Problem 7: Coherence
Problem 11: Intermediate Concepts

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Coherence: Intuition

- Normative systems: Collection of norms
- Formal norm: Conditional statement
- Example: Given a situation, a law book tells you how to act correctly.
- Question: How can we determine if our rules make sense?

Coherence: Formalization

Definition (Normative System)

A *normative System* G is a set of norms.

Definition (Norm)

A *norm* $n = (c, s)$ consists of two PL formulas, a *condition* c and a *statement* s. It is fulfilled if either the condition is not satisfied or the statement holds.

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- Example: "If you are a guest, be polite."

I/O-Logic

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- Note: A set of boolean variables can be termed *consistent*. For normative systems we use *coherence*, since norms do not hold truth values.

Coherence: Possible Solutions (1/3)

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  (1*a*) *G is coherent* *iff* $\exists A\colon \perp \notin out(G, A)$

- This definition seems too weak.
- Consider $G = \{(c, s), (c, \neg s)\}$. Since $\perp \notin out(G, \emptyset)$, the system is coherent.

Coherence: Possible Solutions (2/3)

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  (1b) *G is coherent* *iff* $\forall A \colon \bot \notin out(G, A)$

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- Idea: Consider only foreseeable situations!

  (1c) *G is coherent* *iff* $\forall (c, s) \in G \colon \bot \notin out(G, c)$

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  $(1c)$ G *is coherent* *iff* $\forall (c, s) \in G\colon \bot \notin out(G, c)$

- This requires too many norms to function.
- Let (c_1, s_1) and (c_2, s_2) be norms, then $c_1 \wedge c_2$ is not a situation we consider for coherence with $(1c)$.

Coherence: Possible Solutions (3/3)

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Coherence: Possible Solutions (3/3)

- Question: The norm $(c, \neg c)$ creates a conflict between input and output. Should this norm be allowed?

  (2) G *is coherent* *iff* $out(G, A) \cup A \not\models \bot$

- With (2), norm violation causes incoherence.
- Example: An impolite guest

$$(guest, polite) \in G, \quad guest, \neg polite \in A$$

$$out(G, A) \cup A = \{..., polite, \neg polite, ...\} \models \bot$$

Coherence: Output under constraints

- Idea: To determine coherence we examine systems in specific situations and under certain constraints.

Definition (Output under constraints)

Let G be a normative system and A and C two sets of propositional formulas. Then G is *coherent* in A under constraints C iff $out(G, A) \cup C$ is consistent.

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- Consider the norm $(broken, \neg broken)$ which commands agents to fix things they find to be broken. Is this a reasonable norm?
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- Implication: The presented approach is *static*!
- We *can not* instruct agents on how to act.
- We *can* describe properties of still frames.

Problem 11: Meaning Postulates and Intermediate Concepts

Introduction

Definition (Meaning Postulates)

Stipulative definition, legal meaning.

Definition (Intermediate Concepts)

Relation between legal definitions and words describing natural facts.

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An act of theft is punished by a prison sentence not exceeding 5 years or a fine.

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Example - A Definition

Someone commits an act of theft if that person has taken a movable object from the possession of another person into his own possession with the intention to own it, and if the act occurred without the consent of the other person or some other legal authorization.

$\rightarrow$ meaning postulate for the word *theft*

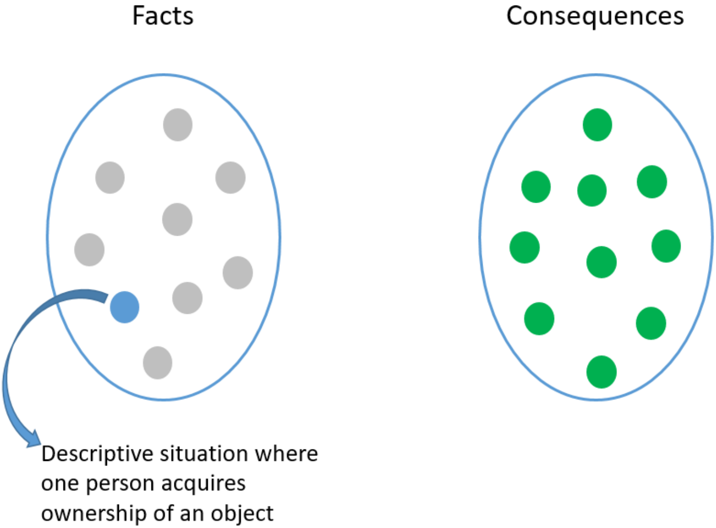
Example - A Definition

Someone commits an act of theft if that person has taken a movable object from the possession of another person into his own possession with the intention to own it, and if the act occurred without the consent of the other person or some other legal authorization.

