Quantification over alternative intensions

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(1) Only Mary is asleep.
(2) \((\forall p)[[\forall p \land (\exists x) p = \text{^S}(x)] \rightarrow p = \text{^S}(m)]\)
(3) \((\forall x)[S(x) \rightarrow x = m]\)
(4) \((\forall x)[x \neq m \rightarrow \text{^S}(x) \neq \text{^S}(m)]\)
(5) \((\forall x)(\forall y)[x \neq y \rightarrow \text{^S}(x) \neq \text{^S}(y)]\)
(6) a. John only meets MARY.
b. \((\forall p)[[\forall p \land (\exists x) p = \text{^M}(j,x)] \rightarrow p = \text{^M}(j,m)]\)
c. \((\forall x_1)(\forall x_2)(\forall y_1)(\forall y_2)[(x_1,x_2) \neq (y_1,y_2) \rightarrow \text{^M}(x_1,x_2) \neq \text{^M}(y_1,y_2)]\)
(7) a. John only introduces MARY to Sue.
b. \((\forall p)[[\forall p \land (\exists x) p = \text{^I}(j,x,s)] \land \rightarrow p = \text{^I}(j,m,s)]\)
c. \((\forall x_1)(\forall x_2)(\forall x_3)(\forall y_1)(\forall y_2)(\forall y_3)\)[(x_1,x_2,x_3) \neq (y_1,y_2,y_3) \rightarrow \text{^I}(x_1,x_2,x_3) \neq \text{^I}(y_1,y_2,y_3)]\)
(8) a. Only Mary is both drunk and asleep.
b. \((\forall p)[[\forall p \land (\exists x) p = \text{^D}(x) \land \text{^S}(x)] \rightarrow p = \text{^D}(m) \land \text{^S}(m)]\)
c. \((\forall x)(\forall y)[x \neq y \rightarrow \text{^D}(x) \land \text{^S}(x)] \neq \text{^D}(y) \land \text{^S}(y)]\)
(9) a. John only knows that MARY knows that Harry introduces Bill to Sue.
b. \((\forall p)[[\forall p \land (\exists x) p = \text{^K}(j,\text{^K}(x,\text{^I}(h,b,s)))]] \rightarrow p = \text{^K}(j,\text{^K}(m,\text{^I}(h,b,s)))]\)
c. \((\forall x_1)...(\forall x_5)(\forall y_1)...(\forall y_5)\)[(x_1,...,x_5) \neq (y_1,...,y_5) \rightarrow \text{^K}(x_1,\text{^K}(x_2,\text{^I}(x_3,x_4,x_5))) \neq \text{^K}(y_1,\text{^K}(y_2,\text{^I}(y_3,y_4,y_5)))]\)
(10) \(\lambda x.[D(x) \land S(x)]\)
(11) \(\lambda x_5.\lambda x_4.\lambda x_3.\lambda x_2.\lambda x_1.K(x_1,\text{^K}(x_2,\text{^I}(x_3,x_4,x_5)))\)
(12) \((\forall \overline{x})(\forall \overline{y})[\overline{x} \neq \overline{y} \rightarrow [^R\overline{x}] \neq [^R\overline{y}]]\)

* HAPPY BIRTHDAY, MANFRED!
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(13) \((\forall X) \Diamond [S = X]\)

(14) \((\forall R)[(\neg (\exists x)R(x, x)) \rightarrow \Diamond [M = R]]\)

(15) \((\forall S)[(\neg (\exists x)(\exists y)[S(x, y, x) \lor S(x, y, y)]) \rightarrow \Diamond [I = S]]\)

(16) \((\forall X) \Diamond [\lambda x. [D(x) \land S(x) = X]]\)

(17) \((\forall T) \Diamond [[\lambda x_5, \lambda x_4, \lambda x_3, \lambda x_2, \lambda x_1. K(x_1, \land K(x_2, \land I(x_3, x_4, x_5)))] = T]\)

