BauchModel_GrowthandHarvestSimilarLowInteraction

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23 March, 2023, 15:21

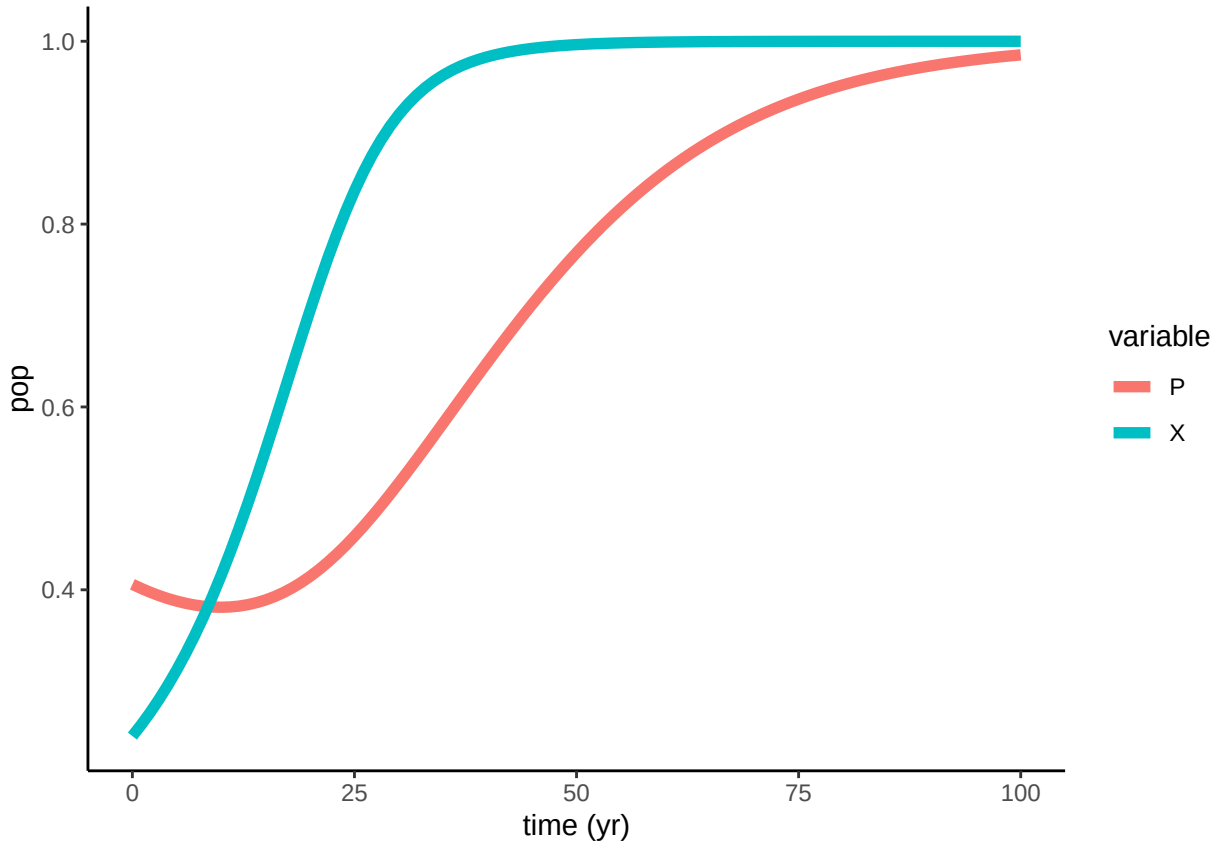

Figure 1: Original Bauch Model

Table 1: Parameter values used in this analysis

Parameter	Population_1	Population_2	Def
r	0.2	0.2	Fish net growth
s	0.8	0.8	Supply and demand
h	0.15	0.15	Harvesting efficiency
k	0.06	0.06	Social learning rate
w	0.35	0.35	Conservation cost
c	1.68	1.68	Rarity valuation
d	0.2	0.2	Social norm strength (within pop)
e	0.01	0.01	Fish emigration (from patch)
i	0.01	0.01	Fish immigration (from opposite patch)
prop	0.1	0.1	Social norm strength (opposite pop)

Table 2: Starting values used in this analysis

Parameter	Population_1	Population_2
F	0.406	0.406
X	0.240	0.240

SCENARIO: THAMPI PARAMS SIMILAR GRWOTH AND HARVEST PARAMS LOW INTERACTION

Function:

$\frac{dP_1}{dt} = r_1 P_1(1 - P_1) - \frac{h_1 * P_1(1-X_1)}{P_1+s_1} - e_1 P_1 + i_1 P_2$

$\frac{dP_2}{dt} = r_2 P_2(1 - P_2) - \frac{h_2 * P_2(1-X_2)}{P_2+s_2} - e_2 P_2 + i_2 P_1$

$\frac{dX_1}{dt} = k_1 X_1(1 - X_1)[\frac{1}{P_1+c_1} - w_1 + d_1(2X_1 - 1) + prop_1(2X_2 - 1)]$

$\frac{dX_2}{dt} = k_2 X_2(1 - X_2)[\frac{1}{P_2+c_2} - w_2 + d_2(2X_2 - 1) + prop_2(2X_1 - 1)]$

