

Recall: Quantification in FCS

- Three-part division
 - **Operator**
 - starts the test
 - **Restrictor**
 - limits the cases where test applies
 - **Nuclear scope**
 - states what we're testing for
- (1) a. **Most** [Brandeis students] [are smart].
b. **Every** [man who likes a donkey] [buys it].

Also Recall:

- Times, like individuals, can be bound (Partee):

(2) Whenever Susan comes in, John leaves.

Every time t [Susan comes in at t] [John leaves at t]

Quantificational adverbs

- Always - every time...
- Usually - most times...
- Sometimes - some times...
- Often - many times...
- Seldom - few times...

Quantifiers over times?

- Hidden domain restrictions

(3) The fog usually lifts before noon here.

- Most *days d* are such that the fog lifts before noon on d.

(3') Most t' [fog lifts at time t on t' (& t' is a day)]

[t is before noon]

Quantifiers over times?

- Hidden domain restrictions

(4) Caesar seldom awoke before dawn.

- Few days d within C's lifetime are such that C awoke before dawn on d .

(4') Few t' [t' is a day in C's lifetime]

[C awoke at t on t' & t is before dawn]

(4'') Few t' [C awoke at t on t' (& t' is a day in C's lifetime)]

[t is before dawn]

An aside: hidden domain restrictions

- Kai von Stechow (1994) *Restrictions on Quantifier Domains. Ph.D.Thesis*, UMass, Amherst.

All quantification involves hidden restrictions:

(5) a. Everyone is here. b. Nobody is absent.

(5a') Every x [$\text{person}(x) \& \underline{\text{part-of-this-class}(x)}$] [$\text{here}(x)$]

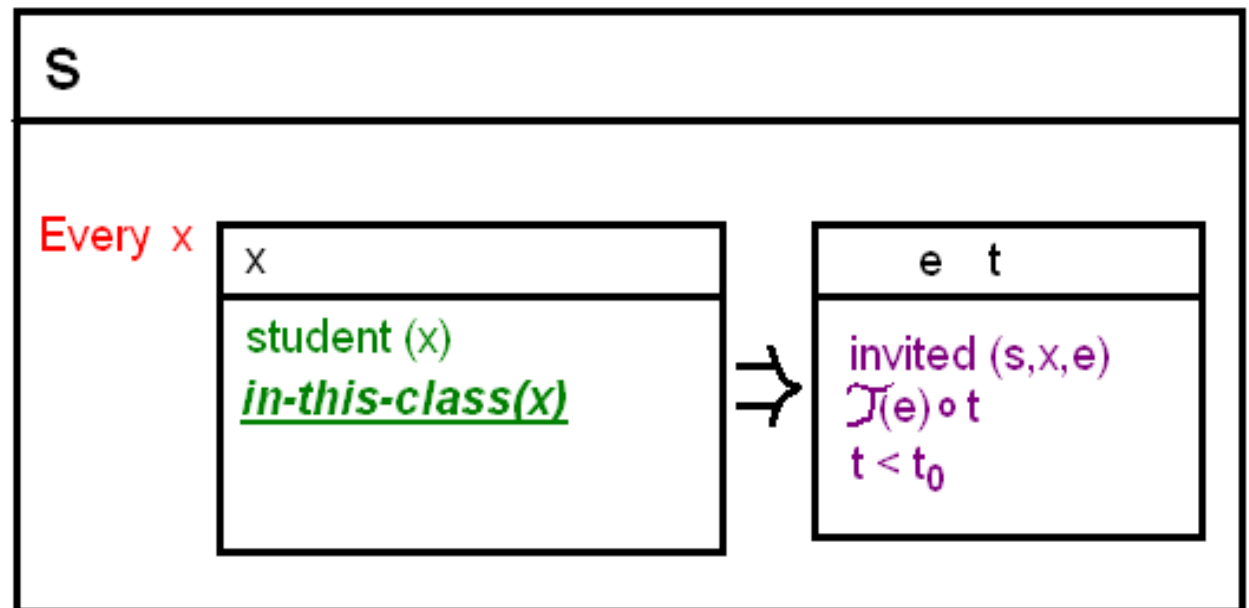
(5b') No x [$\text{person}(x) \& \underline{\text{part of this class}(x)}$] [$\text{absent}(x)$]