(18) \((\forall x)(\forall p)[K(x, p) \rightarrow \lor p]\)

(19) \((\forall A)[(\neg (\exists x)(\exists y)[I(x, y, x) \lor I(x, y, y)]) \rightarrow \Diamond [K = A]]\)

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(20) For any \(X \subseteq D\), there is a \(\mathcal{K}_0\) - model \(\mathcal{M} = (D, W, F_\mathcal{M})\) and a world \(w \in W\) such that:
   - \(F_\mathcal{M}(S)(w) = X\)

(21) a. For any \(R \subseteq D^2\) there is a \(\mathcal{K}_0\)-model \(\mathcal{M} = (D, W, F_\mathcal{M})\) and a world \(w \in W\) such that:
   - \(F_\mathcal{M}(M)(w) = R\).
   b. For any \(S \subseteq D^3\) there is a \(\mathcal{K}_0\)-model \(\mathcal{M} = (D, W, F_\mathcal{M})\) and a world \(w \in W\) such that:
   - \(F_\mathcal{M}(I)(w) = S\).

(22) a. \((\neg (\exists x)M(x, x)\)
   b. \((\neg (\exists x)(\exists y)[I(x, y, x) \lor I(x, y, y)]\)

(23) a. For any irreflexive \(R \subseteq D^2\) there’s is a \(\mathcal{K}_1\)-model \(\mathcal{M} = (D, W, F_\mathcal{M})\) and a world \(w \in W\) such that:
   - \(F_\mathcal{M}(M)(w) = R\).
   b. For any irreflexive \(S \subseteq D^3\) there’s is a \(\mathcal{K}_1\)-model \(\mathcal{M} = (D, W, F_\mathcal{M})\) and a world \(w \in W\) such that:
   - \(F_\mathcal{M}(I)(w) = S\).

(24) \(\{\varphi | \mathcal{M} \models_w \varphi\} = \{\varphi | \mathcal{M}^* \models_{w^*} \varphi\}\)

(25) Mary is asleep.

(26) a. \(\mathcal{M}_0 \not\models_w S(m)\), for any \(\mathcal{M}_0\)-world \(w\);
   b. \(\mathcal{M}_1 \models_{w'} S(m)\), for some \(\mathcal{M}_1\)-world \(w'\).

(27) a. \(\mathcal{M}_0 \models_w \neg \Diamond S(m)\)
   b. \(\mathcal{M}_1 \models_{w'} \Diamond S(m)\)

(28) a. \(\mathcal{M}^* \models_{w_0} \neg \Diamond S(m)\)
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b. \( M^* \not\models w_1 \& S(m) \)

(29) \( M^* \models \neg \lnot S(m) \& S(m) \)

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(30) \((\forall x')(\forall y')[x' \neq y' \rightarrow [^R\{ x' \}] \neq [^R\{ y' \}]]\) \[= (12)\]

(31) \((\forall R)(\forall x')(\forall y')[x' \neq y' \rightarrow [^R\{ x' \}] \neq [^R\{ y' \}]]\)

(32) \((\forall R)[s(R) \rightarrow (\forall x')(\forall y')[x' \neq y' \rightarrow [^R\{ x' \}] \neq [^R\{ y' \}]]\]

(33) Only three is an odd number.

(34) \((\forall x)[O(x) \rightarrow x = 3]\)

(35) \((\forall p)[[\forall' p \land (\exists x)p = ^O(x)] \rightarrow p = ^O(3)]\)

(36) Only Mary is one of John and Mary and exactly as tall as either one.

