B.1 A Conditional Donkey Sentence

There follows a calculation establishing the truth conditions for a donkey sentence containing a quantificational adverb and an if-clause. See section 2.3.1.

\[
[[\text{always [if [a man] } [\lambda_6 [[a donkey] [\lambda_2 [t_6 \text{ owns } t_2]]]]]\\ \text{[he man] beats [it donkey]]}]^0
\]

\[
= [[\text{always}^0 ([[\text{if [a man] } [\lambda_6 [[a donkey] [\lambda_2 [t_6 \text{ owns } t_2]]]])]^{0}})
\]

\[
(\text{[[[he man] beats [it donkey]]]^0})
\]

(by FA)

\[
= [[\text{always}^0 ([[\text{if [a man] } [\lambda_6 [[a donkey] [\lambda_2 [t_6 \text{ owns } t_2]]]])]^{0}})
\]

\[
(\text{[[[beats]]}^0 ([[\text{if [a man] } [\lambda_6 [[a donkey]]]])]^{0}))
\]

(by FA)

\[
= [[\text{always}^0 ([[\text{if [a man] } [\lambda_6 [[a donkey] [\lambda_2 [t_6 \text{ owns } t_2]]]])]^{0}})
\]

\[
(\text{[[[beats]]}^0 ([[\text{if [a man] } [\lambda_6 [[a donkey]]]])]^{0}))
\]

(by Lex)

\[
(\lambda u_1. \lambda u_2. \lambda s_8. u_2(s_8) \text{ beats in } s_8 u_1(s_8))
\]

\[
(\lambda s_7 : \exists !x f(x)(s_7) = 1. \exists x f(x)(s_7)(s_7) = 1)
\]

(by \lambda C)

\[
(\lambda s_7 : \exists !x f(x) \text{ is a donkey in } s_7. \exists !x f(x) \text{ is a donkey in } s_7)
\]

\[
(\lambda s_1 : \exists !x f(x) \text{ is a man in } s_1. \exists !x f(x) \text{ is a man in } s_1)
\]

(by \lambda C)

\[
(\lambda s_8. \exists !x f(x) \text{ is a man in } s_8. \exists !x f(x) \text{ is a donkey in } s_8)
\]

(by \lambda C)

\[
(\lambda s_8. \exists !x f(x) \text{ is a man in } s_8. \exists !x f(x) \text{ is a donkey in } s_8)
\]

(by FA)

\[
(\lambda s_8. \exists !x f(x) \text{ is a man in } s_8. \exists !x f(x) \text{ is a donkey in } s_8)
\]

