# Multiplace Models.

⟨,⟩ & (,) are both fine but ⟨,⟩ better.

1. Ordered Pairs: state the relationship
   1) Tuples: $(a, b) \neq (b, a)$.
      Ordered Triples: $(a, b, c)$.
      Ordered n-Tuple: $(a, b, c, \ldots)$.
   2) Set of Ordered pairs.
      $\{(a,b), (c,d), (\bigcirc, \square)\}$.

extensional: finite & abstract

2. Extensional Multiplace Model.
   1). Every n-place predicate can be defined extensionally by a set of ordered n-tuples.
      e.g. $F^2$: {(Turtles, Slugs), (Dogs, Ants), ...}.
         (Slugs, Turtles) is not a member of $F^2$.

order matters.

   2) Identity is defined as a 2-place predicate that includes the ordered pairs of each member of the universe of discourse with itself.
      e.g. $=$ : $\{(1,1), (2,2), \ldots\}$.

   3) Generic / specific item when translating.
      ① $\forall x(Gx \rightarrow \exists y H(xy))$: all G's H some generic thing.
      ② $\exists y \forall x(Gx \rightarrow H(xy))$: all G's H some specific thing.

3. Examples:

better start from existensial quantifier.

   1). $\exists x(Fx \land Gx)$. $\forall x(Gx \rightarrow \exists y H(xy))$. $\therefore \forall x(Fx \rightarrow \forall y H(yx))$. Invalid.
   Pr1: sth. in F and G.
   Pr2: all G's H some generic thing    $\sim\forall x(Fx \rightarrow \forall y H(yx))$.

~C: sth. in $F$ and nothing $H$ $F$ $= \exists x(Fx \wedge \sim \exists y Hyx))$.

No $(\square, 0)$. in $H$.

UD: $\{0, 1\}$

$F$: $\{0\}$

$G$: $\{0\}$

$H^2$: $\{(0, 1)\}$

2) $\forall x(M(xx) \to \sim Fx)$. $\exists y(Fa \wedge Fy \wedge a \neq y \wedge M(ay) \wedge \sim M(ya))$.

$\forall y(Fy \leftrightarrow \sim Gy)$. $\therefore \forall x \sim M(xx)$. Invalid.

Pr1: If anything M's itself then it's not in $F$

Pr2: a in $F$ and a M's a different $F$ and not a different $F$ M's a.

no $(1, 0)$.

Pr3: Everything is in $F$ exclusive or $G$.

~C: sth. M itself.

$\sim(\forall x \sim M(xx))$.

$= \exists x M(xx)$.

UD: $\{0, 1, 2\}$

$a^0$: 0

$F^1$: $\{0, 1\}$

$G^1$: $\{2\}$

$M^2$: $\{(0, 1), (2, 2)\}$