A Linear Reconstruction of Brunch*

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To model the brunch menu, we turn it into a linear logic proposition that describes the transaction it allows.

\[
\text{menu} = 20 \rightarrow \text{entree} \otimes \text{side} \otimes \text{beverage}
\]

\[
\text{entree} = (\text{eggs} \otimes \text{hash} \otimes \text{cranberries}) \& (\text{crepes} \otimes \text{mascarpone} \otimes \text{pears})
\]

\[
\text{side} = \text{clementines} \oplus \text{apples}
\]

\[
\text{beverage} = (\neg \text{juice} \& \neg \text{tea} \& \neg \text{coffee}) \otimes ((5 \rightarrow \text{cocktail}) \& 1)
\]

\[
\text{cocktail} = \text{mimosa} \& \text{bellini}
\]

Notes:

- The menu offers you a prix fixe meal for $20, including an entrée, a side, and a beverage; since all parts are included, we use simultaneous conjunction $\otimes$.
- The entrée is your choice, so we use alternative conjunction $\&$.
- The side dish is their choice, so we use disjunction $\oplus$.
- The beverage option offers one of juice, tea, or coffee, your choice, but unlimited in quantity, modelled using the exponential $\neg$.
- Finally, the optional extra-cost cocktail is modelled as your choice of nothing at all, 1, or the obligation to pay $5 for a cocktail.

Original menu follows.

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$20 includes:

Choice of entree:
- Poached eggs with turkey hash and cranberry sauce
- Pumpkin mascarpone-filled crepes topped with caramelized pears

Side dish:
- Seasonal fresh fruit (either clementine wedges or apple slices)

Choice of beverage:
- Juice, tea, or coffee -- all bottomless
  (optionally, $5 extra) Mimosa or Bellini