(by PA)
\[= \left[\text{always}\right]^0(\left[\text{if}\right]^0(\left[a\right]^0(\left[\text{man}\right]^0)
\left[\lambda u_6. [\text{a}]^{6-u_6}\left[\text{donkey}\right]^{6-u_6}\left[\left[\lambda_2 \left[t_6 \text{ owns } t_2\right]\right]\right]\right]))
\left[\lambda s_8. \text{i}x \text{ is a man in } s_8 \text{ i}x \text{ is a donkey in } s_8\right] \quad \text{(by FA)}\]
\[= \left[\text{always}\right]^0(\left[\text{if}\right]^0(\left[a\right]^0(\left[\text{man}\right]^0)
\left[\lambda u_6. [\text{a}]^{6-u_6}\left[\text{donkey}\right]^{6-u_6}\left[\left[\lambda t_2 \left[2-t_2\right]\right]\right]\right]))
\left[\lambda s_8. \text{i}x \text{ is a man in } s_8 \text{ i}x \text{ is a donkey in } s_8\right] \quad \text{(by PA)}\]
\[= \left[\text{always}\right]^0(\left[\text{if}\right]^0(\left[a\right]^0(\left[\text{man}\right]^0)
\left[\lambda u_6. [\text{a}]^{6-u_6}\left[\text{donkey}\right]^{6-u_6}\left[\left[\left[t_2\right]\right]\right]\right]\right]))
\left[\lambda s_8. \text{i}x \text{ is a man in } s_8 \text{ i}x \text{ is a donkey in } s_8\right] \quad \text{(by FA)}\]
\[= \left[\text{always}\right]^0(\left[\text{if}\right]^0(\left[a\right]^0(\left[\text{man}\right]^0)
\left[\lambda u_6. [\text{a}]^{6-u_6}\left[\text{donkey}\right]^{6-u_6}\left[\left[2-t_2\right]\right]\right]\right]))
\left[\lambda s_8. \text{i}x \text{ is a man in } s_8 \text{ i}x \text{ is a donkey in } s_8\right] \quad \text{(by TR)}\]
\[= \left[\text{always}\right]^0(\left[\text{if}\right]^0(\left[a\right]^0(\left[\text{man}\right]^0)
\left[\lambda u_6. [\text{a}]^{6-u_6}\left[\text{donkey}\right]^{6-u_6}\left[\left[t_2\right]\right]\right]\right]))
\left[\lambda s_8. \text{i}x \text{ is a man in } s_8 \text{ i}x \text{ is a donkey in } s_8\right] \quad \text{(by Lex)}\]
= [\text{always}]^\theta ([\text{if}]^\theta ([\lambda f_{\langle \langle s, e \rangle, \langle s, t \rangle \rangle}, \lambda g_{\langle \langle s, e \rangle, \langle s, t \rangle \rangle}, \lambda s_5]. \text{there is an individual } y \\
and a situation } s_7 \text{ such that } s_7 \text{ is a minimal situation such that } s_7 \leq s_6 \\
and f(\lambda s_5, y)(s_7) = 1, \text{ such that there is a situation } s_9 \text{ such that } s_9 \leq s_6 \\
and s_9 \text{ is a minimal situation such that } s_7 \leq s_9 \text{ and } g(\lambda s_5, y)(s_9) = 1] \\
(\lambda u_3, \lambda s_4, u_3(s_4) \text{ is man in } s_4) (\lambda u_6, \lambda s_1). \text{ there is an individual } x \text{ and a situation } s_2 \text{ such that } s_2 \text{ is a minimal situation such that } s_2 \leq s_1 \text{ and } x \\
is a donkey in } s_2, \text{ such that there is a situation } s_3 \text{ such that } s_3 \leq s_1 \text{ and } s_3 \\
is a minimal situation such that } s_2 \leq s_3 \text{ and } u_6(s_3) \text{ owns } x \text{ in } s_3)) \\
(\lambda s_8, \text{ix } x \text{ is a man in } s_8 \text{ beats in } s_8 \text{ ix } x \text{ is a donkey in } s_8) \quad \text{(by } \lambda \text{C)} \\
= [\text{always}]^\theta ([\text{if}]^\theta (\lambda s_6, \text{ there is an individual } y \text{ and a situation } s_7 \text{ such that } s_7 \text{ is a minimal situation such that } s_7 \leq s_6 \text{ and } y \text{ is man in } s_7, \\
such that there is a situation } s_9 \text{ such that } s_9 \leq s_6 \text{ and } s_9 \text{ is a minimal situation such that } s_7 \leq s_9 \text{ and there is an individual } x \text{ and a situation } s_2 \text{ such that } s_2 \text{ is a minimal situation such that } s_2 \leq s_9 \text{ and } x \text{ is a donkey in } s_2, \\
such that there is a situation } s_3 \text{ such that } s_3 \leq s_1 \text{ and } s_3 \text{ is a minimal situation such that } s_2 \leq s_3 \text{ and } u_6(s_3) \text{ owns } x \text{ in } s_3)) \\
(\lambda s_8, \text{ix } x \text{ is a man in } s_8 \text{ beats in } s_8 \text{ ix } x \text{ is a donkey in } s_8) \quad \text{(by } \lambda \text{C)} \\
