The language of Temporal Logic:

$$\mathbf{WWF ::= \mid p \mid \neg \varphi \mid \varphi \wedge \psi \mid \mathit{P}\varphi \mid \mathit{F}\varphi \mid}$$

The language of Temporal Hybrid Logic

$$\mathbf{WWF ::= \mid i \mid p \mid \neg \varphi \mid \varphi \wedge \psi \mid \mathit{P}\varphi \mid \mathit{F}\varphi \mid @_i j \mid}$$

Semantic to THML

To generate the semantics of these operators, we need to add the valuation function **V** (over the frames (T, R) which takes propositional symbols, and nominals to subsets of points of T. But we place an important restriction on the valuation V(i) of any nominal i: this must be a singleton subset of T. This means (as we said above) that nominals enable us to specify names for times in T.

Given a model $\mathfrak{M} = (\mathbf{T}, \boldsymbol{R}, \mathbf{V})$ we define satisfaction as follows:

$\mathfrak{M}, t \models a$ iff a is atomic and $t \in V(a)$

$\mathfrak{M}, t \models \neg \varphi$ iff $\mathfrak{M}, t \not\models \varphi$

$\mathfrak{M}, t \models \varphi \wedge \psi$ iff $\mathfrak{M}, t \models \varphi$ and $\mathfrak{M}, t \models \psi$

$\mathfrak{M}, t \models P\varphi$ iff for some t', $t'Rt$ and $\mathfrak{M}, t' \models \varphi$

$\mathfrak{M}, t \models F\varphi$ iff for some t', tRt' and $\mathfrak{M}, t' \models \varphi$

$\mathfrak{M}, t \models @_i\varphi$ iff $\mathfrak{M}, t' \models \varphi$ and $t' \in V(i)$

Semantic to THML wit *now*

The extended model $\mathfrak{M} = (T, R, V, t_0)$ is similar to an ordinary model together with a designated time $t_0 \in T$ and V is extended to V′ in the following way:

$$\mathbf{V}(a) = \begin{cases} \{t_0\}, \text{ if } a \text{ is } now \\ V'(a), \text{ otherwise.} \end{cases}$$

The semantic of the operator *now*, is straightforward:

$\mathfrak{M}, t \models now$ **iff** $t \in V(now)$

$\mathfrak{M}, t \models @_{now}\varphi$ **iff** $\mathfrak{M}, t \models \varphi$ **and** $t \in V(now)$