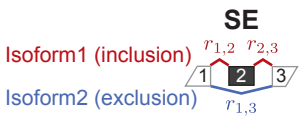
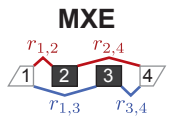
Psi (Percent spliced-in) calculation via `outrigger psi`

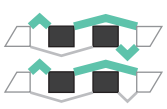


$$\Psi = \frac{r_{1,2} + r_{2,3}}{r_{1,2} + r_{2,3} + 2r_{1,3}}$$

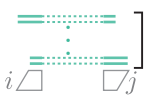


$$\Psi = \frac{r_{1,2} + r_{2,4}}{r_{1,2} + r_{2,4} + r_{1,3} + r_{3,4}}$$

$$\Psi = \frac{\text{inclusion reads}}{\text{inclusion + exclusion reads}}$$

			Notes	Compatible w/ annotation?	
Case 1	Not applicable		Incompatible junctions with sufficient reads	✗	$\Psi = \text{NA}^*$
Case 2			Zero observed reads	✗	$\Psi = \text{NA}$
Case 3			All compatible junctions with insufficient reads	✗	$\Psi = \text{NA}$
Case 4			Only one junction with sufficient reads	✗	$\Psi = \text{NA}$
Case 5			One junction with >10x reads than the other**	✗	$\Psi = \text{NA}$
Case 6			Exclusion: Isoform2 with sufficient reads and Isoform1 with zero reads	✓	$\Psi = 0$
Case 7			Inclusion: Isoform1 with zero reads and Isoform2 with sufficient reads	✓	$\Psi = 1$
Case 8			Sufficient reads on all junctions	✓	$0 < \Psi < 1$
Case 9			Isoform2 with sufficient reads but Isoform1 has one or more junctions with insufficient reads	? a. Total reads ≥ $r^{***}_{\text{threshold}}$	$0 < \Psi < 1$
				? b. Total reads < $r_{\text{threshold}}$	$\Psi = \text{NA}$
Case 10			Isoform1 with sufficient reads but Isoform2 has one or more junctions with insufficient reads	? a. Total reads ≥ $r_{\text{threshold}}$	$0 < \Psi < 1$
				? b. Total reads < $r_{\text{threshold}}$	$\Psi = \text{NA}$
Case 11	Not applicable		Isoform1 and Isoform2 each have both sufficient and insufficient junctions	? a. Total reads ≥ $r_{\text{threshold}}$	$0 < \Psi < 1$
				? b. Total reads < $r_{\text{threshold}}$	$\Psi = \text{NA}$

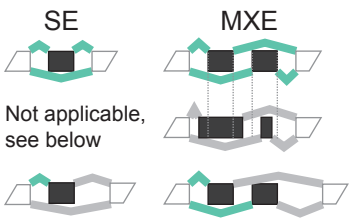
Legend



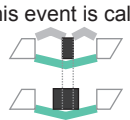
$r_{i,j}$ Reads on junction spanning exon *i* to exon *j*

r_{min} Minimum number of reads per junction, default 10 and can be user-defined with the flag `--min-reads`

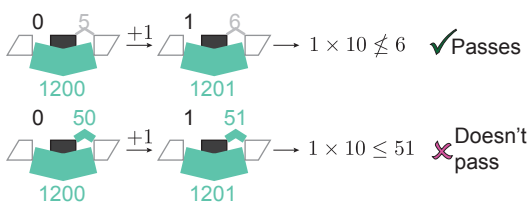
* $\Psi = \text{NA}$ can mean three things:
1. Transcript was not expressed
2. Insufficient evidence to confidently call exon inclusion or exclusion
3. Junctions map to different alternative or flanking exon(s) – considered as distinct events during the indexing step, `outrigger index`



For a SE event, if the junctions map to different alternative exon (small black exon on the top), then the event with smaller exon has a Ψ value ranging from zero to one, but for the wider exon (on the bottom), which doesn't have matched inclusion reads, this event is called excluded with Ψ=0



** The multiplier for how much greater one side junction can be is user-defined with the flag `--uneven-coverage-multiplier`, here shown with the default value of 10.
To deal with 0 reads, a pseudocount of 1 is added to all junctions for this test only:



*** $r_{\text{threshold}}$ Threshold for total junction reads in the event

$$r_{\text{threshold}} = n_{\text{junctions}} \times r_{\text{min}}$$

e.g. for an MXE event (4 junctions) and a minimum of 10 reads per junction: $\sum_{i,j} r_{i,j} = 4 \times 10 = 40$

$\sum_{i,j} r_{i,j}$ Total Junction reads

$n_{\text{junctions}}$ Number of junctions in splicing event type (e.g. 3 for SE or 4 for MXE)

Configurable options

Junction read inputs	`--bam`
	`--sj-out-tab`
	`--junction-reads-csv`
		(default: reads from `outrigger index`)

r_{min}	`--min-reads 10` (default)	
	`--uneven-coverage-multiplier 10` (default)	