (green curve) increases the target node ***Pleasure_(4)*** by 0.78



Total Effects

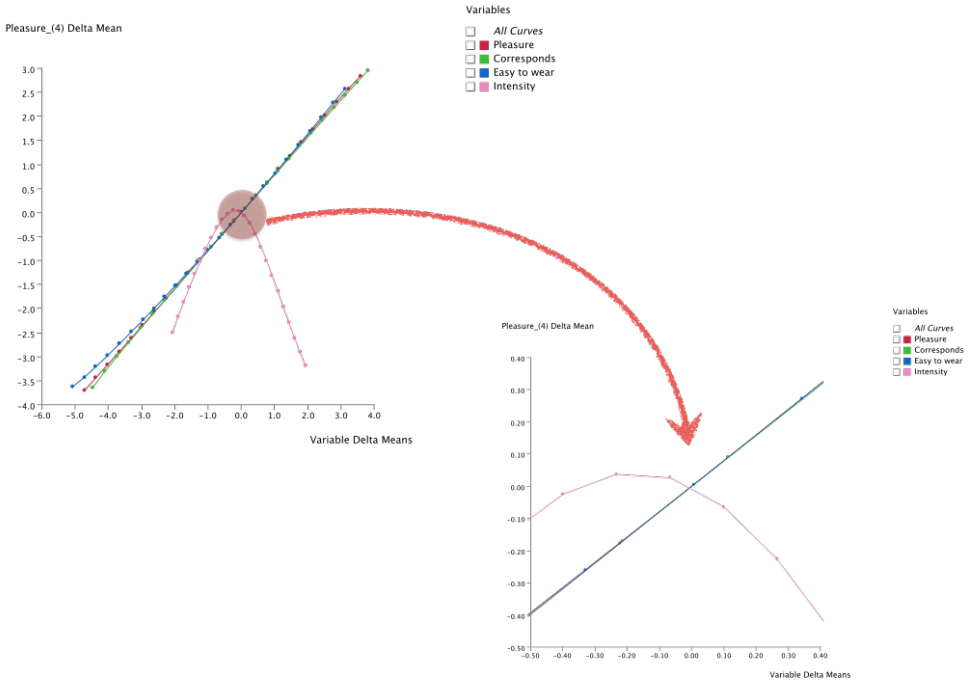
Total Effects are the derivatives of the Total Effect functions, taken at the a-priori mean values of the variables,

$$Te = \frac{\delta_y}{\delta_x}$$

the Standardized value normalizing the effect by taking into account the ration between the standard deviation of the variable and the one of the Target.

$$STe = \frac{\delta_y}{\delta_x} \times \frac{\sigma_x}{\sigma_y}$$

Example



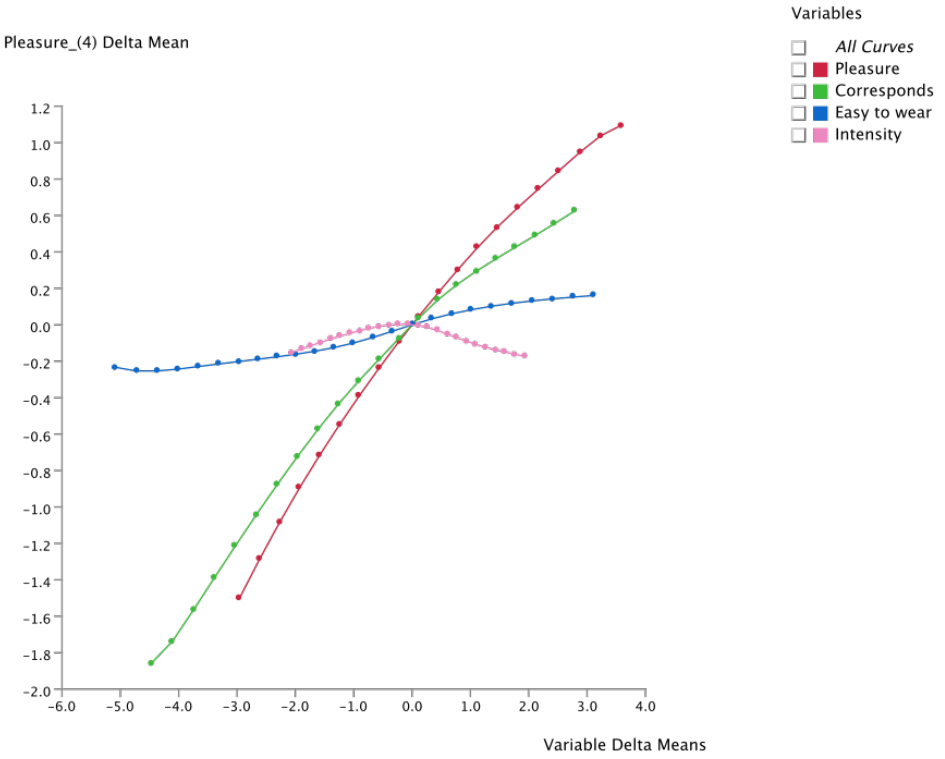
Node	Value/Mean	Standardized Total Effects	Total Effects
Pleasure	6.05	0.96	0.8
Corresponds	5.76	0.95	0.79
Easy to wear	6.5	0.83	0.79
Intensity	3.07	-0.19	-0.55

