

Bray - Curtis

	gut 1	left + 1	right 1	tongue
gut	0	0.19	0.15	0.65
left	0.19	0	0.07	0.69
right	0.15	0.07	0	0.703
tongue	0.65	0.69	0.703	0

Bray - Curtis

$$BC(B, A) = \frac{\sum_i |X_A - X_B|}{\sum_i (X_A + X_B)}$$

$$\begin{aligned} \text{gut vs left} &= |42 - 12| + |0 - 1| + |37 - 22| + |99 - 88| + |1 - 0| \\ &= 58 + 1 + 15 + 11 + 1 \\ &= 302 \\ 58 / 302 &= 0.19 \rightarrow \text{gut vs left}. \end{aligned}$$

$$\begin{aligned} \text{gut vs right} &= |42 - 25| + |0 - 3| + |37 - 23| + |99 - 86| + |1 - 0| \\ &= 48 \\ &= |42 + 25| + |0 + 3| + |37 + 23| + |99 + 86| + |1 + 0| \\ &= 316 \\ 48 / 316 &= 0.15 \rightarrow \text{gut vs right} \end{aligned}$$

$$\begin{aligned} \text{gut vs tongue} &= |42 - 0| + |0 - 0| + |37 - 87| + |99 - 12| + |1 - 1| \\ &= 180 \end{aligned}$$

$$|42| + |37 + 87| + |99 + 12| + |1| = 278 \quad 180 / 278 = 0.65$$

$$\begin{aligned} \text{left + vs right} &= |12 - 25| + |1 - 3| + |22 - 23| + |88 - 86| \\ &= 18 \\ |12 + 25| + |1 + 3| + |22 + 23| + |88 + 86| &= 260 \\ 18 / 260 &= 0.07 \end{aligned}$$

$$\text{left vs tongue} = |12 - 0| + |42 - 87| + |88 - 12| = 153 \quad y = 0.69$$

$$|12 + 0| + |42 + 87| + |88 + 12| = 241$$

$$\begin{aligned} \text{right vs tongue} &= |25| + |3| + |23 - 87| + |86 - 12| = 166 \quad y = 0.703 \\ |25| + |3| + |23 + 87| + |86 + 12| &= 236 \end{aligned}$$

Unweight Unifrac distance

$$\text{gut vs left} = \frac{0.5 + 0.25}{F_2 \quad F_5 \quad 5.8} = 0.13$$

F_2
0.5
 0.25

$$\text{gut vs right} = 0.13$$

F_5
 F_8

$$\text{gut vs tongue} = \frac{0.5 + 0.25}{F_1, F_5 \quad 0.6 + 0.5 + 1.25 + 0.75 + 1.45 + 0.25} = 0.156$$

F_2 not contribute

$$\text{left vs right no unique branch} = \frac{0}{5.05} = 0$$

$$\text{left vs tongue} = \frac{0.5 + 0.5}{F_1, F_2 \quad 0.5 + 1.25 + 0.5 + 0.5 + 0.6 + 1.45 + 0.75} = 0.18$$

F_5 not contribute

$$\text{right vs tongue} = \frac{0}{5.05} = 0.18$$

F_1, F_2, F_5 not contribute

	gut	left	right	tongue
gut	0	0.13	0.13	0.156
left	0.13	0	0	0.18
right	0.13	0	0	0.18
tongue	0.156	0.18	0.18	0

Beta diversity

$$\text{Jaccard distance } J(A, B) = 1 - \frac{|A \cap B|}{|A \cup B|}$$

	f1	f2	f3	f4	f5	
gut 1	42	0	37	99	1	$ A \cap B $: # of shared
left. p1	12	1	22	88	0	$ A \cup B $: # feature present in
ri. p1	25	3	23	86	0	of sample
tongue	0	0	87	12	0	

- gut 1 vs left 1

shared: 3 (1, 3, 4)
presented in all 5

$$= 1 - \frac{3}{5} = 0.4$$

- left 1 vs gut 1

	gut 1	lef. 1	right. 1	tongue
gut 1	0	0.4	0.4	0.5
left. 1	0.4	0	0	0.5
right. 1	0.4	0	0	0.5
tongue	0.5	0.5	0.5	0

- gut 1 vs right 1

shared = 3 (1, 3, 4)

presented = 5

$$1 - \frac{3}{5} = 0.4$$

gut 1 vs tongue

shared = 2 (3 & 4)

presented = 4

$$\Leftrightarrow 1 - \frac{2}{4} = 0.5$$

left 1 vs right 1

shared: 4 (1, 2, 3, 4)

presented = 4

$$1 - \frac{4}{4} = 0$$

right vs gut 1

shared = 3

presented = 5

$$1 - \frac{3}{5} = 0.4$$

left 1 vs tongue

shared = 2 (3 & 4)

presented = 4

$$1 - \frac{2}{4} = 0.5$$

right vs tongue

shared = 2 (3 & 4)

presented = 4

$$1 - \frac{2}{4} = 0.5$$