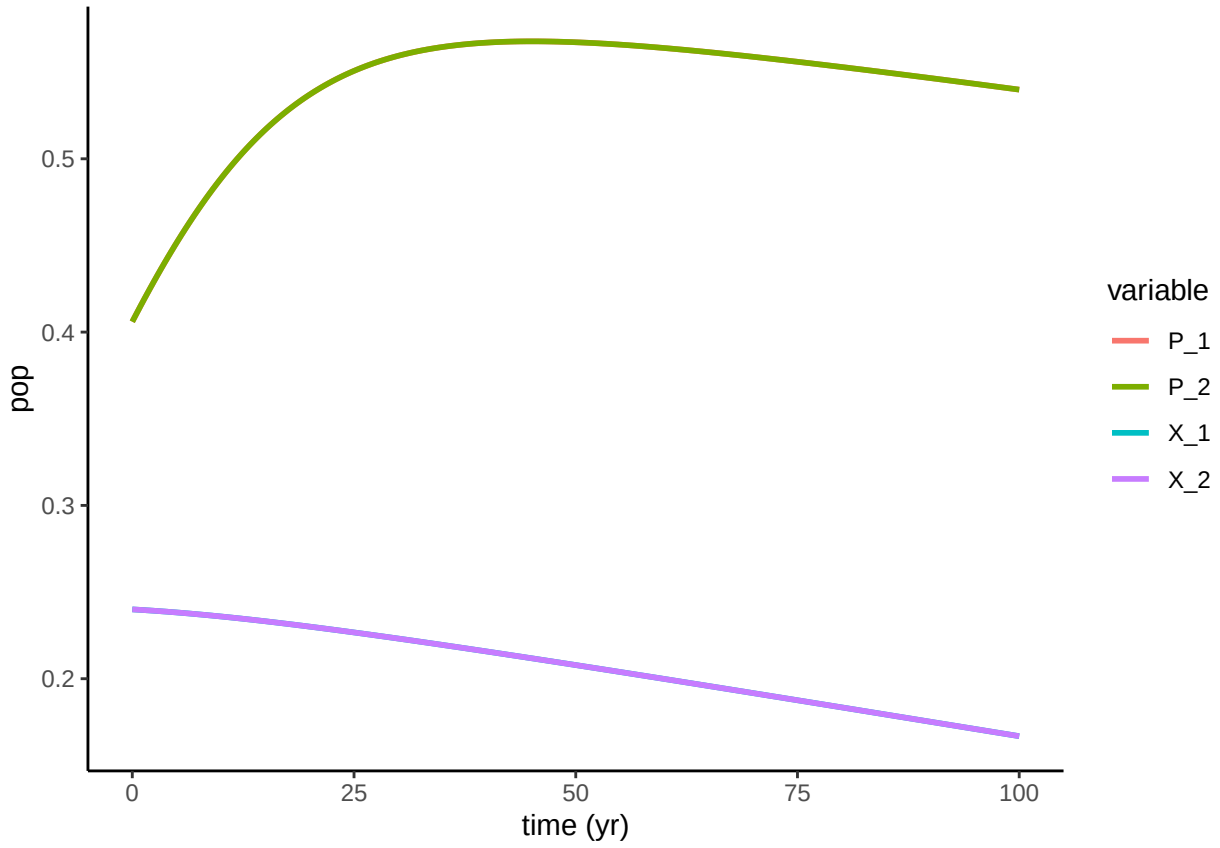

Figure 2: New Model with default paramters

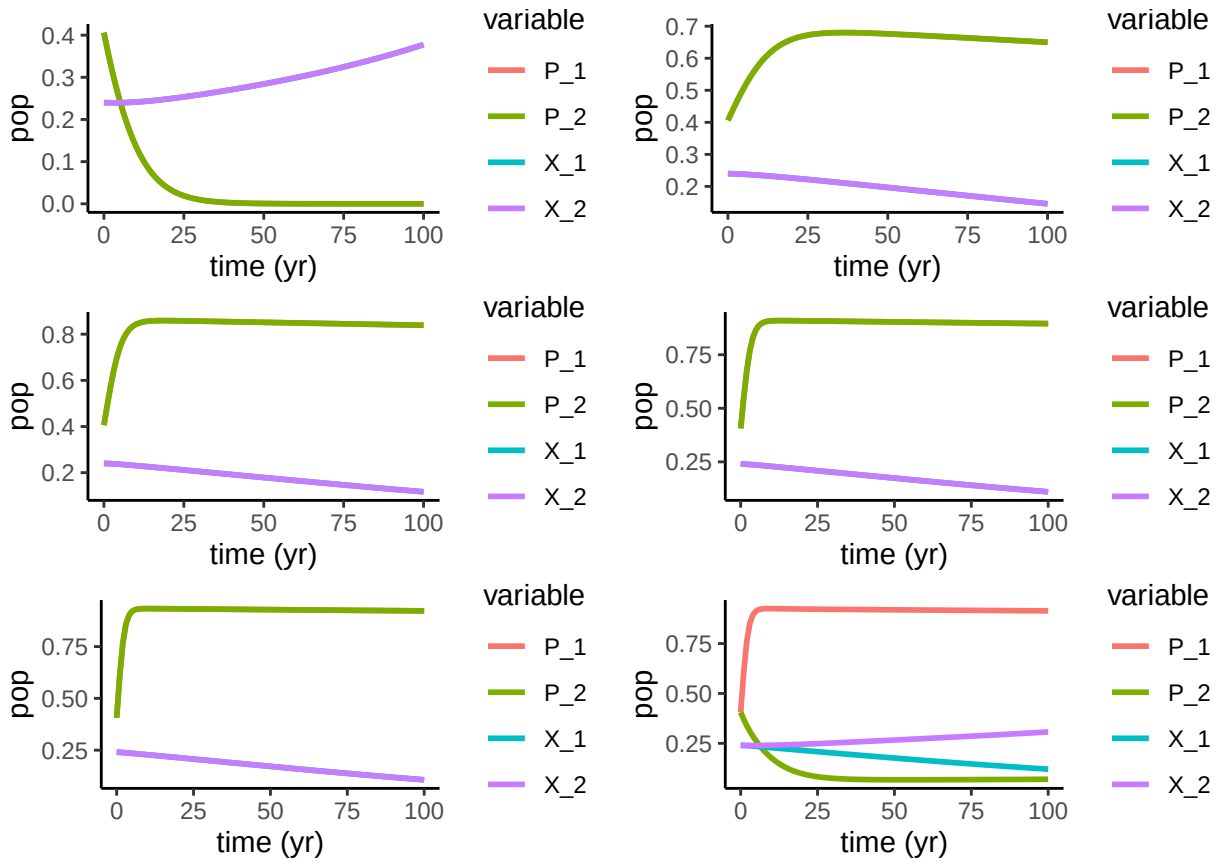

Figure 3: R - Net growth/fecundity, range 0 to 1

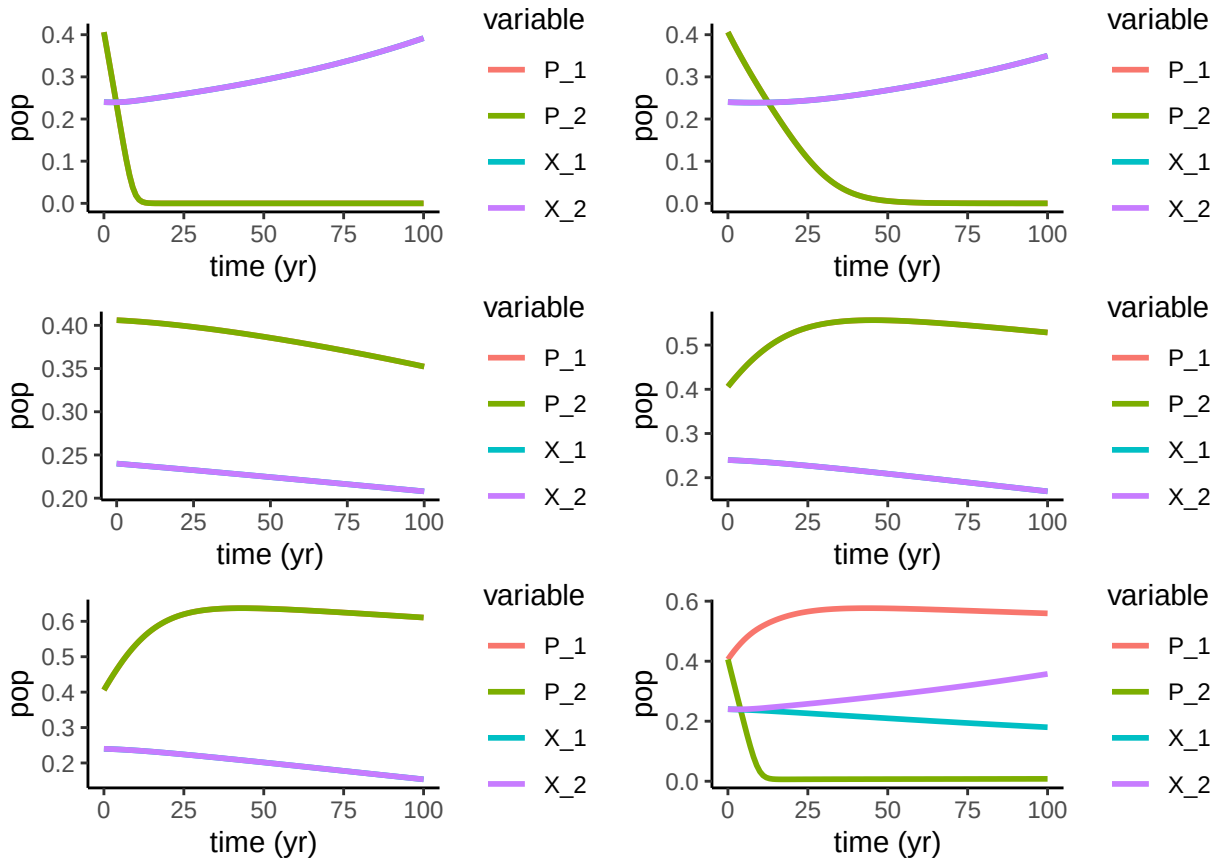

Figure 4: S - supply and demand, range 0.1 to 1

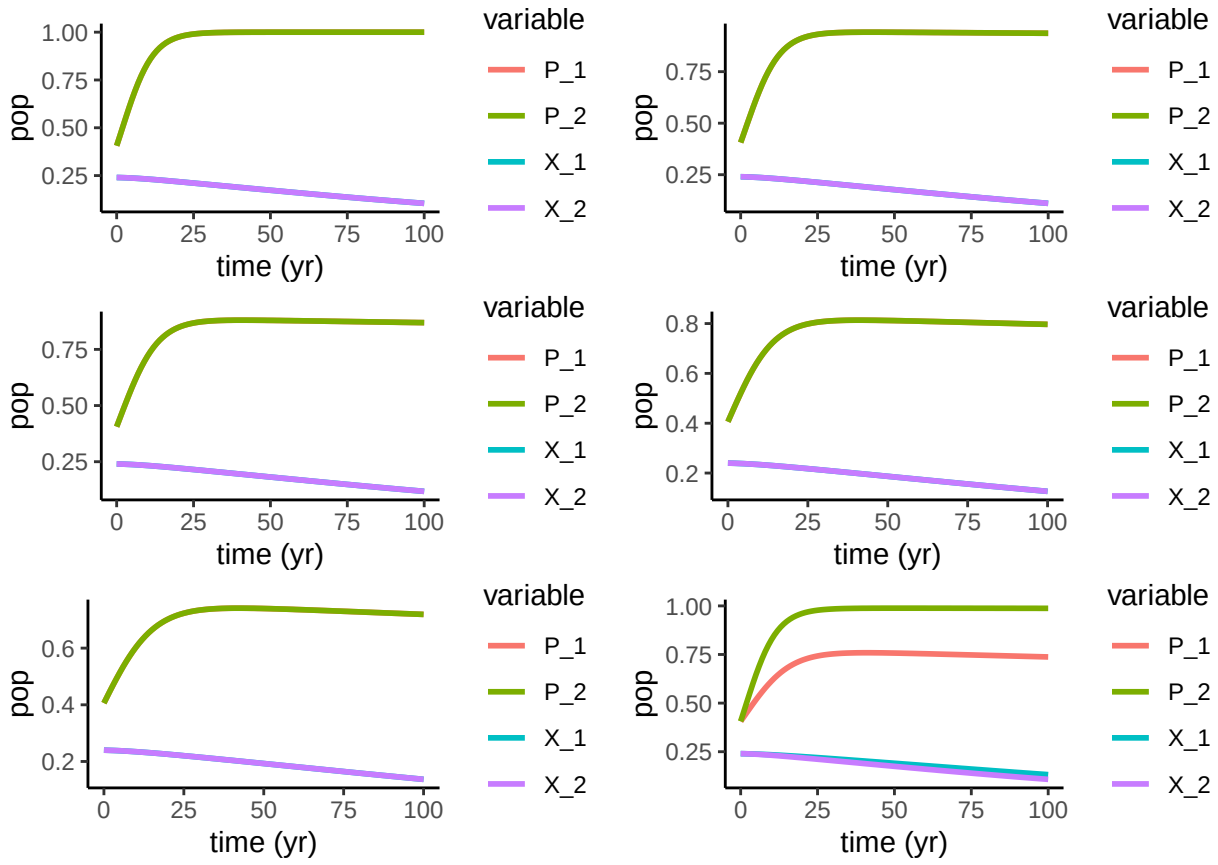

Figure 5: h - Harvesting efficiency, range 0 to 0.1. Note, default is .075

