

# Inference by Enumeration: Procedural Outline

- Track objects called **factors**

- Initial factors are local CPTs (one per node)

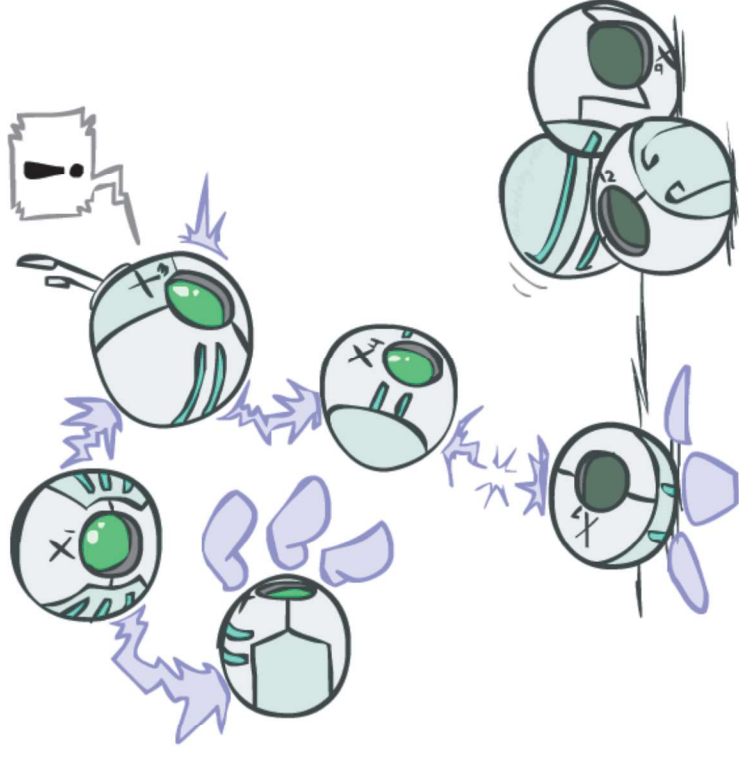
$P(R)$	$P(T R)$	$P(L T)$
+r	+t	+l
-r	-t	-l
0.1	0.8	0.3
0.9	0.2	0.7
	+t	+l
	-t	-l
	0.1	0.1
	0.9	0.9

- Any known values are selected

- E.g. if we know  $L = +l$  the initial factors are

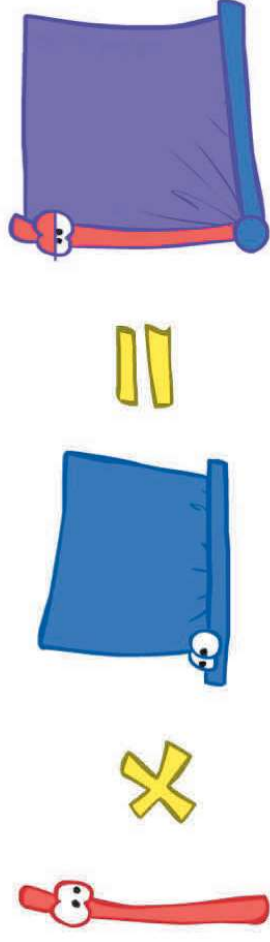
$P(R)$	$P(T R)$		$P(+\ell T)$	
+r	0.1	+t	+t	0.3
-r	0.9	-t	-t	0.1
		-r	+t	0.1
		-r	-t	0.9

- Procedure: Join all factors, eliminate all hidden variables, normalize

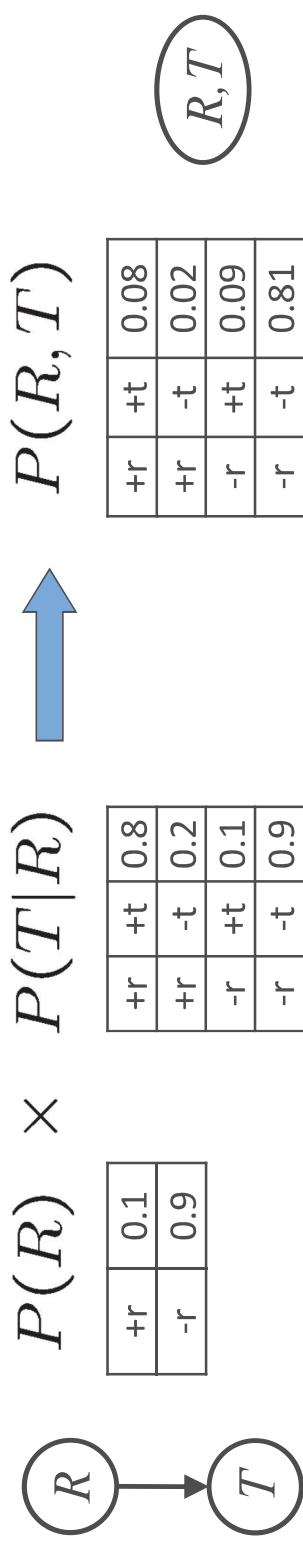


# Operation 1: Join Factors

- First basic operation: **joining factors**
- Combining factors:
  - Just like a database join**
  - Get all factors over the joining variable
  - Build a new factor over the union of the variables involved



- Example: Join on R



- Computation for each entry: pointwise products  $\forall r, t : P(r, t) = P(r) \cdot P(t|r)$