A person in the sense of the law is a human being *that has been* born*.*

$\rightarrow$ meaning postulates and *intermediate concepts*

Possible Solution 1: Relational Expressions



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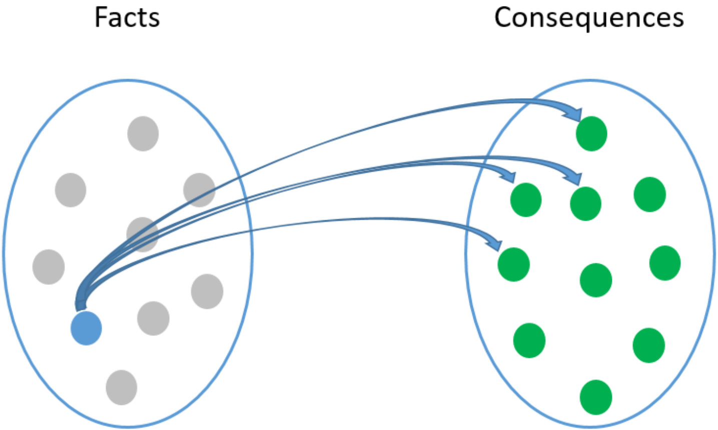

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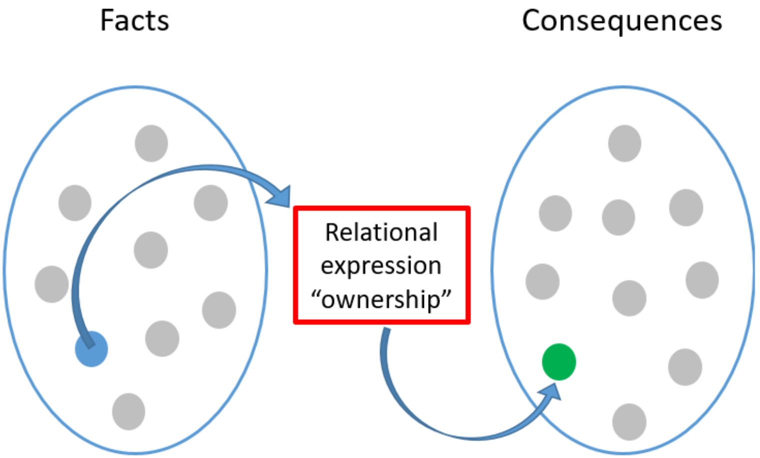

p + n implications are required to express that each fact has a particular consequence.

Possible Solution 2: I/O-Logic

- enhance I/O logic with separate set of intermediates
- employ a *separate set T of intermediates (a, x)* with
  - $a =$ facts
  - $x =$ obtaining legal term
  - $G =$ set of norms
- use $A \cup out(T, A)$ as input to derive an output along G

Possible Solution 2: I/O-Logic

- Example: I/O Logic

$$A = \{..., dog, ...\}, \quad G = \{..., (\neg dog, premises), ...\}$$

$$out(G, A) = \{..., no\text{-}dogs\text{-}on\text{-}premises, ...\}$$

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$$A = \{..., dog, ...\}, \quad G = \{..., (\neg dog, premises), ...\}$$

$$out(G, A) = \{..., \textit{no-dogs-on-premises}, ...\}$$

- Example: I/O Logic with intermediate concept T

$$A = \{..., dog, ...\}, \quad G = \{..., (\neg dog, premises), ...\}$$

$$T = \{..., (\textit{blind-person, guide-dogs}), ...\}$$

$$out(T, A) \cup A = \{..., \textit{no-dogs-on-premises, except-blind-people}, ...\}$$

Critique

- Length
- Lack of analysis, abstraction and formalization