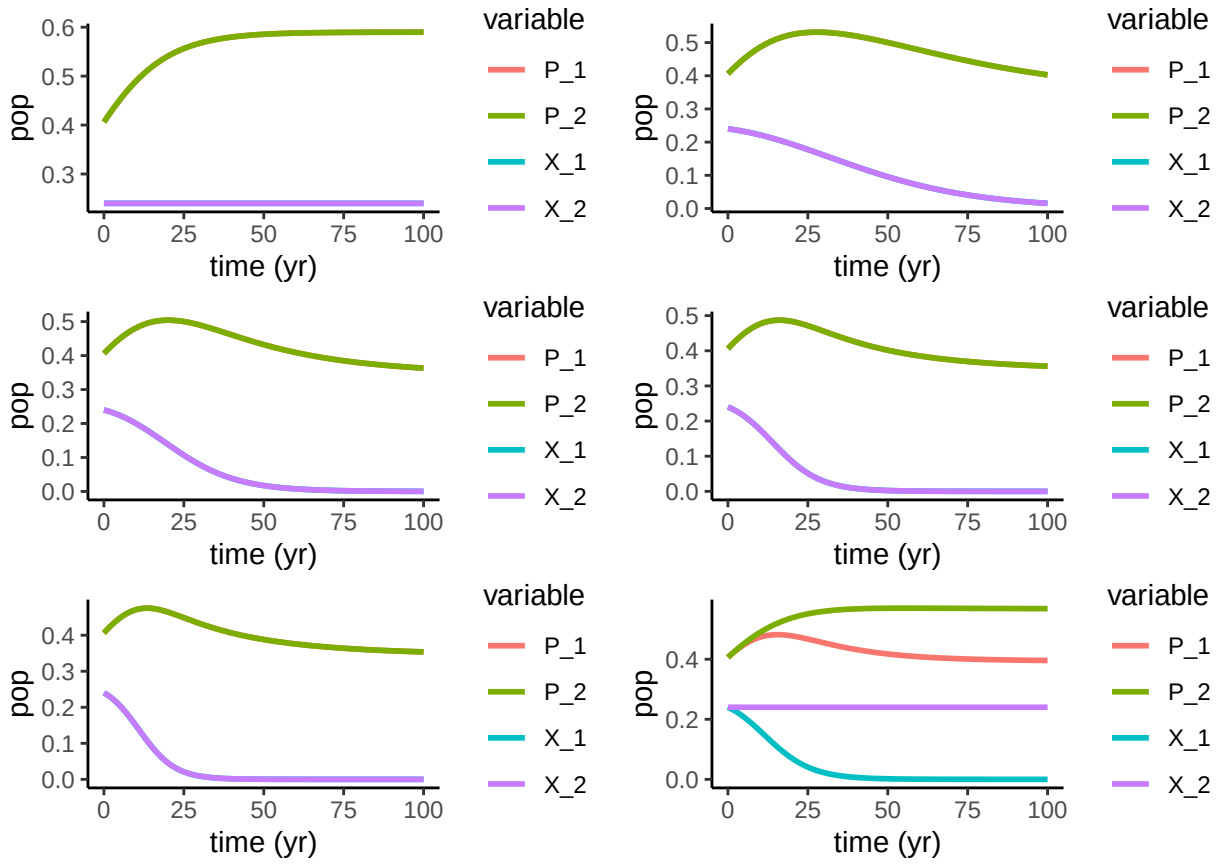

Figure 6: K - Social learning rate 0 to 1

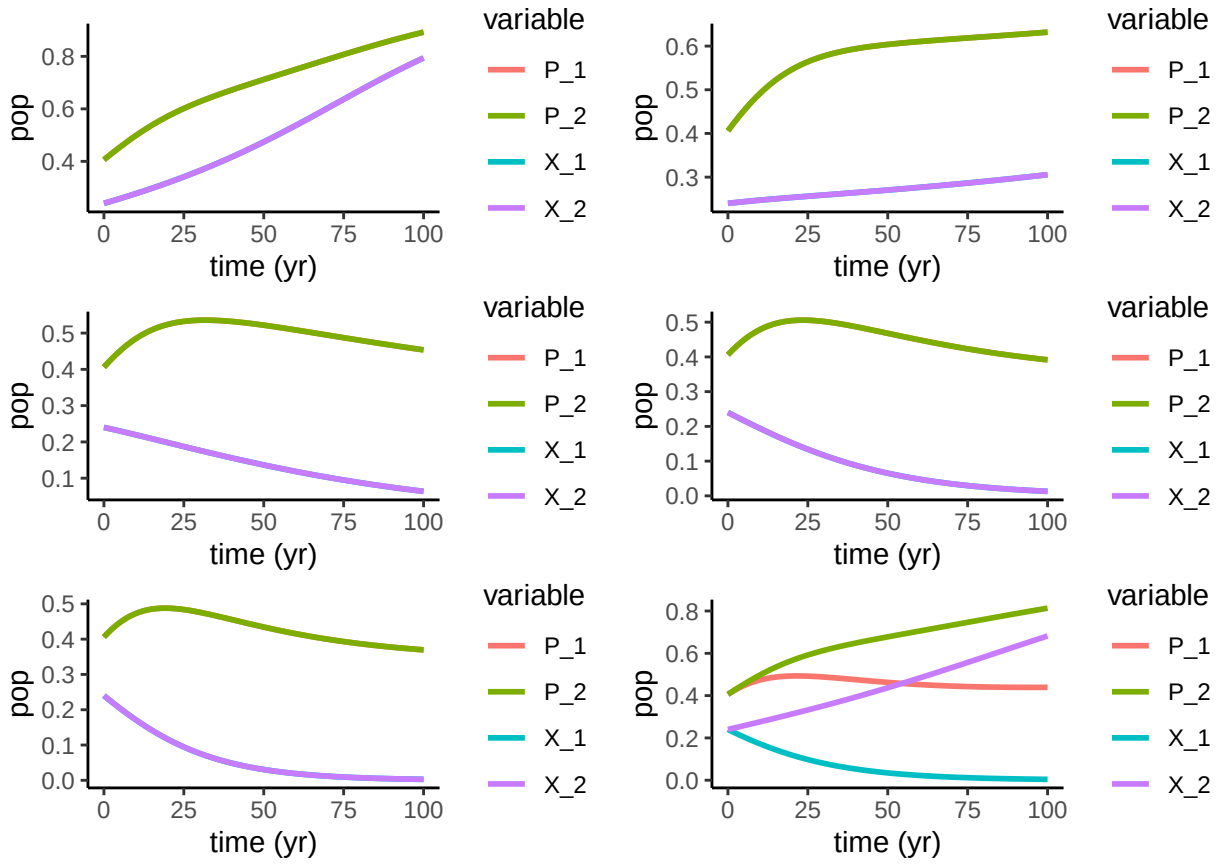

Figure 7: w - conservation costs

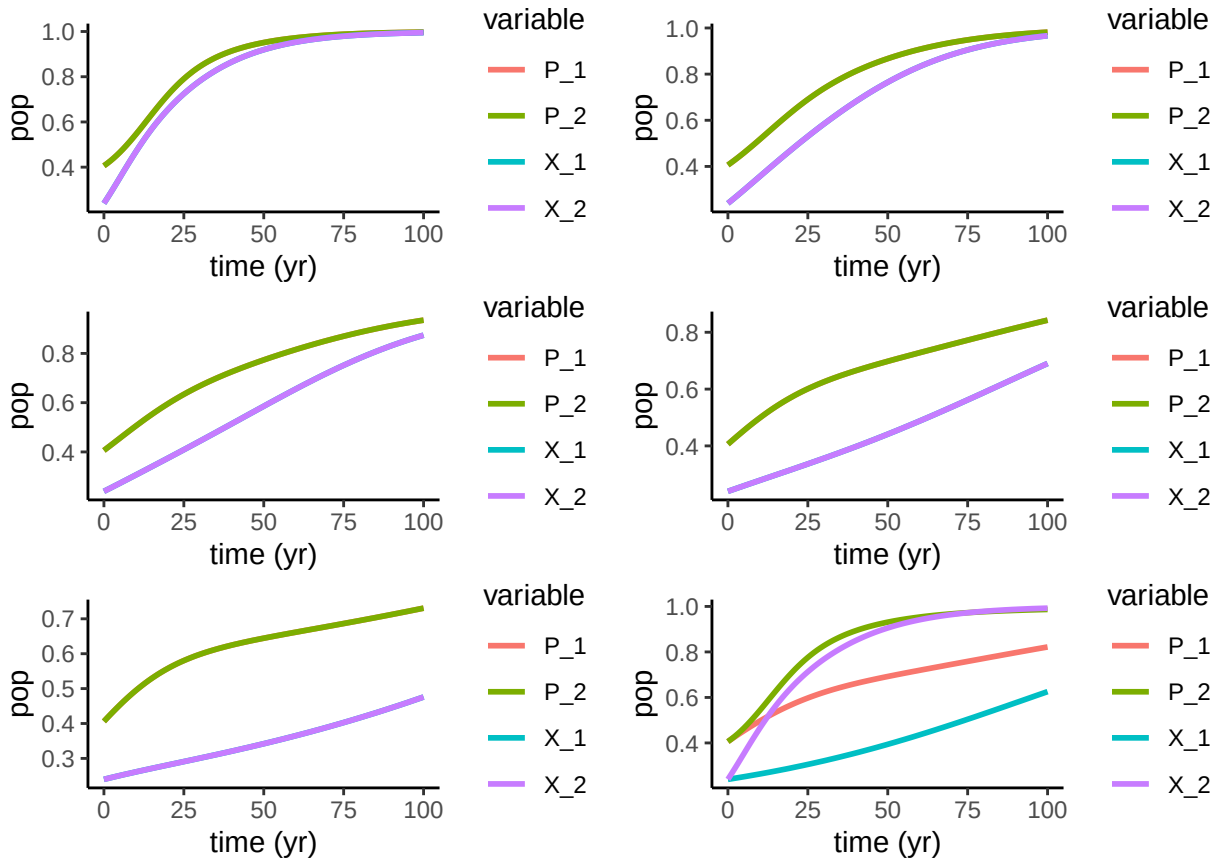

Figure 8: c - rarity valuation param

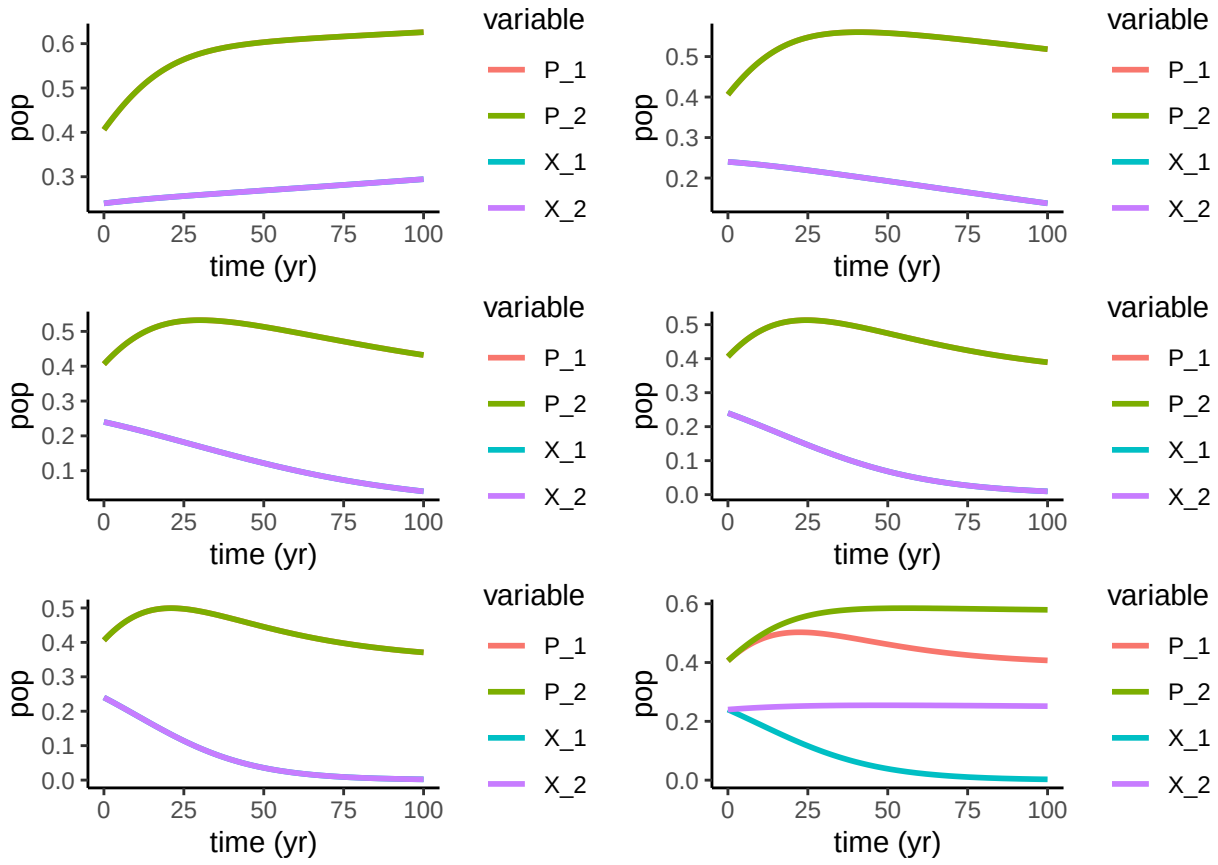

Figure 9: d - social norm strength