(37) \((\forall x)[x = j \lor x = m] \land (\forall y)[[y = j \lor y = m] \rightarrow h(x) = h(y) \rightarrow x = m]\)

(38) \((\forall p)[[\forall' p \land (\exists x)p = ^S(x)] \rightarrow p = ^S(m)] \land S(m)\]

(39) \((\forall p)[[\forall' p \land p = p_{j=m}] \rightarrow p = p_{j=m}]\)

(40) \([[(\forall p)[[\forall' p \land (\exists x)p = ^S(x)] \rightarrow p = ^S(m)] \land S(m)]\)

\[\equiv [[(\forall p)[[\forall' p \land (\exists x)p = ^S(x)] \leftrightarrow p = ^S(m)]\]

(41) \([(\forall x)[S(x) \leftrightarrow x = m] \land S(m)]\)

\[\equiv (\forall x)[S(x) \leftrightarrow x = m]\]

(42) \((\forall x)[O(x) \leftrightarrow x = 3]\)

(43) \((\forall p)[[\forall' p \land (\exists x)p = ^O(x)] \leftrightarrow p = ^O(3)]\)

(44) \([[(\forall p)[[\forall' p \land p = p_{j=m}] \rightarrow p = p_{j=m}] \land [m = j \lor m = m] \land (\forall y)[[y = j \lor y = m] \rightarrow h(m) = h(y)]]]\)

\[\equiv [[(\forall p)[[\forall' p \land p = p_{j=m}] \rightarrow p = p_{j=m}] \land h(m) = h(j)]\]

\[\equiv h(m) = h(j)\]

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(45) a. John only meets MARY. \[= (6-a)\]

b. \( (\forall p)[[\forall' p \land (\exists y)p = ^M(j, y)] \rightarrow p = ^M(j, m)] \) \[\approx (6-b)\]

c. \( (\forall P)[[P(j) \land (\exists y) P = ^\check{M}(x, y)] \rightarrow P = ^\check{M}(x, m)]\)

(46) a. Harry only meets SUE.

b. \( (\forall P)[[P(h) \land (\exists y) P = ^\check{M}(x, y)] \rightarrow P = ^\check{M}(x, s)]\)

(47) a. \( \lambda y. \lambda Q. (\forall z)[Q\{z\} \rightarrow z = y] \)
b. \( \lambda p. \lambda \mathcal{A}. (\forall q) \left[ [\forall q \land \mathcal{A}(q)] \rightarrow q = p \right] \)
c. \( \lambda x. \lambda P. \lambda \mathcal{A}. (\forall S) \left[ [S\{x\} \land \mathcal{A}(S)] \rightarrow S = P \right] \)

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(48)

A: I only advise co-housing FLUFFY with a distinct one of Fluffy and Buffy.
B: Really? I assume you also advise co-housing BUFFY with a distinct one of Fluffy and Buffy.
A: That’s the same thing. To co-house Buffy with a distinct one of Fluffy and Buffy is to co-house Fluffy with a distinct one of Fluffy and Buffy.

(49) \( \Phi(b) \)
\[\equiv \ (\exists y)[C(b,y) \land [y = f \lor y = b]] \]
\[\equiv \ (\exists y)[C(b,y) \land y = f] \]
\[\equiv \ C(b,f) \]
\[\equiv \ (\exists y)[C(f,y) \land y = b] \]
\[\equiv \ C(f,f) \]
\[\equiv \ (\exists y)[C(f,y) \land [y = f \lor y = b]] \]
\[\equiv \ \Phi(f) \]

(50) \( (\forall x)[A(a,^\exists [C(x,y) \land [y = b \lor y = f]]) \rightarrow x = f] \)
\[\equiv \ (\forall x)[A(a,^\exists \Phi(x)) \rightarrow x = f] \]

(51) \( (\forall p)[[\forall \mathcal{X}] p \land (\exists x) p = ^\mathcal{X} A(a,^\exists \Phi(x))] \rightarrow p = ^\mathcal{X} A(a,^\exists \Phi(f))] \)

(52) \( (\forall q)[[A(a,q) \land (\exists x) q = ^\Phi(x)] \rightarrow q = ^\Phi(f)] \)

(53) \( (\forall q : (\exists x)q = ^\Phi(x))[A(a,q) \rightarrow q = ^\Phi(f)] \)

References

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