(a) Example dataset

S	A	B	Y	$\text{rank}(Y)$	ART_A	ART_B	ART_{AB}
s_1	a_1	b_1	0.4	3	7	3	3
s_1	a_1	b_2	3.0	7	6	6	6
s_1	a_2	b_1	0.8	4	3	4	8
s_1	a_2	b_2	1.6	5	1	5	1
s_2	a_1	b_1	0.3	1.5	5	2	2
s_2	a_1	b_2	3.1	8	8	7	7
s_2	a_2	b_1	0.3	1.5	2	1	5
s_2	a_2	b_2	2.3	6	4	8	4

(b) ART calculation

$$ART_A(Y_{ijk}) = rank(Y_{ijk} - \overline{Y}_{ij} + \overline{Y}_i - \overline{Y})\ \text{estimated main effect } a_i$$

$$ART_B(Y_{ijk}) = rank(Y_{ijk} - \overline{Y}_{ij} + \overline{Y}_j - \overline{Y})\ \text{estimated main effect } b_j$$

$$ART_{AB}(Y_{ijk}) = rank(Y_{ijk} - \overline{Y}_{ij} + \overline{Y}_{ij} - \overline{Y} - (\overline{Y}_i - \overline{Y}) - (\overline{Y}_j - \overline{Y}))$$

residual

estimated interaction effect $a_i b_j$

(c) Mean terms

$\overline{Y}$	$\overline{Y}_i$	$\overline{Y}_j$	$\overline{Y}_{ij}$
grand mean	$A = a_i$	$B = b_j$	$A = a_i$ & $B = b_j$