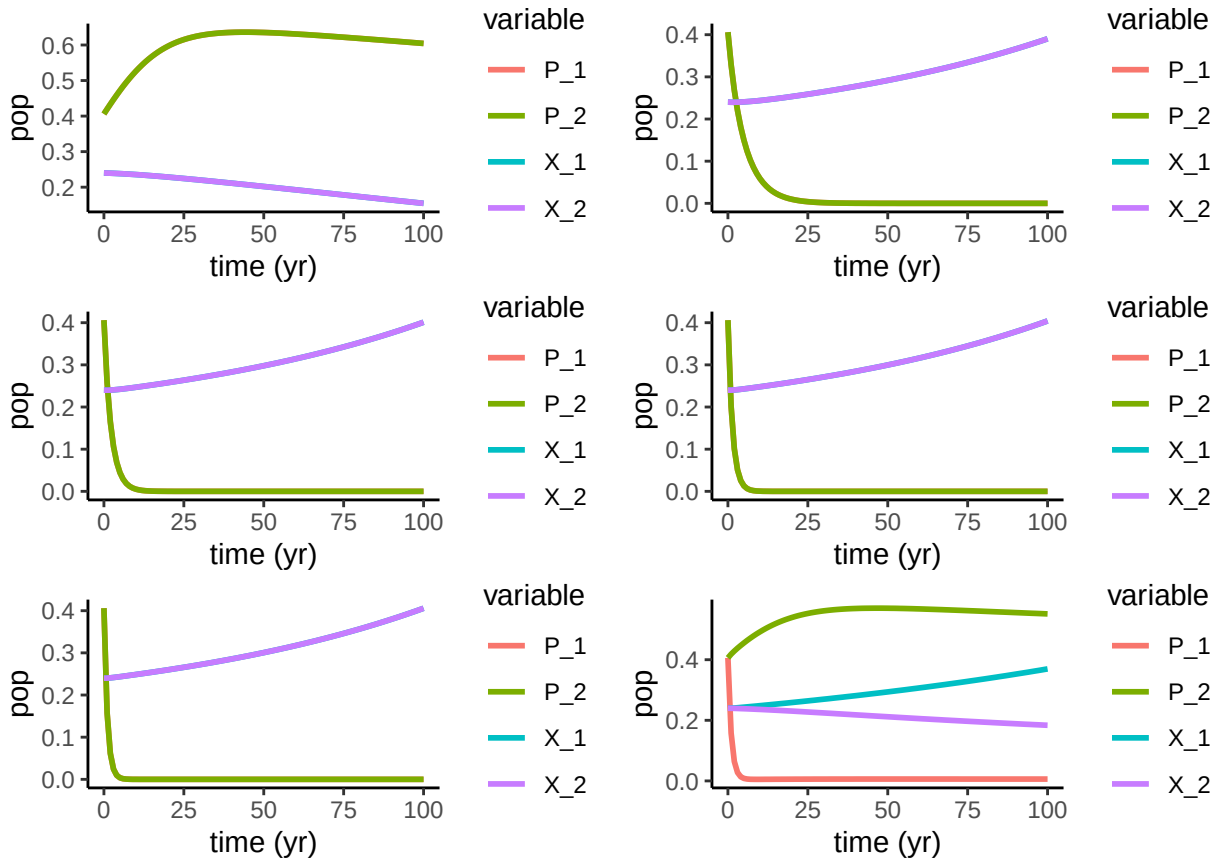

Figure 10: e - fish emigration

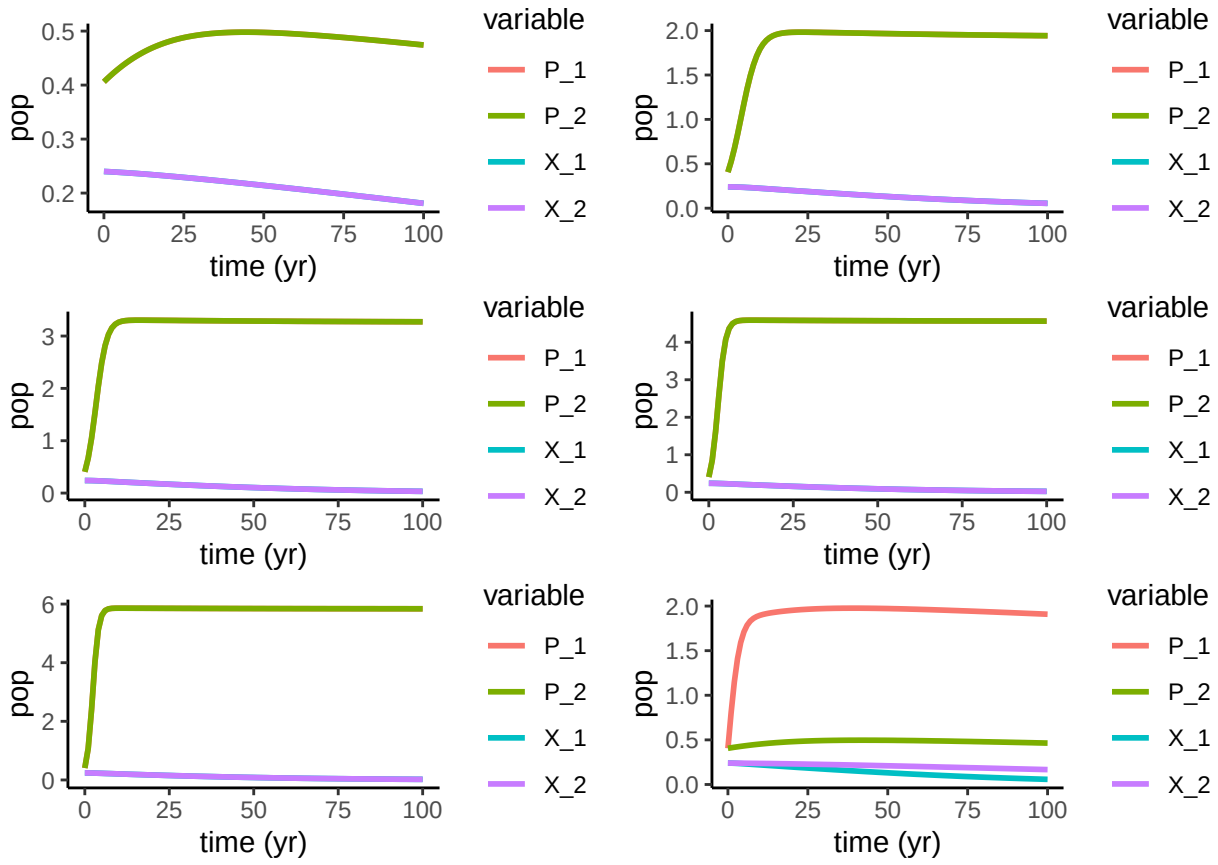

Figure 11: i - fish immigration

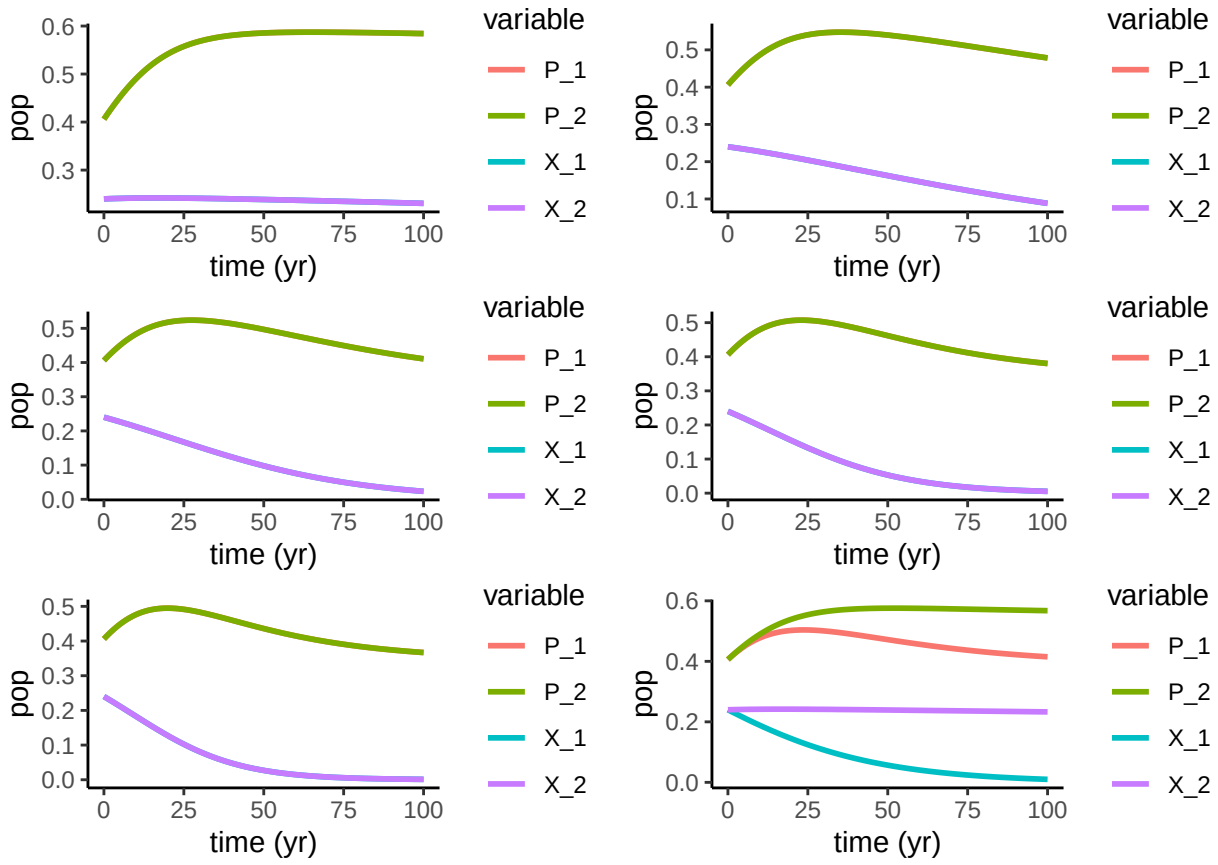

Figure 12: prop - Population influence on the other

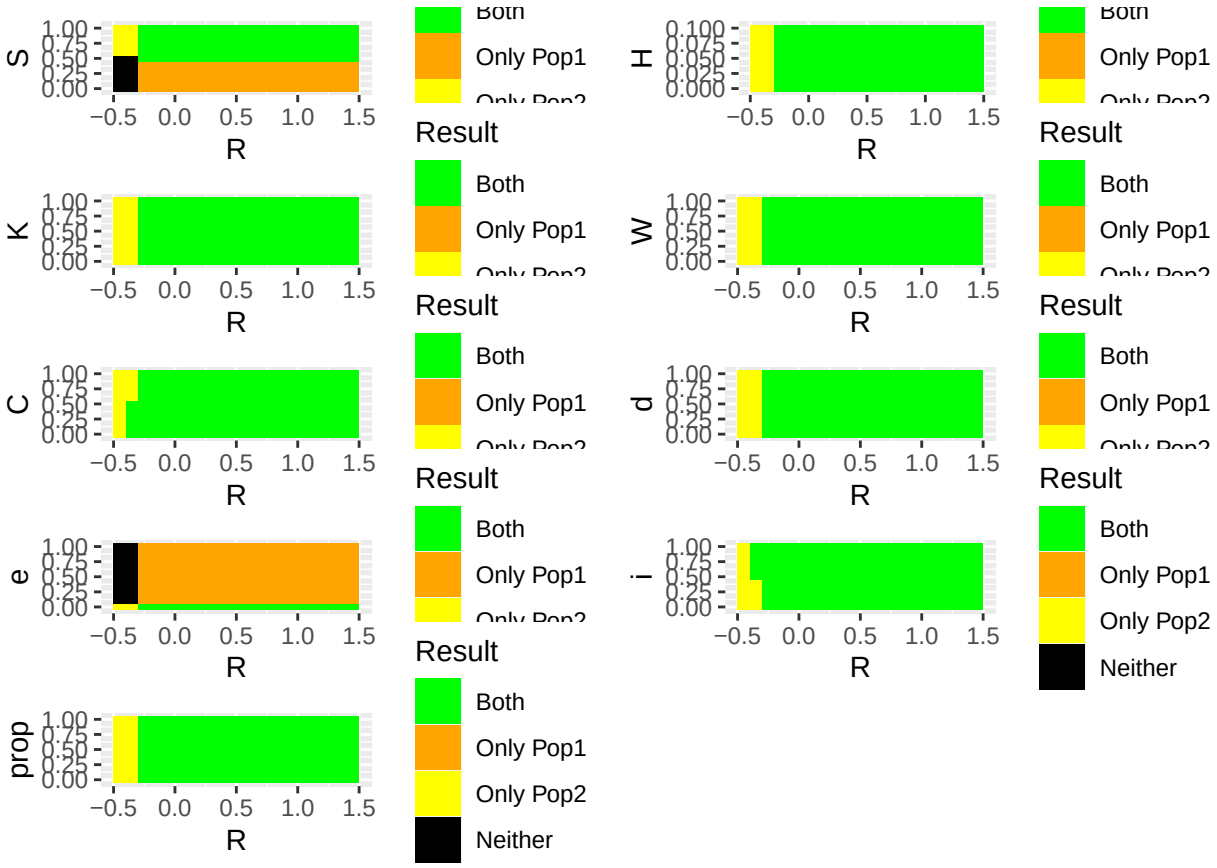

Figure 13: R parameter planes

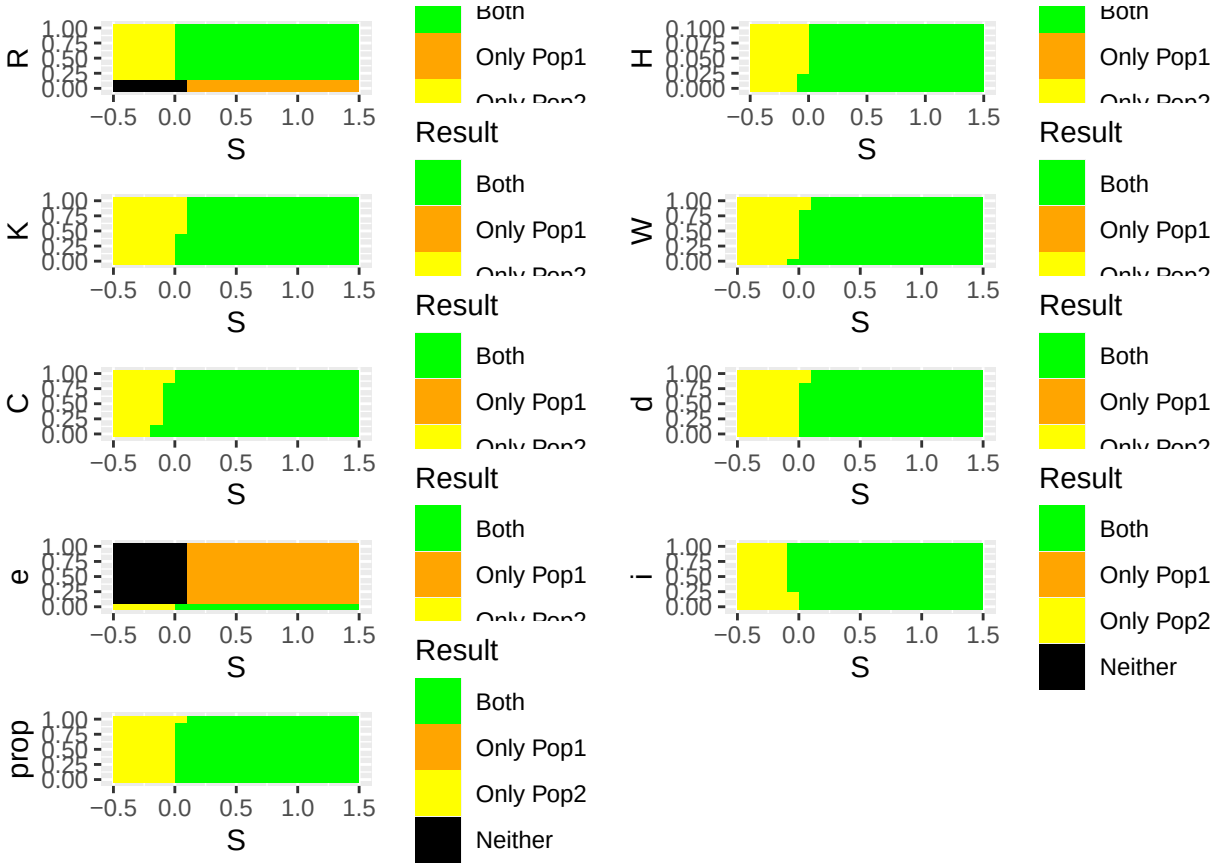

