

# cubical evaluation semantics

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I've been thinking a bit more carefully about the evaluation semantics and the semantic domain. What I think we want to do is take a term and an environment and return a family of values (indexed in restrictions); but crucially, I think it is important that the environment be a vector of *values* and not of value-families. By studying carefully the case for instantiating closures (where the rubber meets the road for variables), I think it becomes clear that this is the right way.

To interpret a variable, we just project from the environment and ignore the restriction. I think the way that we had been thinking of doing it would result in the restriction from inside the closure infecting the argument.

Colors: **terms**, **value families**, **values**, **restrictions**. I am writing  $\phi^* F$  to mean the reindexing of a family by a restriction.

$$\begin{aligned}\llbracket (\lambda \{M\}) \rrbracket_\rho &= [\phi] \lambda \langle M, \rho, \phi \rangle \\ \llbracket (\Pi A \{B\}) \rrbracket_\rho &= [\phi] \Pi(\phi^* \llbracket A \rrbracket_\rho, \langle B, \rho, \phi \rangle) \\ \llbracket (M N) \rrbracket_\rho &= \llbracket M \rrbracket_\rho @ \llbracket N \rrbracket_\rho \\ \llbracket x_i \rrbracket_\rho &= [\_] \rho_i\end{aligned}$$

$$F @ G = [\phi] \left\{ \begin{array}{lll} F[\phi] \equiv \lambda \langle M, \rho, \psi \rangle & \Rightarrow & \phi^* \llbracket M \rrbracket_{\rho, G[\phi]}[\psi] \\ F[\phi] \equiv \text{neutral} & \Rightarrow & \text{neutral} \\ F[\phi] \equiv \text{coe} & \Rightarrow & \text{coe} \\ F[\phi] \equiv \text{hcom} & \Rightarrow & \text{hcom} \end{array} \right.$$