Tri-partite structures in FCS

- A single box has all the card-tabs at the top
 - This is just the list of all file-card variables and constants
- Inside the box, information from the sentence
- Operators that are *tests* create split boxes
 - This mimics the tri-partite structure for quantification

(6) Sophia saw every student

(6')

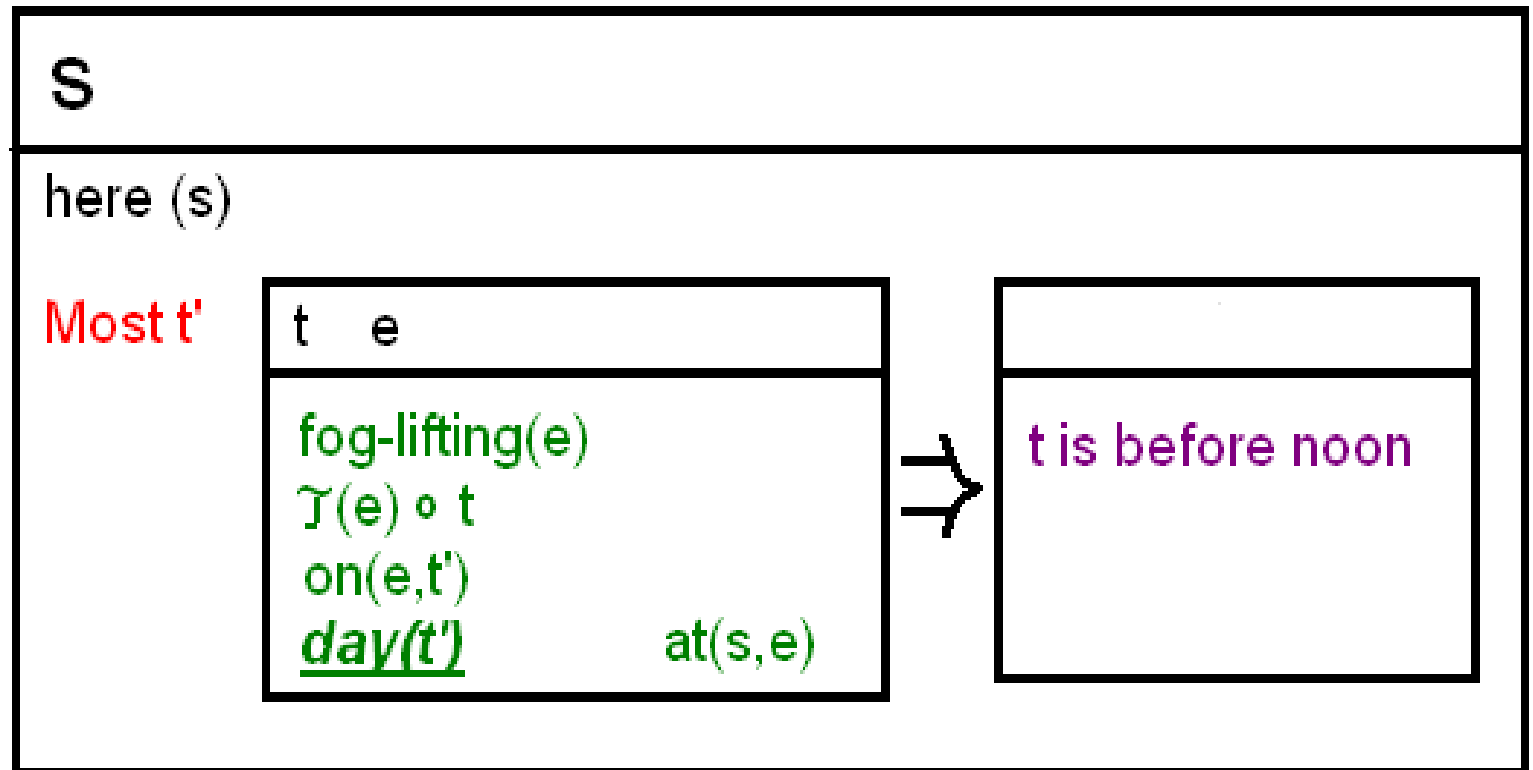


Quantification over times?