Figure 14: S parameter planes

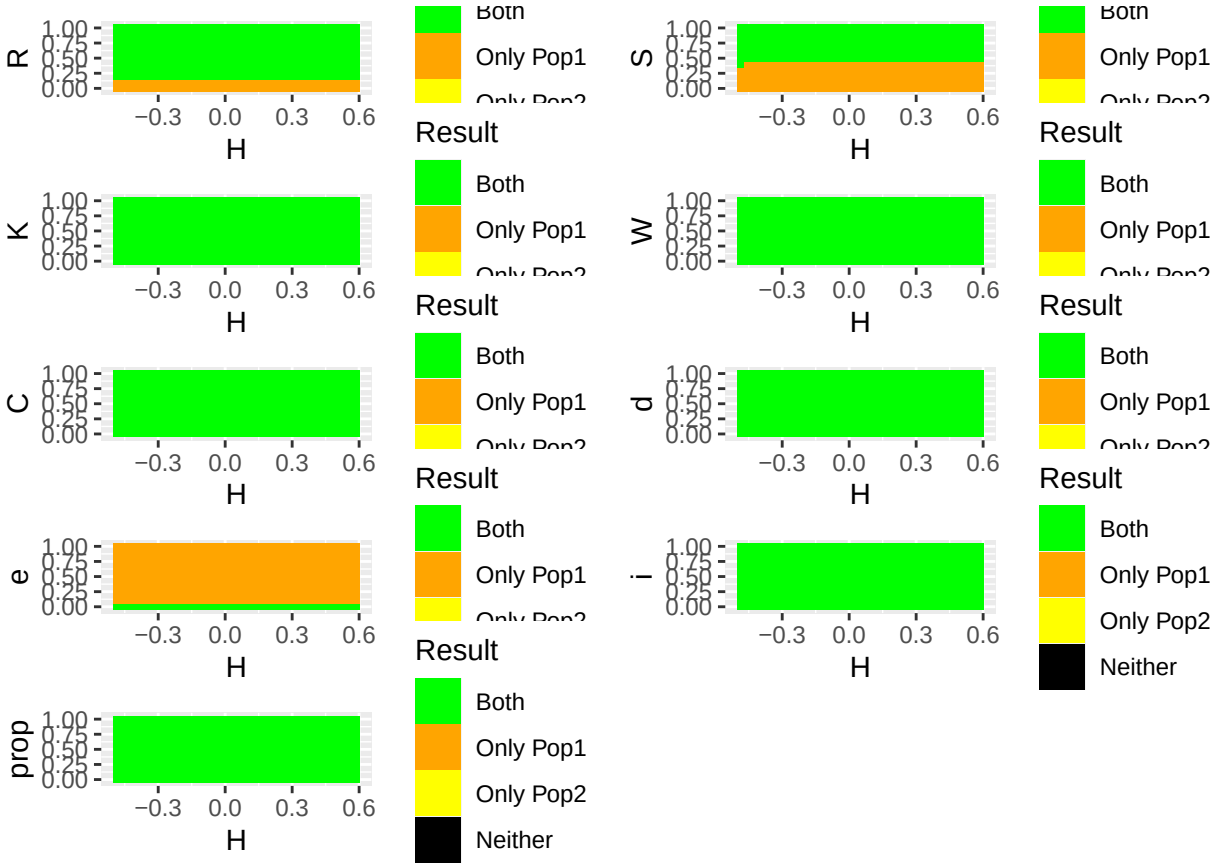

Figure 15: h parameter planes

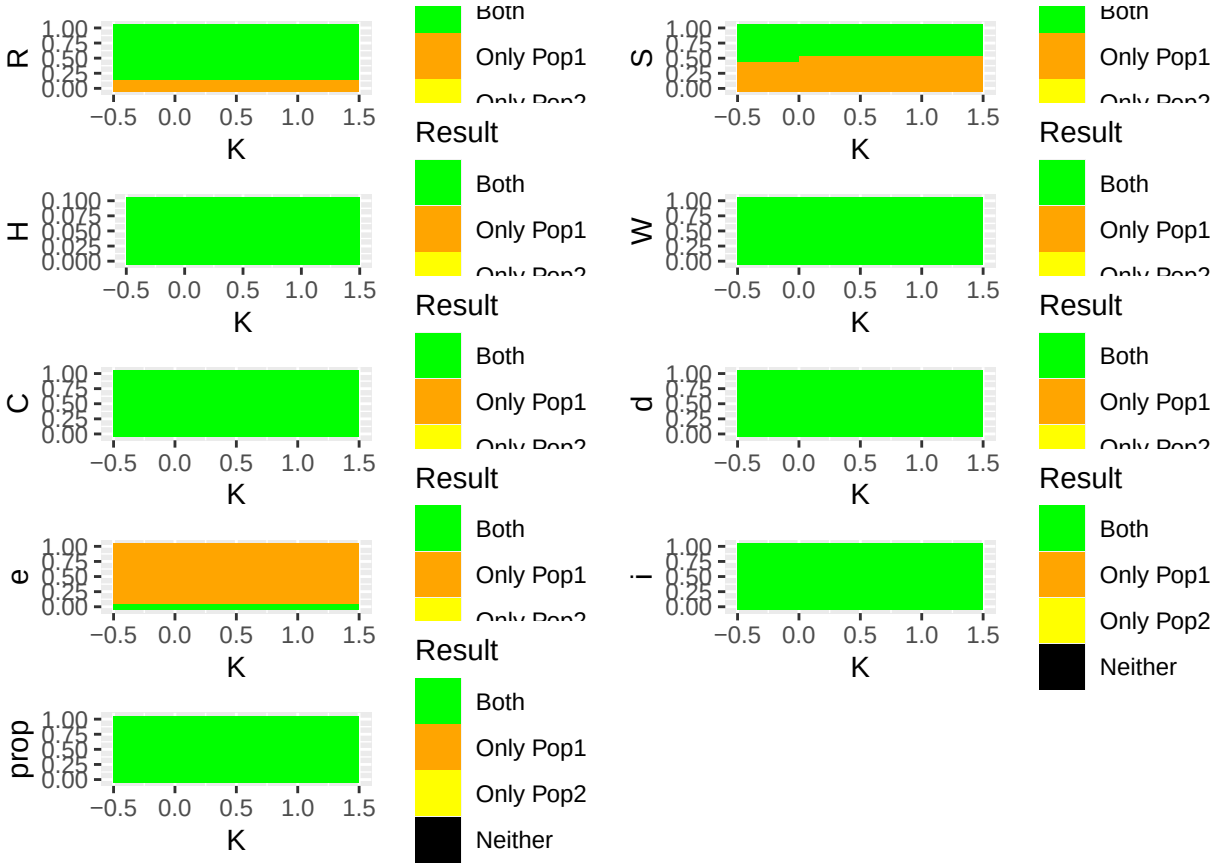

Figure 16: K parameter planes ranging from 0-1

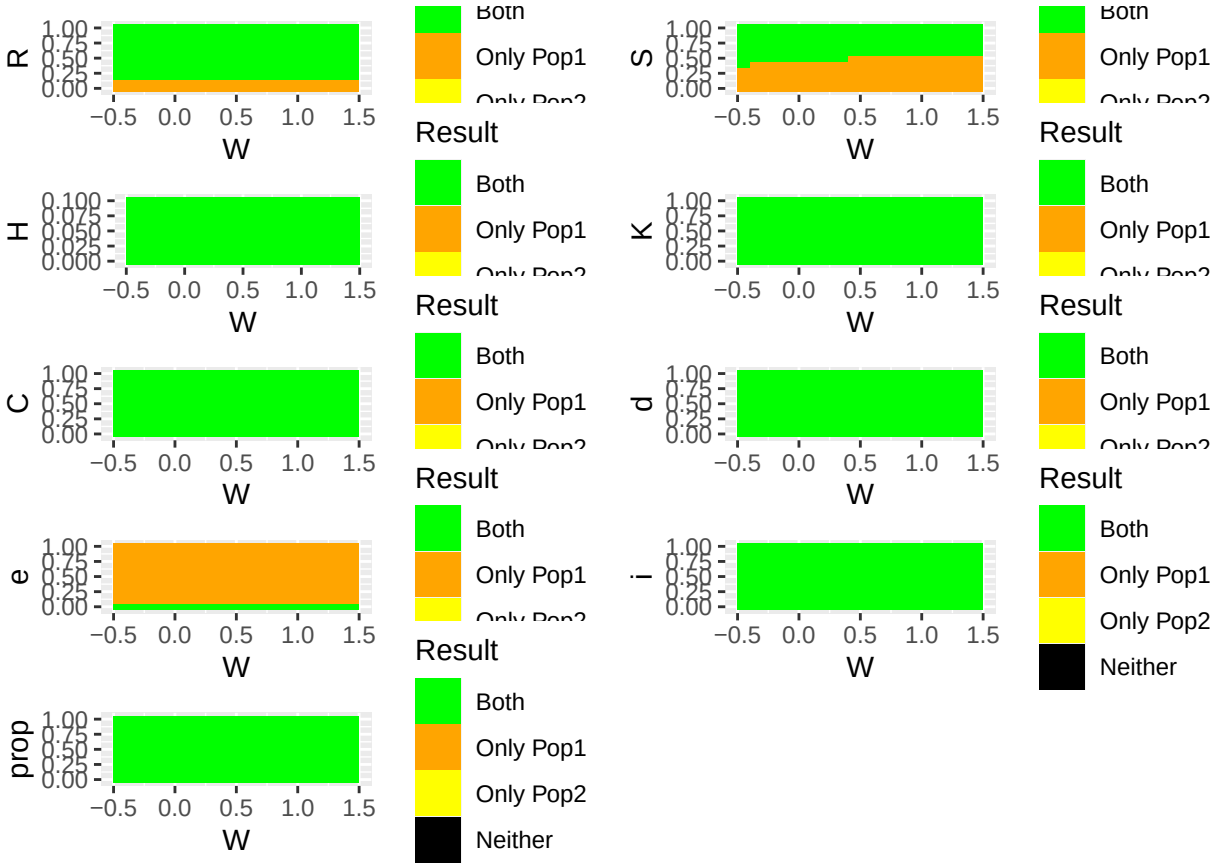

Figure 17: w parameter planes

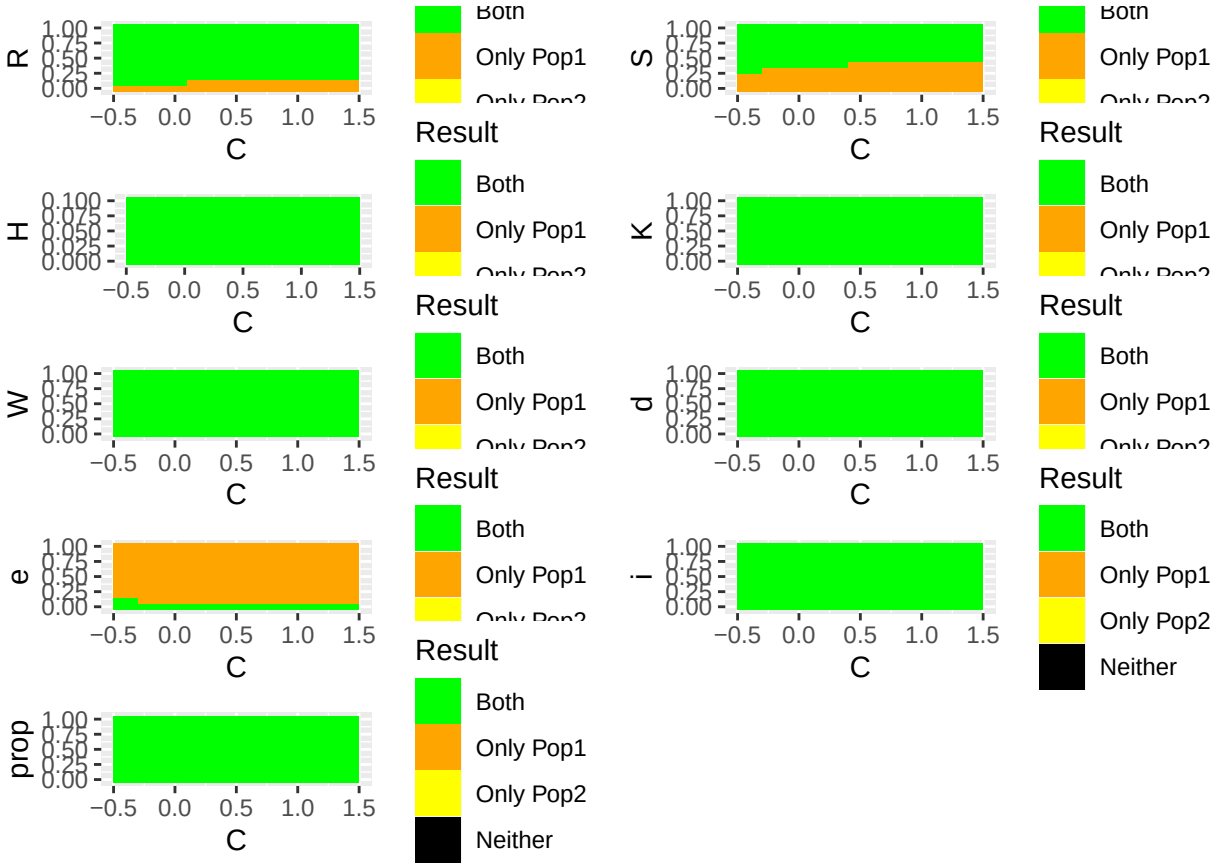

Figure 18: c parameter planes

