Handout for “More Truths about Generic Truth”
(example sentences and similar stuff only)

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(1) Dogs bark
(2) Lions have manes
(3) The Dutch are good sailors
(4) Dogs bark.
(5) $\forall x (\text{Dog}(x) \rightarrow \text{Bark}(x))$
(6) $\forall x (\text{Dog}(x) \rightarrow \forall e (\text{C}(e) \rightarrow \text{Bark}(x, e)))$

Challenge: The Proviso Problem
(7) Ducks lay eggs. (Krifka et al 1995)
(8) Cardinals are bright red. (Leslie 2008)

Challenge: Weak Existential Generics
(9) Mosquitoes carry the West Nile Virus. (Leslie 2007, 2008)

(10) Ravens are normally black.
(11) Penguins don’t fly
(12) Birds fly
(13) Turtles live to be 100 years old
(14) Girls do better in school than boys (Nickel 2010)
(15) $\forall x \forall y (\text{girl}(x) > (\text{boy}(y) > x \text{ does better than } y))$
(16) $\forall x \forall y ((\text{girl}(x) \land \text{boy}(y)) > x \text{ does better than } y)$
(17) $\forall x (\text{girl}(x) > \forall y (\text{boy}(y) > x \text{ does better than } y)$
(18) $\forall x \forall y (\text{boy}(y) > (\text{girl}(x) > x \text{ does better than } y)$
A Modality or a Probability?

**Cohen truth**: “A’s B” is true just in case the probability of an arbitrary A’s being a B is greater than 0.5, where an A’s being a B is understood in terms of conditional probability.

But what sort of probability – subjective probability or frequency? Both are problematic as an account of generics.

Frequency Accounts fail for

(19) This machine crushes oranges.
(20) Kim handles the mail from Antarctica.

Subjective Probability Accounts confound degree of belief with semantics. I can have all sorts of false beliefs about birds but that doesn’t affect the meaning. A

Probabilistic Theory of Generics (Ariel Cohen)

(21) (a) Dogs bark.
(b) Dogs make good guard animals.
(c) So dogs bark and make good guard animals.

(22) (a) The conditional probability of x’s barking given that x is a dog > .5
(b) The conditional probability of x’s being a good guard animal given that x is a dog > .5
(c) So the conditional probability of x’s barking and being a good guard animal given that x is a dog > .5.

Embedded Generics

(23) People who go to bed late don’t get up early.
(24) Dogs chase cats that chase mice.

Anti-Cohen argument:

\((A \supset B) > (A > B)\) is Cohen true iff \(P(\frac{A > B}{A \supset B}) > 0.5\).

By conditionalization we have \(P(\frac{A > B}{A \supset B}) = P(\frac{B}{A \supset B}) = 1.\)

Then \(P(A > B)\)

\[= P((A > B) \land (A \supset B)) + P((A > B) \land \neg(A \supset B))\]
\[\geq P((A > B) \land (A \supset B))\]
\[= P(\frac{A > B}{A \supset B}) \cdot P(A \supset B) = P(A \supset B)\]
That is, the probability of a generic is always at least as great as the probability of the corresponding material conditional!!

**Fact 1:** Assuming conditionalization, no generic $A > B$ is Cohen true unless the strict conditional $A \supset B$ (i.e., $\square(A \supset B)$) is also true (if $0 < Pr(A) < 1$)

(Considerations of Higher-order probabilities and perfect information yield:)

**Fact 2:** Assuming higher order probabilities and perfect information: (i) every embedded generic of the form $C > (A > B)$ is Cohen true iff $A > B$ is Cohen true, no matter what the $C$; (ii) every embedded generic of the form $(A > B) > C$ is defined only if $A > B$ is Cohen true. Assuming that the embedded generic is defined, $C \land (A > B)$ is true iff $C$ is true.

(These Facts make us think there is no plausible probabilistic account of characterizing genericity).

Our 1997 account account incorrectly left the interpretation of embedded generics on the right unaffected by the antecedent of the outer generic. $A > (B > C)$ is true at a world $w$ iff $*(w, ||A||) \subseteq ||B > C||$

- E.g., *Pheasants normally leave their cover when startled.*

We actually want to look at the normal $p$-pheasant worlds and we want to evaluate what happens there when we have a normal $p$-startling event. But our semantics does not currently do this.

Here's a fix:

- $||p||_X = p$
- $||\phi \land \psi||_X = ||\phi||_X \cap ||\psi||_X$
- $||\neg \phi||_X = W - ||\phi||_X$
- $||\forall x \phi||_X = \bigcap_{a \in D} ||\phi(a)||_X$
- $||\phi > \psi||_X = \left\{ w \in X : *(w, ||\phi||) \cap X \subseteq ||\psi||_X \cap *(w, ||\phi||) \right\}$, if $X \cap *(w, ||\phi||) \neq 0$
  \[= \left\{ w \in X : *(w, ||\phi||) \subseteq ||\psi||_X \right\}, \text{ otherwise} \]

- $M, w \models \phi > \psi$ iff $*(w, ||\phi||) \subseteq ||\psi||_{*(w, ||\phi||)}$