(3) The fog usually lifts before noon here.

- Representation for (3) would be something like

(3'')



Maybe not times?

(7) Riders on the 13th Ave line seldom get seats.

- Scenario: 22 hours – 14% of all riders, plenty of seats
2 rush hours – 86% of riders, no seats
- This is NOT about counting “times”!

(7') Few t [riders are on 13th Ave line at t] [riders get seats at t]

- The formula above is ***false in the scenario.***
- ***But the sentence (7) is true in the scenario!***

Quantifiers over events?

- (3), (4), and (7) all come out fine if Q-adverbs quantify over events:

(3''') Most e [fog-lifting(e)] [(e) is before noon]

(4''') Few e [awoke(c,e)] [(e) is before dawn]

(7'') Few e [ride(x,e)&on(e,13thAv)]
[part-of(e',e), find-seat(x,e')]

Maybe not events?

- The adverbs still quantify over something even when there are no events
- (8) A man who owns a donkey always beats it now and then.
- For every pair of man and donkey, such that man owns donkey, there are occasional beating events.
 - NOT at every time t , there is a beating event!
- (9) A quadratic equation never has more than two solutions.
- No quadratic equation is such that its set of solutions has cardinality greater than 2
 - NO POSSIBLE EVENTS HERE!

Lewis's solution

- Q-adverbs are not picky – they'll quantify over anything
 - If there is a free variable, they'll get it
 - If not, there is always time to quantify over

(10) a. A Brandeis student is usually smart.

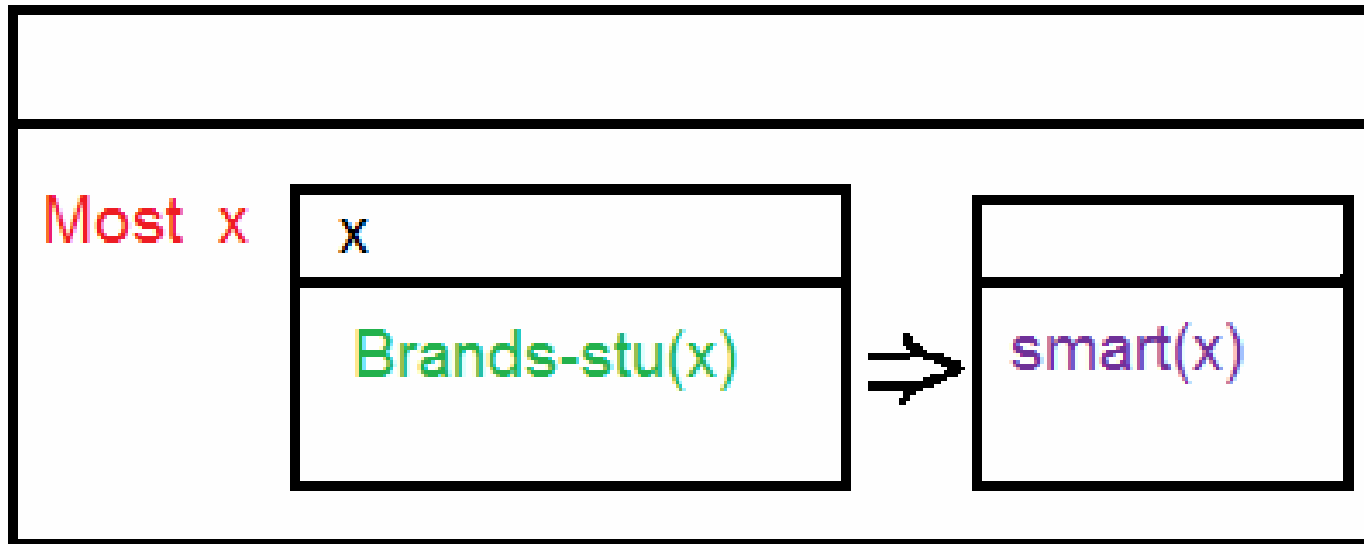
b. The Brandeis student is usually smart.

Lewis's solution in FCS

(10) a. A Brandeis student is usually smart.