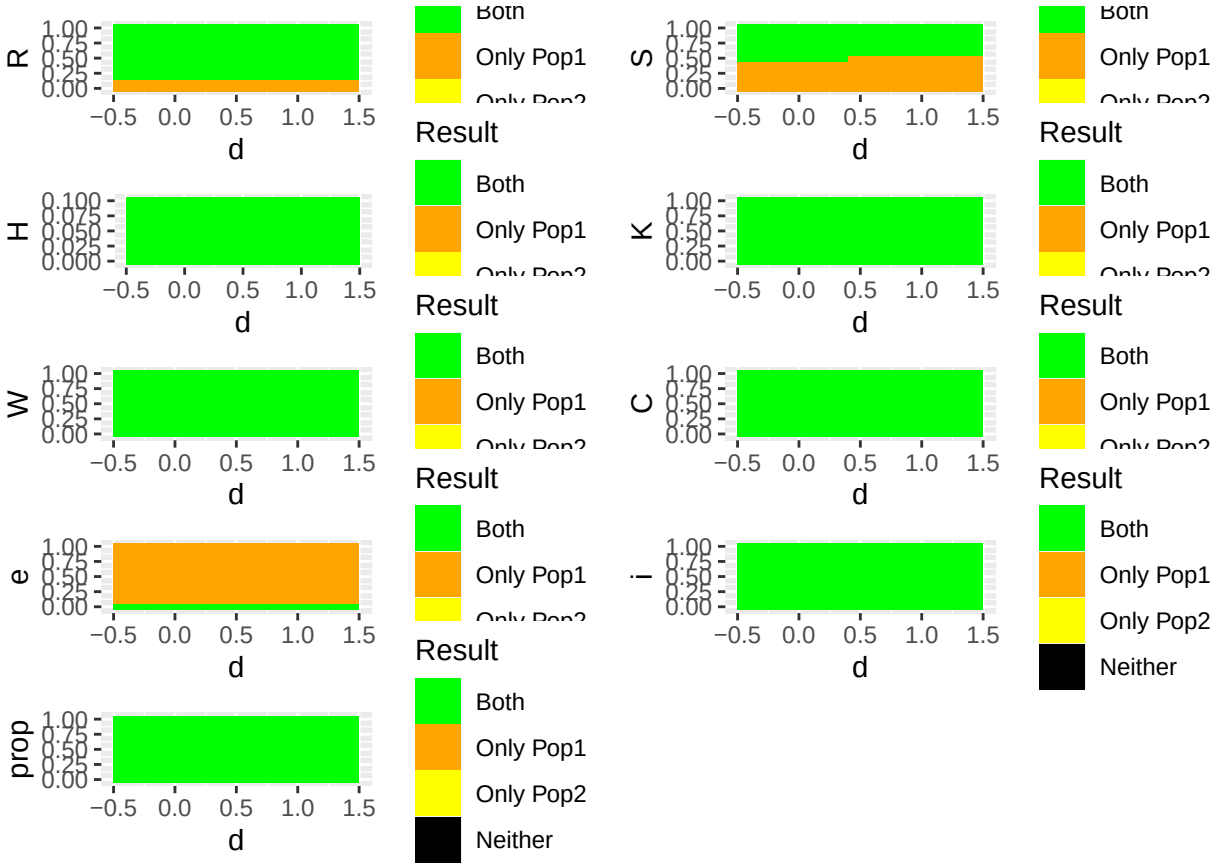

Figure 19: d parameter planes

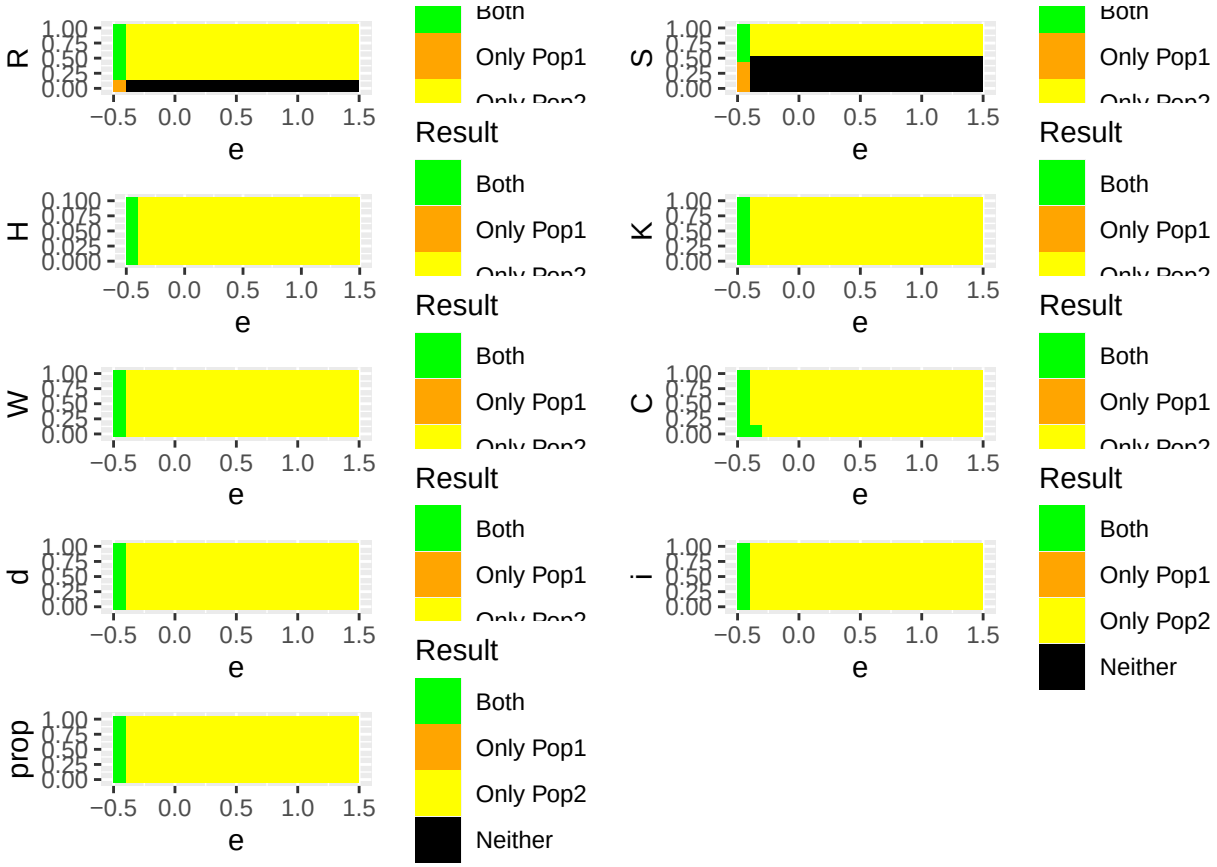

Figure 20: e parameter planes

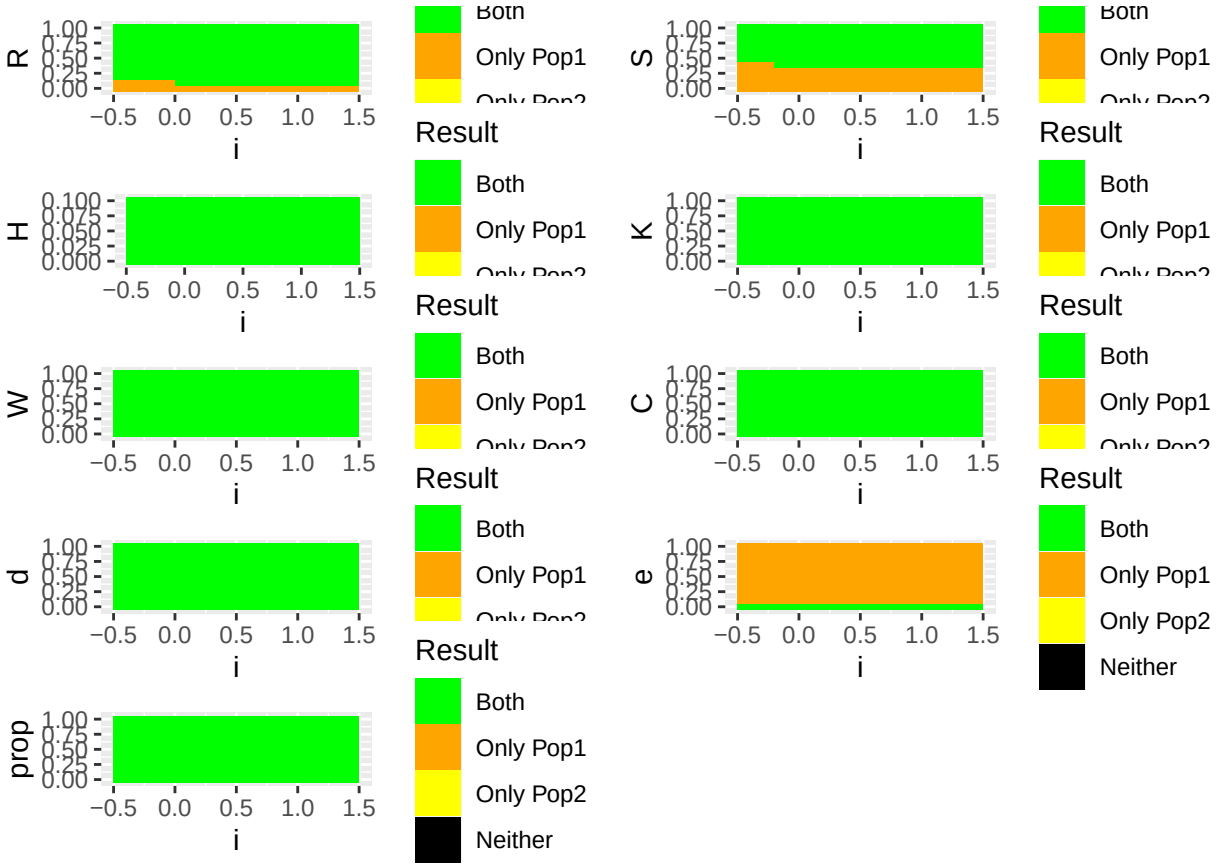

Figure 21: i parameter planes

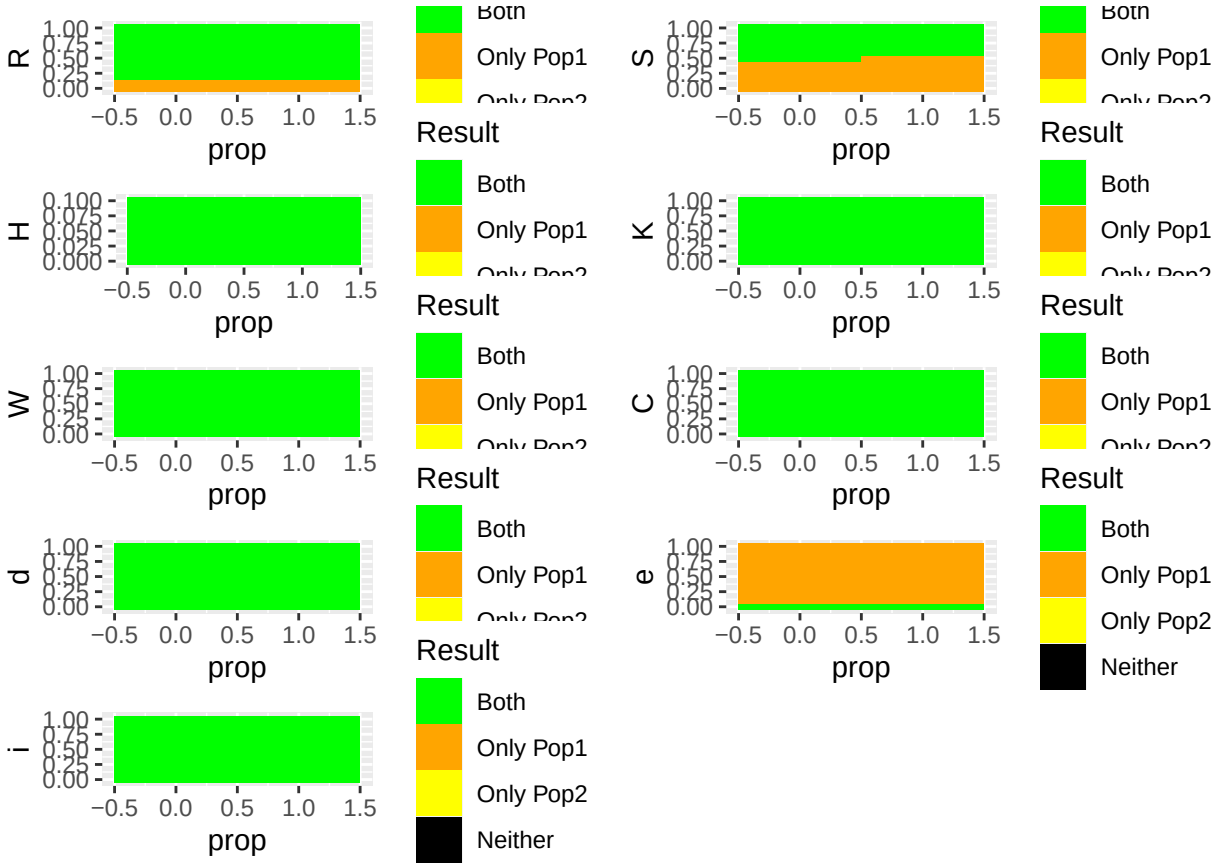

Figure 22: prop parameter planes

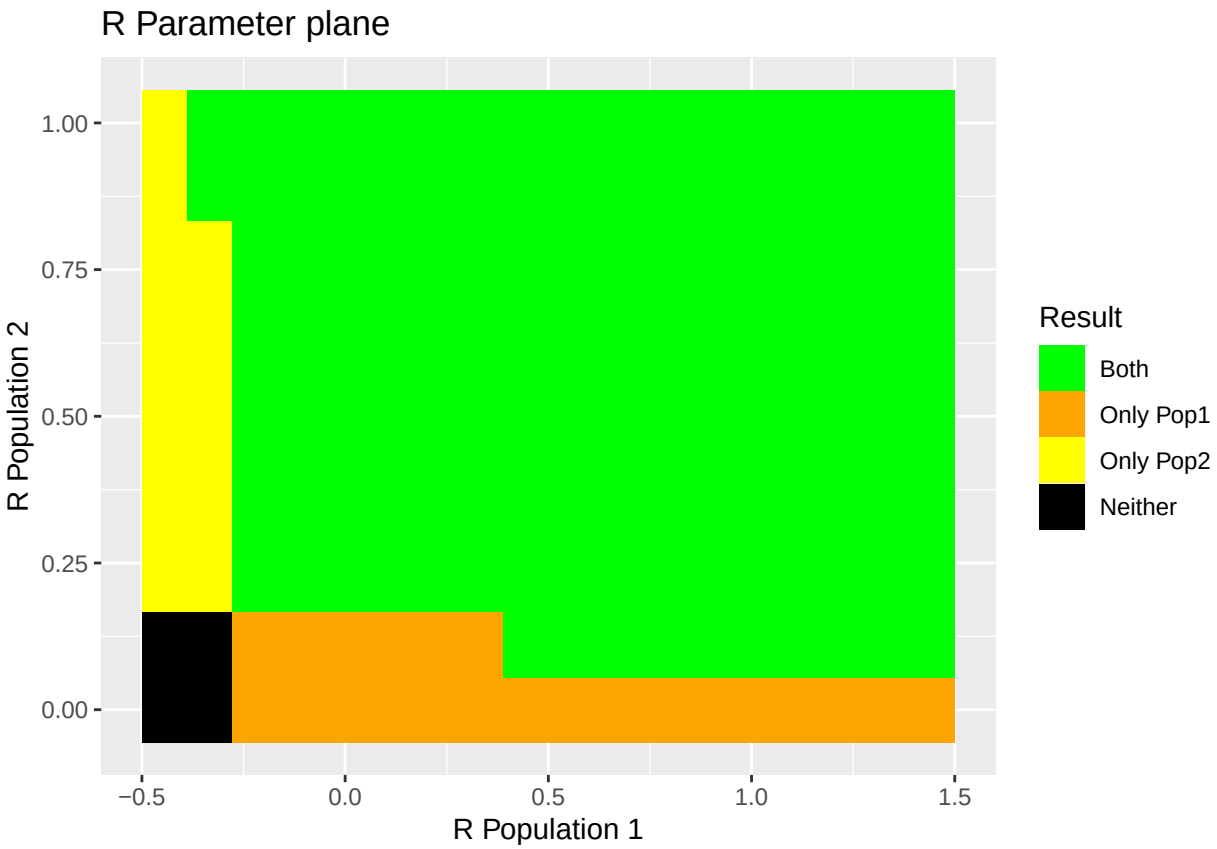