Axioms for the generic conditional within a modal language

- axioms of quantified S5
- $\forall x(\phi > \psi) \equiv (\phi > \forall x \psi)$, if $x$ is not free in $\phi$
- $\phi > \phi$
- $(\phi > (\phi > \psi)) \supset (\phi > \psi)$
- $(\phi > (\phi > \psi)) \equiv (\phi > \psi)$
- $((\phi > \psi) \land (\chi > \psi)) \supset ((\phi \lor \chi) > \psi)$
- $\square(\phi \supset \psi) \supset (\phi > \psi)$
• □φ ⊃ (ψ > φ)
• □(φ ⊃ ψ) ⊃ (((φ > ¬χ) ∧ (ψ > χ)) ⊃ (ψ > ¬φ)) (Specificity)
• □(φ ⊃ ψ) ⊃ ((χ > φ) ⊃ (χ > ψ))
• □(φ = ψ) ⊃ ((φ > χ) ⊃ (ψ > χ))
• (T > φ) ⊃ φ (a useful principle)

• φ > (ψ > ψ) is true in all our models
• φ > ψ still does not entail nor is it entailed by any combination of truth functional operators over φ and ψ.
• (φ > ψ) ⊃ (φ > (φ > ψ))
• (φ > (φ > ψ)) ⊃ (φ > ψ), provided we add a constraint on the model:
  *(w, φ) ⊆ \bigcup_{w' \in *(w, φ)} *(w', φ)

**Definition:** B is independent of A iff

• *(w, ||A ∧ B||) = *(w, ||A||) ∩ *(w, ||B||)
• *(w, ||B||) = *(w', ||B||), for all w' ∈ *(w, ||A||)

**Fact 3:** (A > (B > C)) ≡ ((A ∧ B) > C) iff A and B are independent.

Why an import-export law doesn’t always hold:

• If it’s penguin, it normally doesn’t fly (it’s a penguin is equivalent to it’s a bird and a penguin)
• ?? If it’s a bird, then normally if it’s a penguin, normally it doesn’t fly.
• Given the semantics, the exported version involves the evaluation
  \[\|\text{fly}(x)||_{*(w, ||\text{bird}(x)||)}; \quad \text{since } *(w, ||\text{bird}(x)||) \cap *(w, ||\text{penguin}(x)||) = \emptyset\]

Building Logical Forms for Generics using Asher 2010:

• Nouns are λ terms whose λ bound objectual variable have the type (kind individual). Which type gets selected for the noun will depend on the predicate to which it forms an argument.
  - Ducks lay eggs
  - Ducks are widespread throughout Europe
Ducks lay eggs and are widespread throughout Europe.

- Generics have a silent quantificational element that may combine with a bare plural in the restrictor of the quantifier.
- The null determiner or quantificational element is of polymorphic type, whose value depends on the input of its first argument.
- Bare plurals in the nuclear scope of a quantifier undergo type coercion, $\exists$ closure, to meet the selectional restrictions of the predicate.

(Existential generics)

(25) Firemen are available
(26) $\forall y (y = y > \exists x (\text{firemen}(x) \land \text{available}(x)))$

Given our assumption that $\ast (w, \top) = \{w\}$, (26) is equivalent to:

(27) $\exists x (\text{firemen}(x) \land \text{available}(x))$

(Troublesome cases of Accommodation)

(28) Female ducks lay eggs
(29) Male cardinals are bright red
(30) Ducks lay eggs and are female

Further, on the modal analysis it lead to the plainly false, *Ducks are female,* since $\forall x (A > (B \land C)) \supset \forall x (A > B)$ is valid on our semantics.

Cohen’s alternative semantics to the rescue!

(31) $\forall x ((\text{duck}(x) \land (x \text{ bears live young} \lor x \text{ lays eggs} \lor x \text{ reproduces by mitosis})) > x \text{ lays eggs})$

(32) These farm animals have different means of reproduction.
(33) Cows bear live young,
(34) Cows bear live young,
(35) Ducks lay eggs.
(36) FEMALE ducks lay eggs.
You be careful about mosquitoes and deer ticks. Mosquitoes carry the WNV and deer ticks do too.

Double genericity:

Russians smoke after dinner.
 Mosquitoes carry the West Nile Virus.
 Sharks attack an injured bather.

\[
\forall (\text{Russian}(x) > \forall e(\text{after dinner}(e)) > \text{smokes}(x)(e))
\]

\[
\forall x(\text{Mosquito}(x) > \forall e(\text{C}(e) > \text{carry the WNV}(x, e)))
\]

\[
\forall x(\text{Shark}(x) > \forall e(\text{C}(e) > \exists x(\text{bather}(x) \land \text{attack}(x, e))))
\]

The appropriate circumstances we appeal to here in the restrictor of the generic obey certain important constraints (as does the modality we appealed to).

(a) The circumstances don’t change with regard to whether we look, for instance, at (42) or at its internal negation, Mosquitoes don’t carry WNV.

(b) In addition, the circumstances described in (41) & (43) must be ones that can plausibly occur to any mosquito or shark and are causally sufficient (in normal cases) to ensure the truth of the restrictor of the generic.

Harder examples:

Cardinals are bright red and lay smallish, speckled eggs.
Lions have large manes and rear their young in groups.
Jade is green and black.
Jade is green but also sometimes black.
Jade is green. Jade is also black.
References