= [\text{always}]^\theta ([\lambda p_{\langle \langle s, t \rangle \rangle}, p](\lambda s_6, \text{ there is an individual } y \text{ and a situation } s_7 \text{ such that } s_7 \text{ is a minimal situation such that } s_7 \leq s_6 \text{ and } y \text{ is man in } s_7, \\
such that there is a situation } s_9 \text{ such that } s_9 \leq s_6 \text{ and } s_9 \text{ is a minimal situation such that } s_7 \leq s_9 \text{ and there is an individual } x \text{ and a situation } s_2 \text{ such that } s_2 \text{ is a minimal situation such that } s_2 \leq s_9 \text{ and } x \text{ is a donkey in } s_2, \\
such that there is a situation } s_3 \text{ such that } s_3 \leq s_9 \text{ and } s_3 \text{ is a minimal situation such that } s_2 \leq s_3 \text{ and } y \text{ owns } x \text{ in } s_3)) \\
(\lambda s_8, \text{ix } x \text{ is a man in } s_8 \text{ beats in } s_8 \text{ ix } x \text{ is a donkey in } s_8) \quad \text{(by } \lambda \text{C)} \\
= [\text{always}]^\theta (\lambda s_6, \text{ there is an individual } y \text{ and a situation } s_7 \text{ such that } s_7 \text{ is a minimal situation such that } s_7 \leq s_6 \text{ and } y \text{ is man in } s_7, \\
such that there is a situation } s_9 \text{ such that } s_9 \leq s_6 \text{ and } s_9 \text{ is a minimal situation such that } s_7 \leq s_9 \text{ and there is an individual } x \text{ and a situation } s_2 \text{ such that } s_2 \text{ is a minimal situation such that } s_2 \leq s_9 \text{ and } x \text{ is a donkey in } s_2,
such that there is a situation \( s_3 \) such that \( s_3 \leq s_9 \) and \( s_3 \) is a minimal situation such that \( s_2 \leq s_3 \) and \( y \) owns \( x \) in \( s_3 \)
\( (\lambda s_8. \text{iX} \ x \text{ is a man in } s_8 \text{ beats in } s_8 \text{iX} \ x \text{ is a donkey in } s_8) \quad \text{(by } \lambda C) \)
\( = [\lambda p_{<s,t>}. \lambda q_{<s,t>}. \lambda s_1. \text{for every minimal situation } s_4 \text{ such that } s_4 \leq s_1 \text{ and } p(s_4) = 1, \text{there is a situation } s_5 \text{ such that } s_5 \leq s_1 \text{ and } s_5 \text{ is a minimal situation such that } s_4 \leq s_5 \text{ and } q(s_5) = 1] \ (\lambda s_6. \text{there is an individual } y \text{ and a situation } s_7 \text{ such that } s_7 \text{ is a minimal situation such that } s_7 \leq s_6 \text{ and } y \text{ is man in } s_7, \text{such that there is a situation } s_9 \text{ such that } s_9 \leq s_6 \text{ and } s_9 \text{ is a minimal situation such that } s_7 \leq s_9 \text{ and there is an individual } x \text{ and a situation } s_2 \text{ such that } s_2 \text{ is a minimal situation such that } s_2 \leq s_9 \text{ and } x \text{ is a donkey in } s_2, \text{such that there is a situation } s_3 \text{ such that } s_3 \leq s_9 \text{ and } s_3 \text{ is a minimal situation such that } s_2 \leq s_3 \text{ and } y \text{ owns } x \text{ in } s_3) \)
\( (\lambda s_8. \text{iX} \ x \text{ is a man in } s_8 \text{ beats in } s_8 \text{iX} \ x \text{ is a donkey in } s_8) \quad \text{(by Lex)} \)
\( = \lambda s_1. \text{for every minimal situation } s_4 \text{ such that } s_4 \leq s_1 \text{ and there is an individual } y \text{ and a situation } s_7 \text{ such that } s_7 \text{ is a minimal situation such that } s_7 \leq s_4 \text{ and } y \text{ is man in } s_7, \text{such that there is a situation } s_9 \text{ such that } s_9 \leq s_4 \text{ and } s_9 \text{ is a minimal situation such that } s_7 \leq s_9 \text{ and there is an individual } x \text{ and a situation } s_2 \text{ such that } s_2 \text{ is a minimal situation such that } s_2 \leq s_9 \text{ and } x \text{ is a donkey in } s_2, \text{such that there is a situation } s_3 \text{ such that } s_3 \leq s_9 \text{ and } s_3 \text{ is a minimal situation such that } s_2 \leq s_3 \text{ and } y \text{ owns } x \text{ in } s_3, \text{there is a situation } s_5 \text{ such that } s_5 \leq s_1 \text{ and } s_5 \text{ is a minimal situation such that } s_4 \leq s_5 \text{ and } \text{iX} \ x \text{ is a man in } s_5 \text{ beats in } s_5 \text{iX} \ x \text{ is a donkey in } s_5 \text{ (by } \lambda C) \)