Figure 23: r population planes

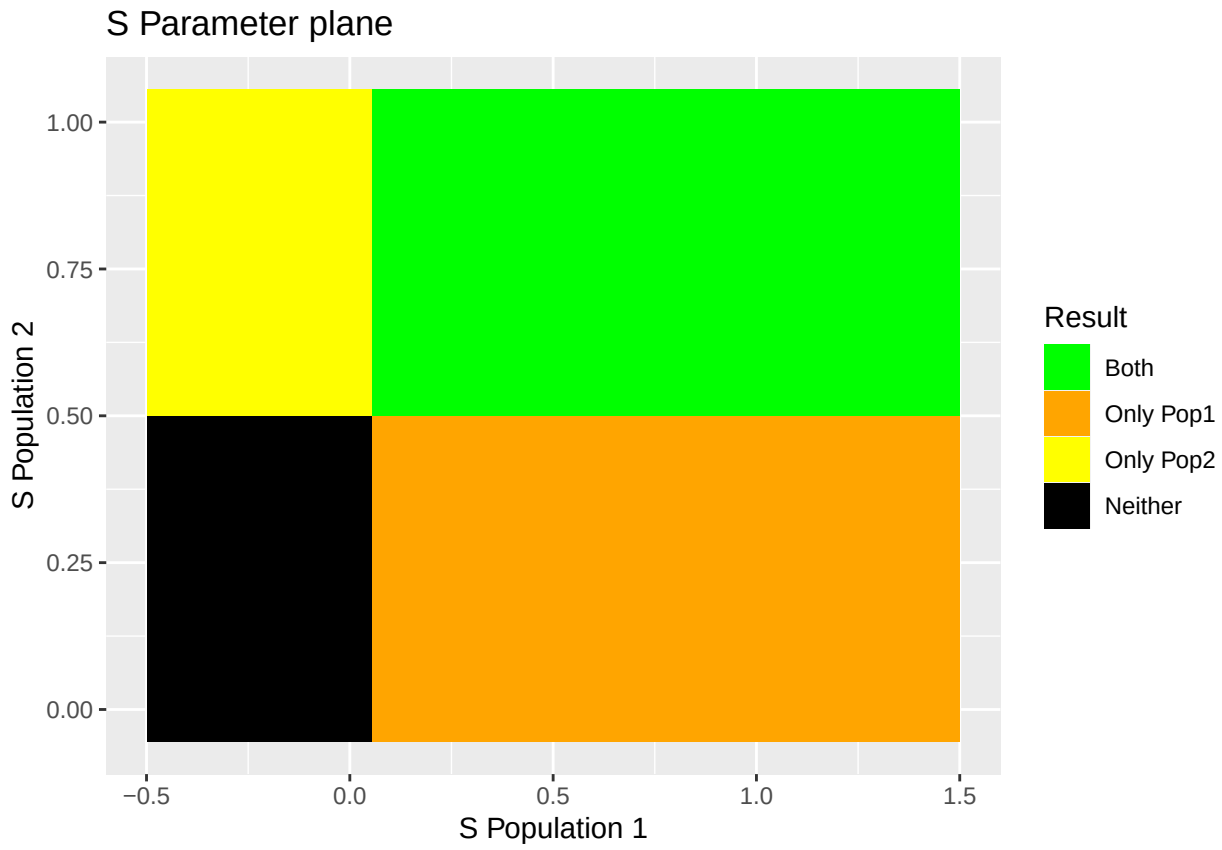

Figure 24: s population planes

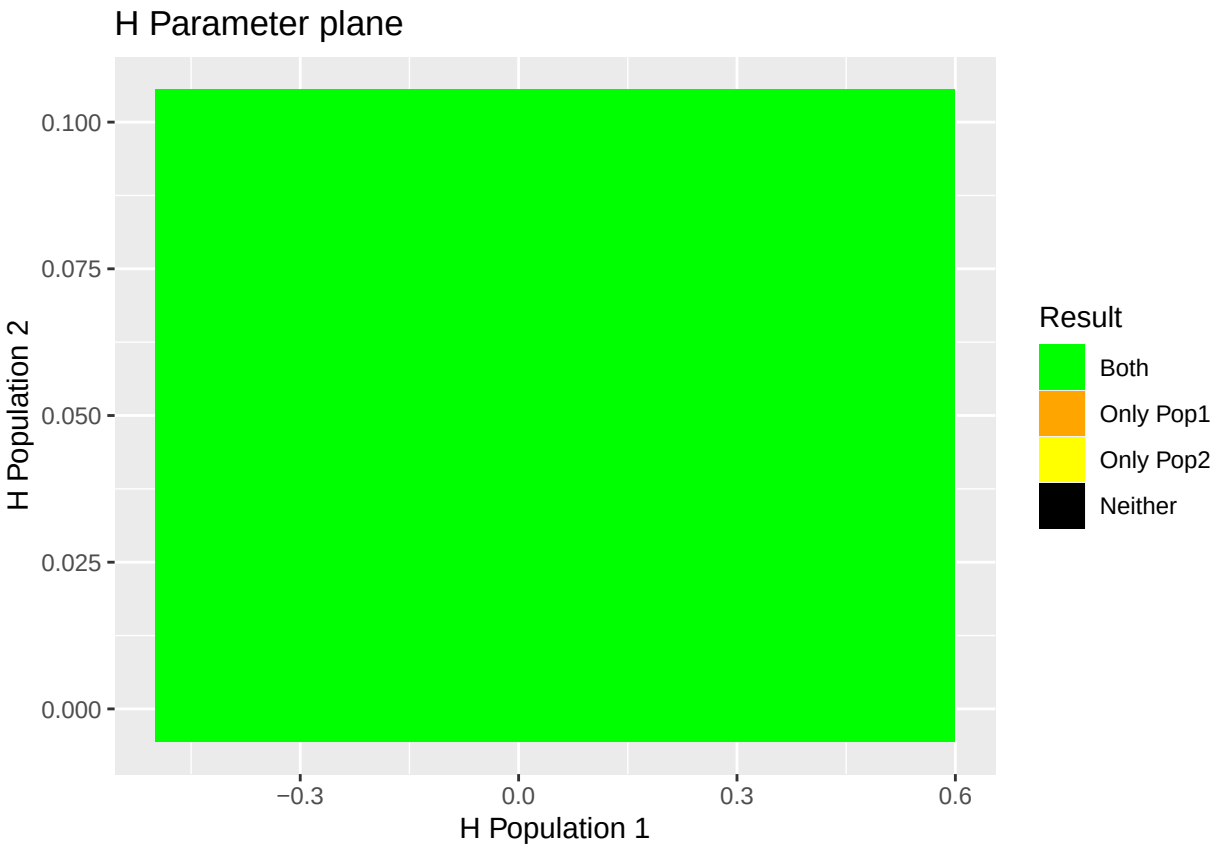

Figure 25: h population planes

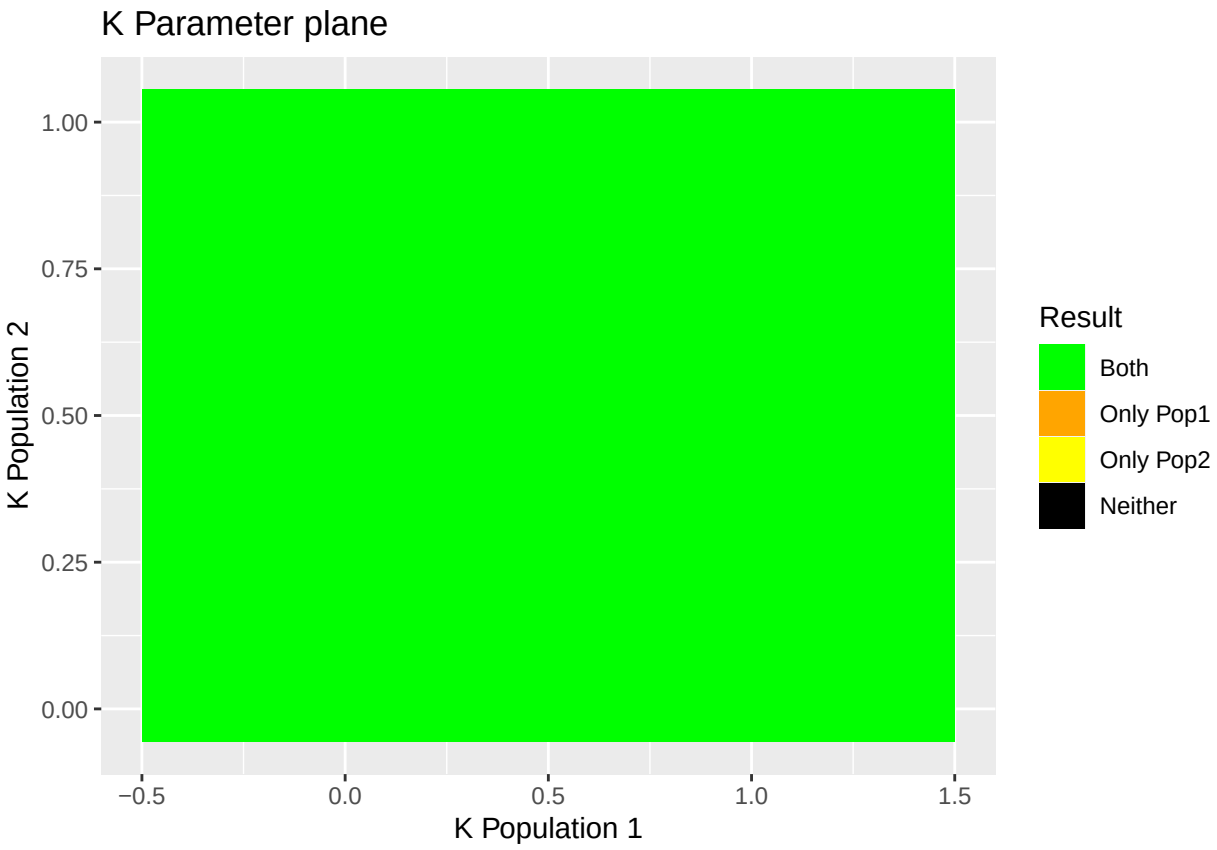

Figure 26: k population planes 0 to 1

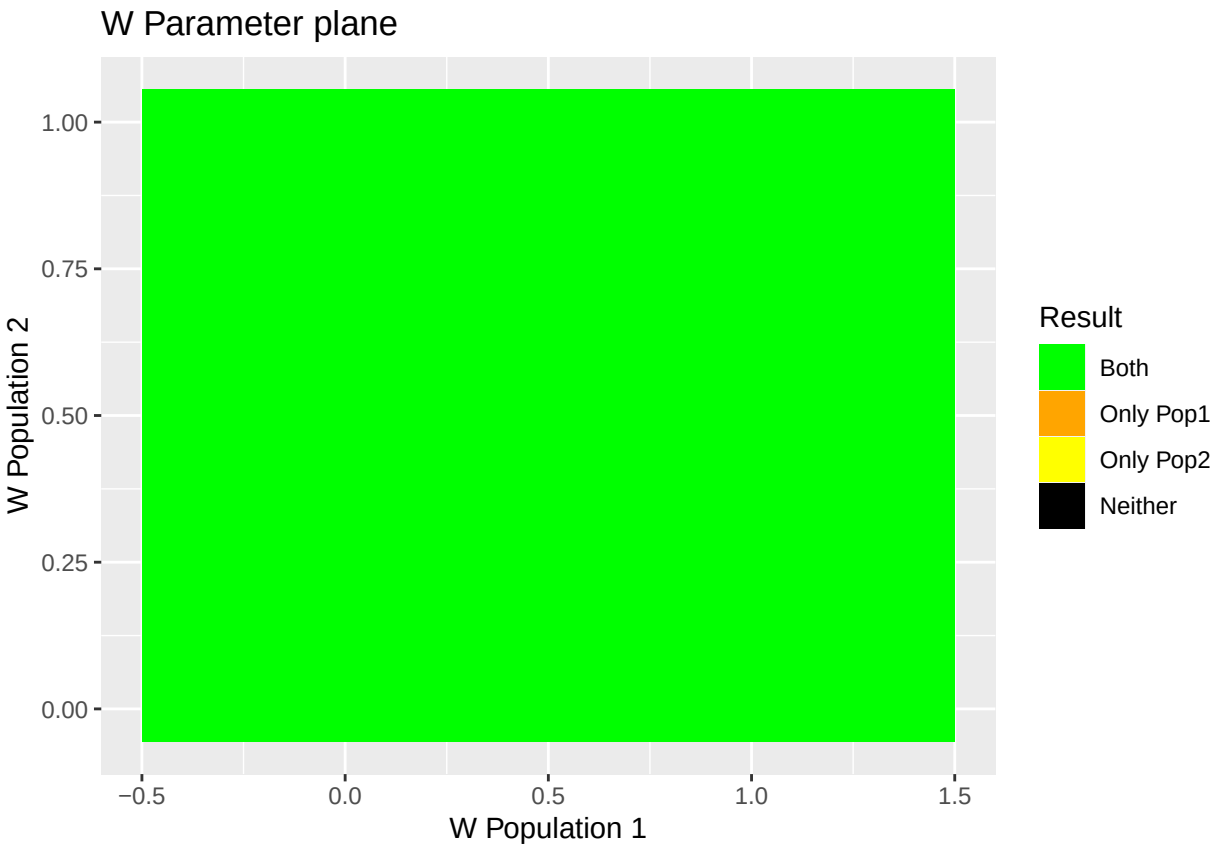

Figure 27: w population planes

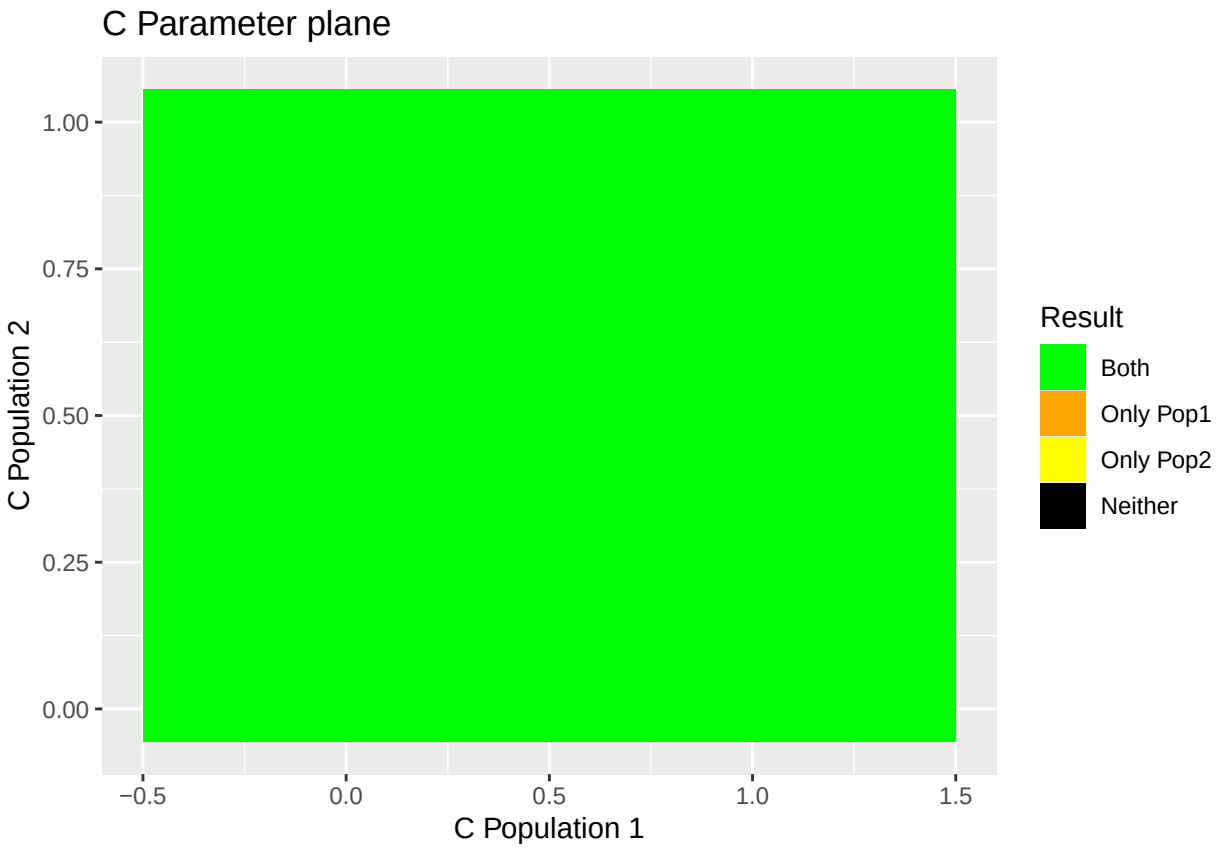