- Indefinite places a free variable within the restrictor of a Q-adverb
 - so “most students” reading is available

(10a')

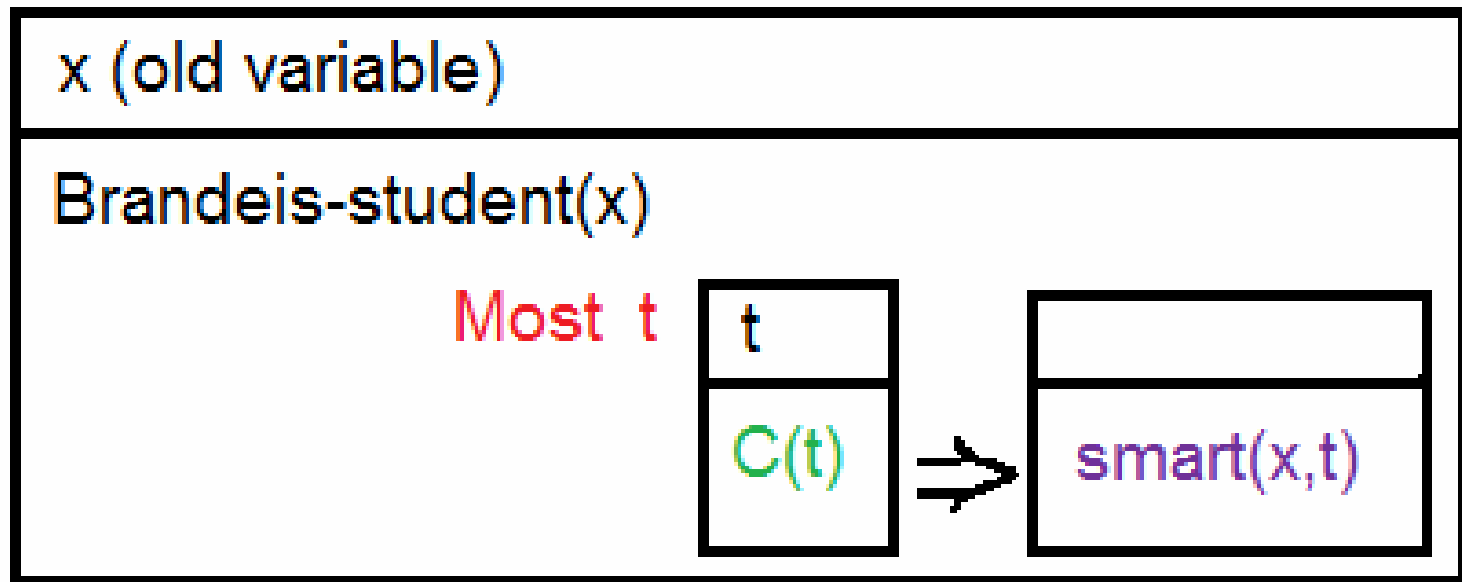


Lewis's solution in FCS (cont'd)

(10) b. The Brandeis student is usually smart.

- Definite places no free variable within the restrictor of a Q-adverb
 - so only the “now smart, now not” reading is available

(10b')