Direct Effect Function

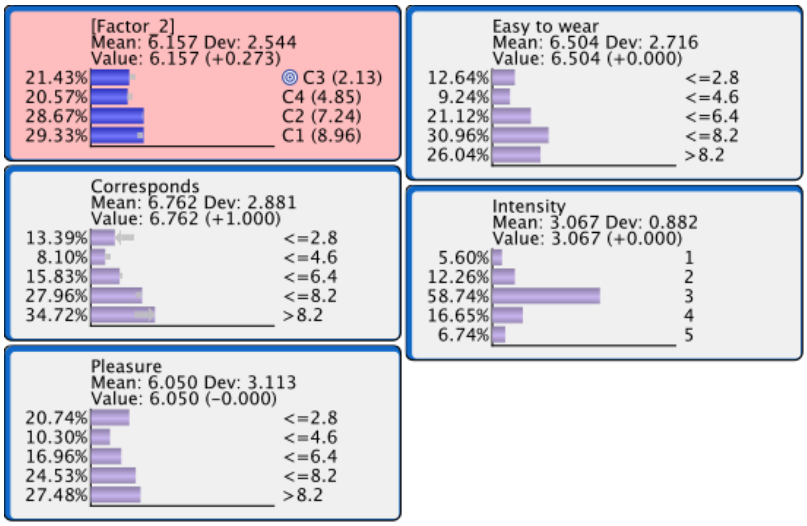
The Direct Effect Function is estimated by using the Mean Value Analysis (based in the MinXEnt) to go through the variation domain of a variable in order to measure its impact on the Target mean, **while holding fixed** the probability distributions of all the variables, except:

- The *Not-Observable* variables belonging to the Class “*Factor*”
- The variables belonging to the Class “*Non_Confounder*” .

Example



Adding 1 to the mean value of ***Corresponds*** (green curve) while holding fixed all the marginal probability distributions of all the other variables increases the target node ***Pleasure_(4)*** by 0.27



Direct Effects

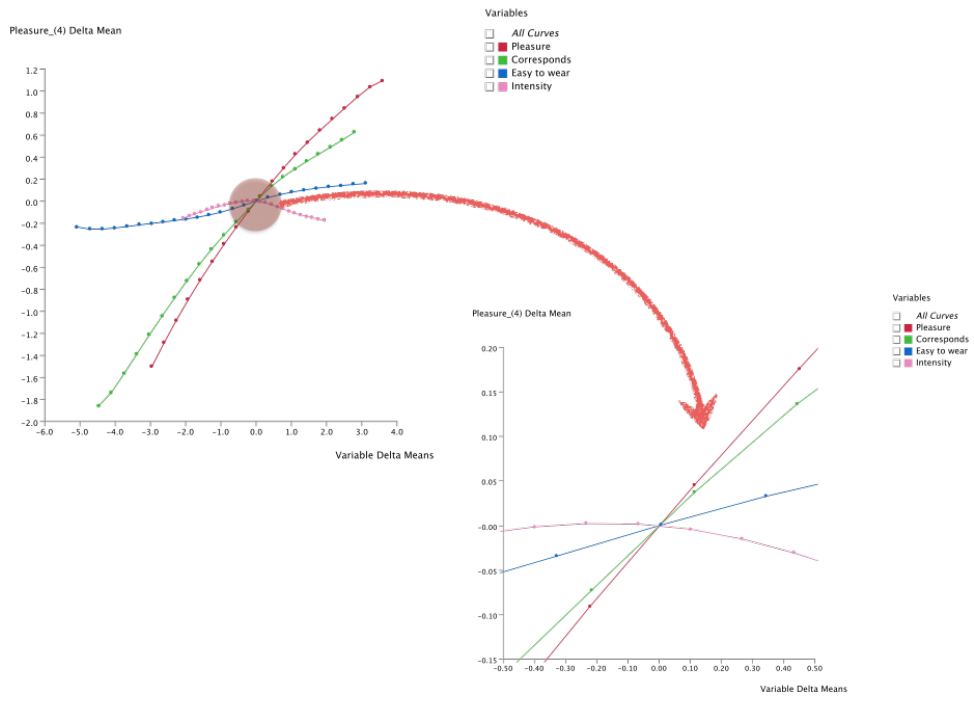
Direct Effects are the derivatives of the Direct Effect functions, taken at the a-priori mean values of the variables,

$$De_x = \frac{\delta_y}{\delta_x}$$

the Standardized value normalizing the effect by taking into account the ration between the standard deviation of the variable and the one of the Target.

$$SDe_x = \frac{\delta_y}{\delta_x} \times \frac{\sigma_x}{\sigma_y}$$

Example



Node	Value/Mean	Standardized Direct Effects	Direct Effects
Pleasure	6.05	0.48	0.4
Corresponds	5.76	0.4	0.33
Easy to wear	6.5	0.1	0.1
Intensity	3.07	-0.01	-0.03