Figure 28: c population planes

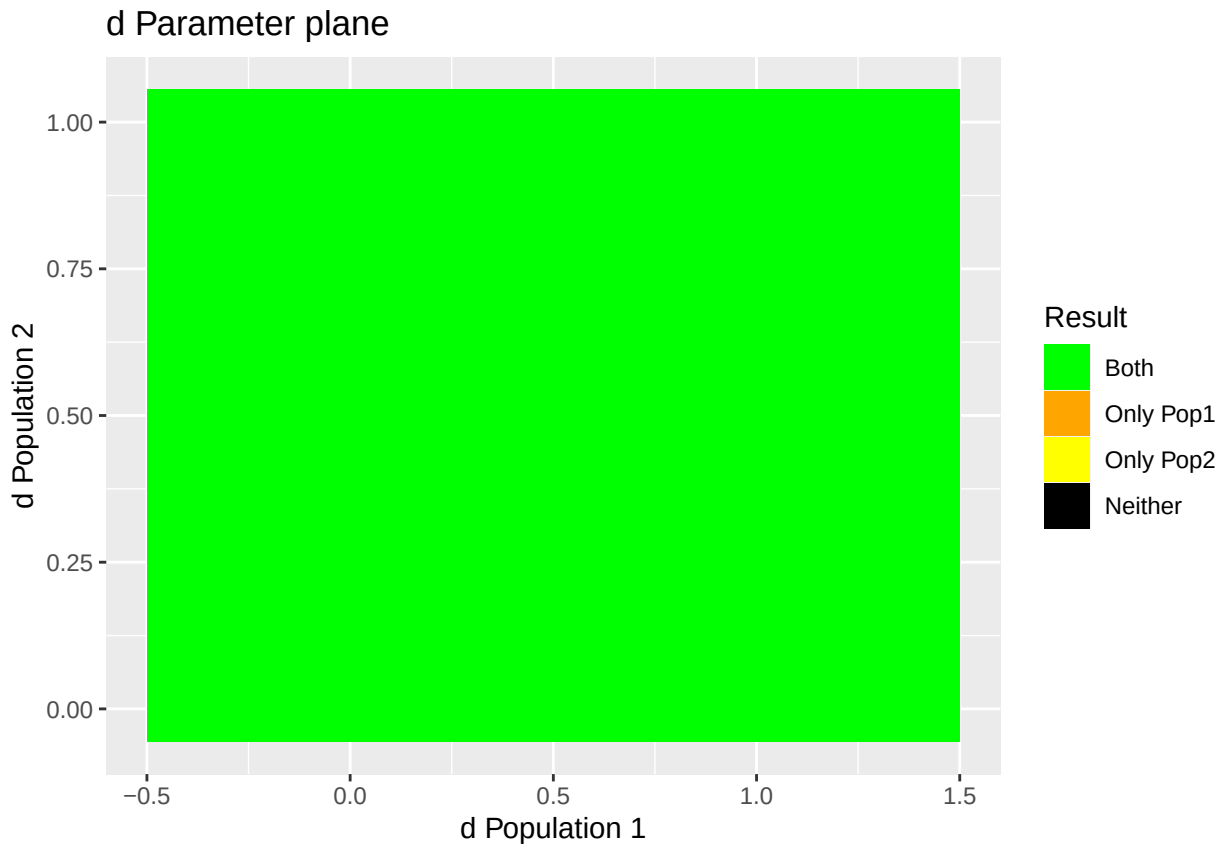

Figure 29: d population planes

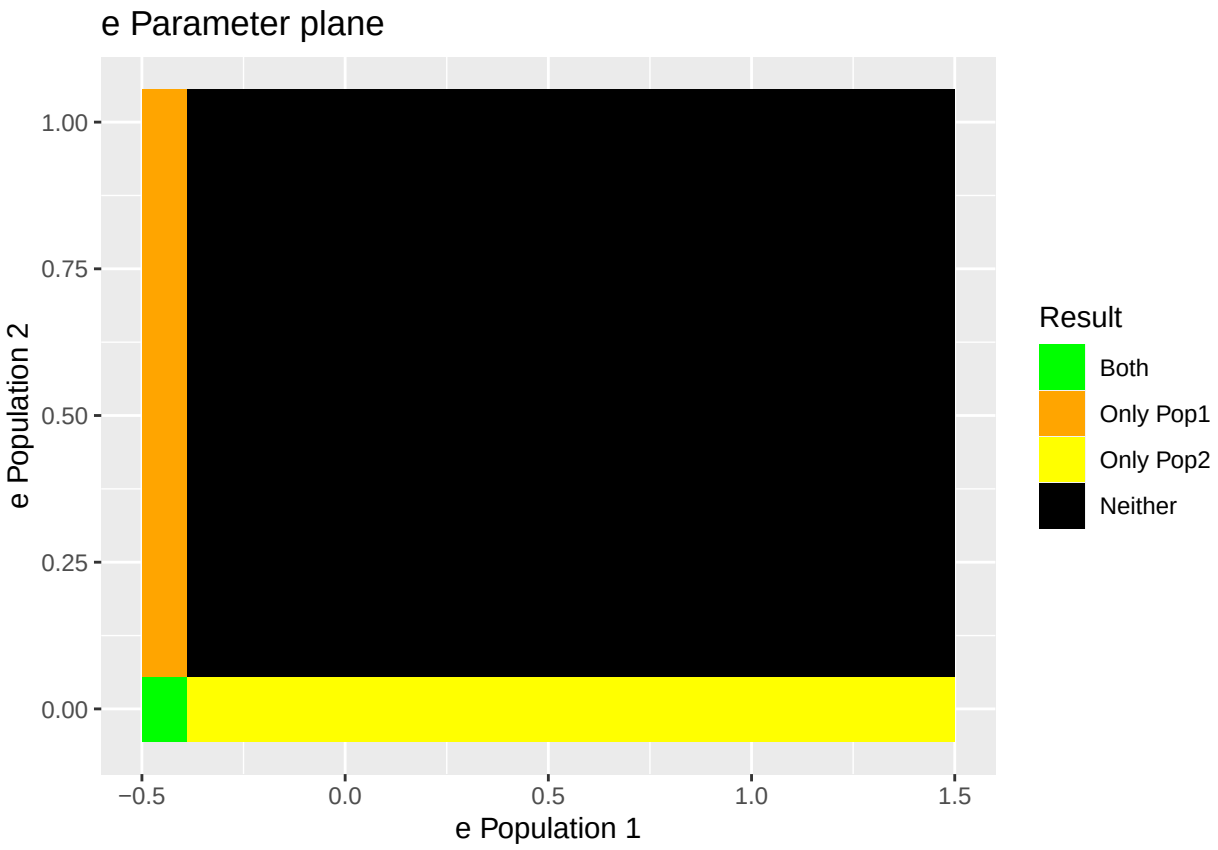

Figure 30: e population planes

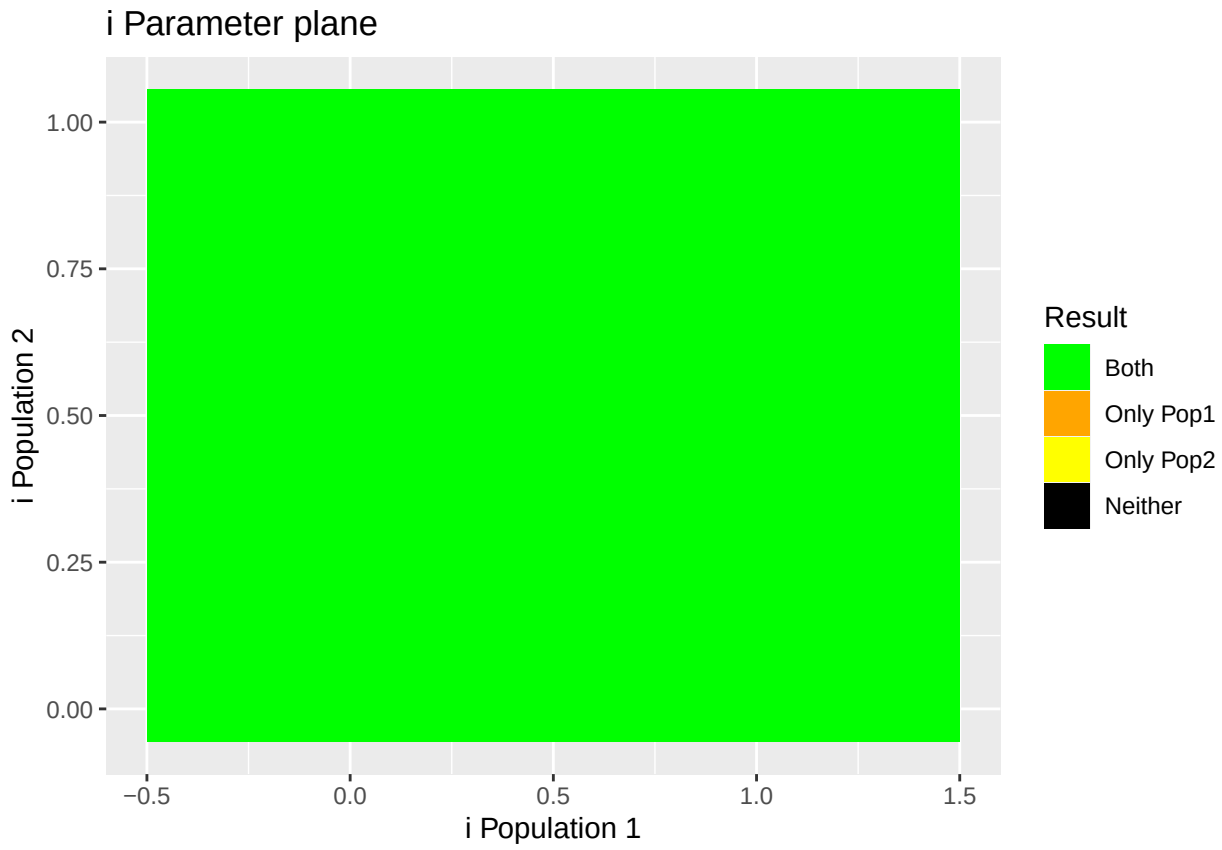

Figure 31: i population planes

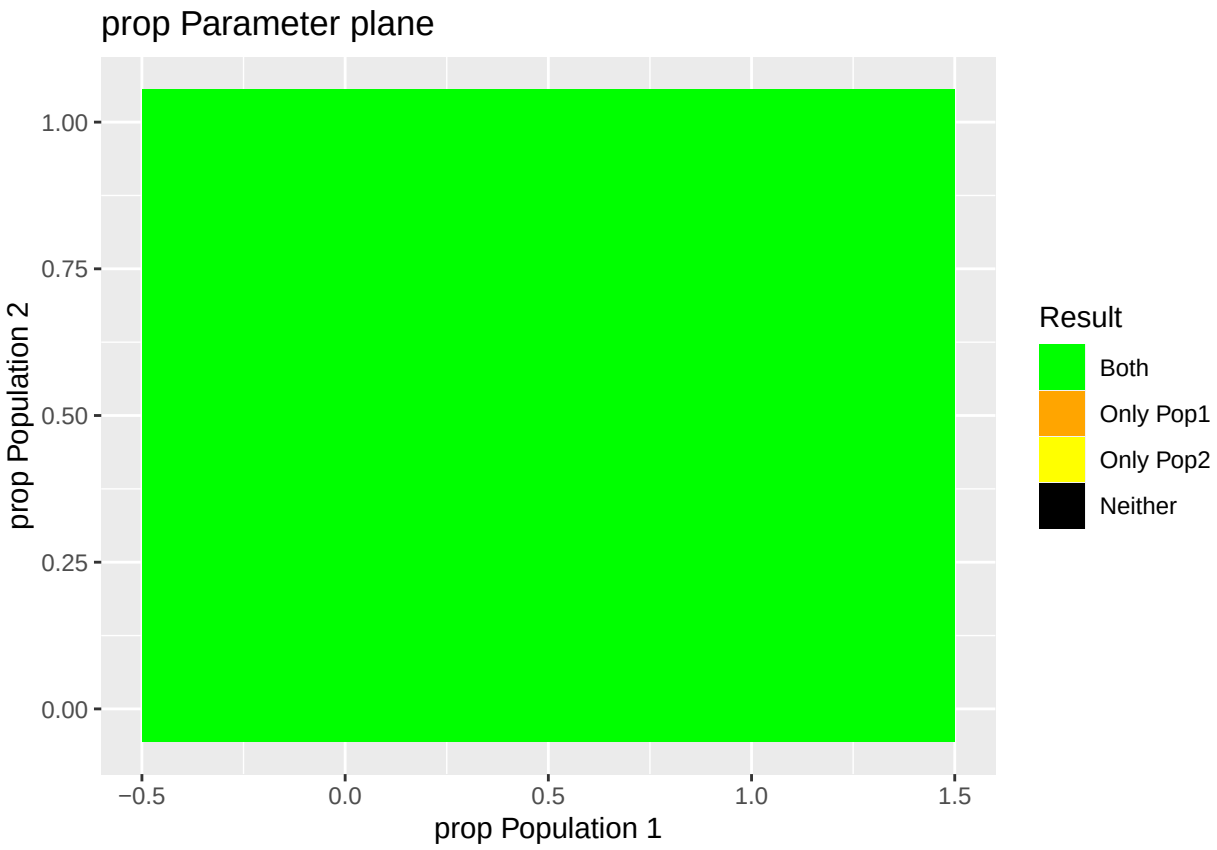

Figure 32: prop population planes