\text{B.2 A Relative-Clause Donkey Sentence}

There follows a calculation establishing the truth conditions for a donkey sentence containing a QP and relative clause. See section 2.3.2.

\[
[(\text{every } \text{man } [\lambda x. [\lambda y. [\lambda t_6. [\lambda t_2. [t_6 \text{ owns } t_2]]])]][\text{beats } [\text{it donkey}]]^0
\]
\( = [\text{every}]^0 ([(\text{man } [\lambda x. [\lambda y. [\lambda t_6. [\lambda t_2. [t_6 \text{ owns } t_2]]])]][\text{beats } [\text{it donkey}]]^0)
\( (\text{beats})^0 ([\text{it}]^0 (\text{[donkey]}^0)))
\( = [\text{every}]^0 ([(\text{man } [\lambda x. [\lambda y. [\lambda t_6. [\lambda t_2. [t_6 \text{ owns } t_2]]])]][\text{beats } [\text{it donkey}]]^0)
\( ([\lambda u_1. \lambda u_2. \lambda s_8. u_2(s_8) \text{ beats in } s_8 \text{ } u_1(s_8)])
\( ([\lambda f_{<s,c>}. \lambda s_9. \lambda x. f(\lambda s_9. x)(s_7) = 1. \text{iX } f(\lambda s_9. x)(s_7) = 1])
\( (\lambda u_3. \lambda s_6. u_3(s_6) \text{ is a donkey in } s_6)) \quad \text{(by Lex)}
\)
\[
\begin{align*}
\{\text{every}\}^0 & \left( \left[ \text{man who } [\lambda_6 \left[ \text{a donkey} \right] \lambda_2 \left[ t_6 \text{ owns } t_2 \right]] \right] \right)^0 \\
& \left( \lambda u_1 \cdot \lambda u_2 \cdot \lambda s_8 \cdot u_2(s_8) \text{ beats in } s_8 \ u_1(s_8) \right) \\
& (\lambda s_7 : \exists ! x \text{ is a donkey in } s_7 \cdot s_8 \text{ is a donkey in } s_7) \\
\end{align*}
\]
(by \(\lambda C\))

\[
\begin{align*}
\{\text{every}\}^0 & \left( \left[ \text{man who } [\lambda_6 \left[ \text{a donkey} \right] \lambda_2 \left[ t_6 \text{ owns } t_2 \right]] \right] \right)^0 \\
& \left( \lambda u_2 \cdot \lambda s_8 \cdot u_2(s_8) \text{ beats in } s_8 \ \lambda x \text{ is a donkey in } s_8 \right) \\
\end{align*}
\]
= [[\forall y]^{0} (\lambda u. \lambda s_7. u_1(s_7) is a man in s_7 and \\
[\forall a]^{6-u_1}(\forall \text{donkey})(6-u_1)](\lambda u_4. \lambda u_5. \lambda u_6. \lambda s_9. u_6(s_9) owns u_5(s_9) in s_9)((u_4)(u_1))(s_7) = 1)
(\lambda u_2. \lambda s_8. u_2(s_8) beats in s_8 i_x x is a donkey in s_8) (by Lex)

= [[\forall y]^{0} (\lambda u_1. \lambda s_7. u_1(s_7) is a man in s_7 and \\
[\forall a]^{6-u_1}(\forall \text{donkey})(6-u_1)](\lambda u_4. \lambda s_9. u_1(s_9) owns u_4(s_9) in s_9))(s_7) = 1)
(\lambda u_2. \lambda s_8. u_2(s_8) beats in s_8 i_x x is a donkey in s_8) (by \lambda C)

= [[\forall y]^{0} (\lambda u_1. \lambda s_7. u_1(s_7) is a man in s_7 and [\lambda s_7]. there is an individual x and a situation s_2 such that s_2 is a minimal situation such that s_2 \leq s_1 and \\
f(\lambda s_2.x)(s_2) = 1, such that there is a situation s_3 such that s_3 \leq s_1 and \\
s_3 is a minimal situation such that s_2 \leq s_3 and g(\lambda s_3.x)(s_3) = 1] \\
(\lambda u_3. \lambda s_6. u_3(s_6) is a donkey in s_6) (\lambda u_4. \lambda s_9. u_1(s_9) owns u_4(s_9) in s_9)]
(s_7) = 1)
(\lambda u_2. \lambda s_8. u_2(s_8) beats in s_8 i_x x is a donkey in s_8) (by Lex)