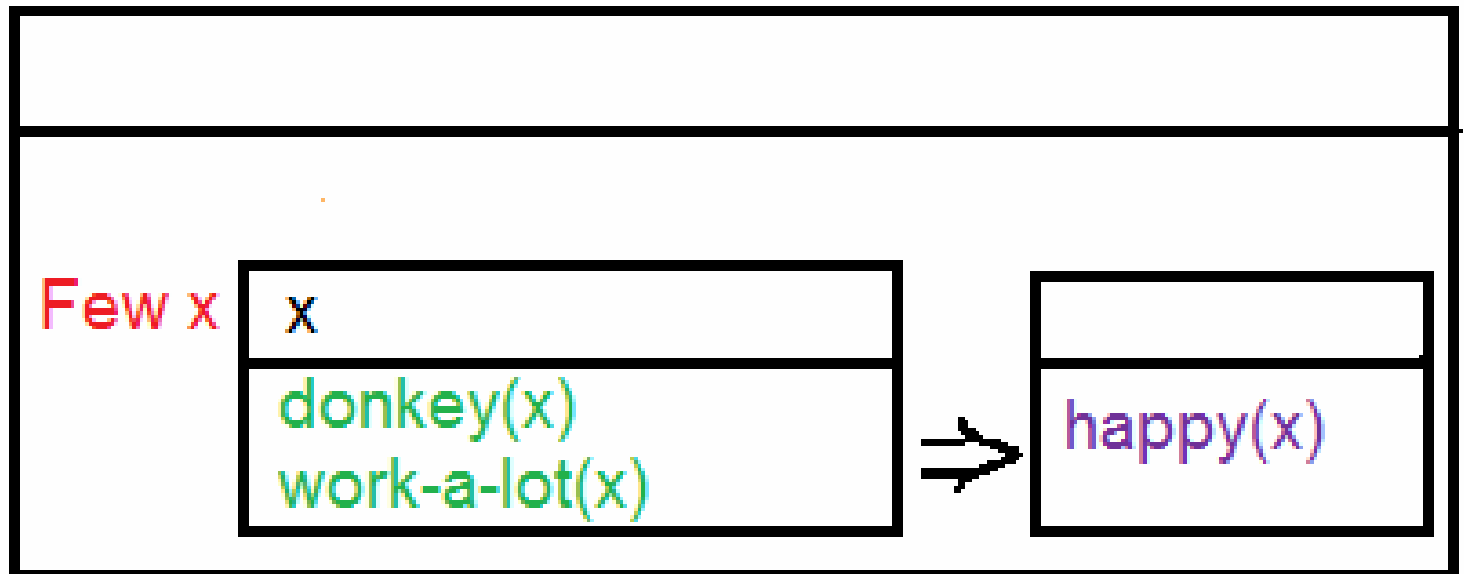
Donkey conditionals

- Note that these two sentences are synonymous
 - On the non-time reading of “rarely”

(11) If a donkey works a lot, it's rarely happy.

(12) Few donkeys that work a lot are happy.

(11')=(12')



Conditionals – a new approach

- What if we treat conditionals in general as tripartite quantification structures?
 - The “if”-clause provides the restrictor
 - The consequent clause provides the nuclear scope
 - If there is no Q-adverb, assume a silent Generic q-adverb (like a less-strict version of “every”)

(11") rarely [If a donkey works a lot], [it's happy].

(13) If a donkey is grey, it's stubborn.

Conditionals as tri-partite structures

- Let's take a brief look at conditionals that were giving us trouble before
 - (14) If my hen lays an egg, Cologne cathedral will collapse.
 - (15) If iron were less dense than water, it would float on water.
- If these are tri-partite structures, what are we quantifying over?

Conditionals as tri-partite structures

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(14) If my hen lays an egg, Cologne cathedral will collapse.

(15) If iron were less dense than water, it would float on water.

- If these are tri-partite structures, what are we quantifying over?

(14') QU var [my hen lays an egg(var)] [cathedral will collapse(var)]

(15') QU var [iron less dense than water(var)] [it floats on water(var)]

Conditionals as tri-partite structures

- Let's take a brief look at conditionals that were giving us trouble before

(14) If my hen lays an egg, Cologne cathedral will collapse.

(15) If iron were less dense than water, it would float on water.

- If these are tri-partite structures, what are we quantifying over? **Worlds!**

(14") Every w [my hen lays an egg(w)] [cathedral will collapse(w)]

(15") Every w [iron less dense than water(w)] [it floats on water(w)]

Conditionals as tri-partite structures

(14) If my hen lays an egg, Cologne cathedral will collapse.

(15) If iron were less dense than water, it would float on water.

- These are modal – they consider possible worlds
 - Like other kinds of quantification, there are hidden domain restrictions.

E.g.

(14''') Every w [my hen lays an egg in w) & causal-laws-same(w, w_0)
[Cologne cathedral collapses in w]

Conditionals as tri-partite structures

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E.g.

(14''') Every w [my hen lays an egg in w) & causal-laws-same(w, w_0)
[Cologne cathedral collapses in w]

(15''') Every w [less dense(iron, water, w) &
physical-laws-same(w, w_0) & $w = w_0$]
[iron floats on water in w]