= [[\forall y]^{0} (\lambda u_1. \lambda s_7. u_1(s_7) is a man in s_7 and [\lambda s_7]. there is an individual x and a situation s_2 such that s_2 is a minimal situation such that s_2 \leq s_1 and \\
x is a donkey in s_2, such that there is a situation s_3 such that s_3 \leq s_1 and s_3 is a minimal situation such that s_2 \leq s_3 and u_1(s_3) owns x in s_3)](s_7) = 1)
(\lambda u_2. \lambda s_8. u_2(s_8) beats in s_8 i_x x is a donkey in s_8) (by \lambda C)

= [[\forall y]^{0} (\lambda u_1. \lambda s_7. u_1(s_7) is a man in s_7 and there is an individual x \\
and a situation s_2 such that s_2 is a minimal situation such that s_2 \leq s_7 and \\
x is a donkey in s_2, such that there is a situation s_3 such that s_3 \leq s_7 and s_3 is a minimal situation such that s_2 \leq s_3 and u_1(s_3) owns x in s_3)] (\lambda u_2. \lambda s_8. u_2(s_8) beats in s_8 i_x x is a donkey in s_8) (by \lambda C)

= [\lambda f_{\langle s,e \rangle, \langle s,t \rangle}, \lambda g_{\langle s,e \rangle, \langle s,t \rangle}, \lambda s_4]. for every individual y; for every 
minimal situation s_5 such that s_5 \leq s_4 and f(\lambda s_1.y)(s_5) = 1, there is a 
situation s_6 such that s_6 \leq s_4 and g(\lambda s_1.y)(s_6) = 1] (\lambda u_1. \lambda s_7. u_1(s_7) is a man in s_7 and 
and there is an individual x and a situation s_2 such that s_2 is a minimal situation such that s_2 \leq s_7 and 
x is a donkey in s_2, such that there is a situation s_3 such that s_3 \leq s_7 and s_3 is a minimal situation such that s_2 \leq s_3 and 
u_1(s_3) owns x in s_3)
(\lambda u_2. \lambda s_8. u_2(s_8) beats in s_8 i_x z is a donkey in s_8) (by Lex)

= \lambda s_4. for every individual y; for every minimal situation s_5 such that 
s_5 \leq s_4 and (\lambda u_1. \lambda s_7. u_1(s_7) is a man in s_7 and there is an individual x 
and a situation s_2 such that s_2 is a minimal situation such that s_2 \leq s_7 and 
x is a donkey in s_2, such that there is a situation s_3 such that 

\[ s_3 \preceq s_7 \text{ and } s_3 \text{ is a minimal situation such that } s_2 \preceq s_3 \text{ and } u_1(s_3) \text{ owns } x \text{ in } s_3][\lambda s_1.y](s_5) = 1, \text{ there is a situation } s_6 \text{ such that } s_6 \preceq s_4 \text{ and } s_6 \text{ is a minimal situation such that } s_5 \preceq s_6 \text{ and } [\lambda u_2. \lambda s_8. u_2(s_8) \text{ beats in } s_8 \text{ is a donkey in } s_8][\lambda s_1.y](s_6) = 1 \text{ (by } \lambda C) \]

\[ = \lambda s_4. \text{ for every individual } y:\]

for every minimal situation \( s_5 \) such that
\[ s_5 \preceq s_4 \text{ and } y \text{ is a man in } s_5 \text{ and there is an individual } x \text{ and a situation } s_2 \text{ such that } s_2 \text{ is a minimal situation such that } s_2 \preceq s_5 \text{ and } x \text{ is a donkey in } s_2, \text{ such that there is a situation } s_3 \text{ such that } s_3 \preceq s_5 \text{ and } s_3 \text{ is a minimal situation such that } s_2 \preceq s_3 \text{ and } y \text{ owns } x \text{ in } s_3, \text{ there is a situation } s_6 \text{ such that } s_6 \preceq s_4 \text{ and } s_6 \text{ is a minimal situation such that } s_5 \preceq s_6 \text{ and } y \text{ beats in } s_6 \text{ is a donkey in } s_6 \text{ (by } \lambda C) \]