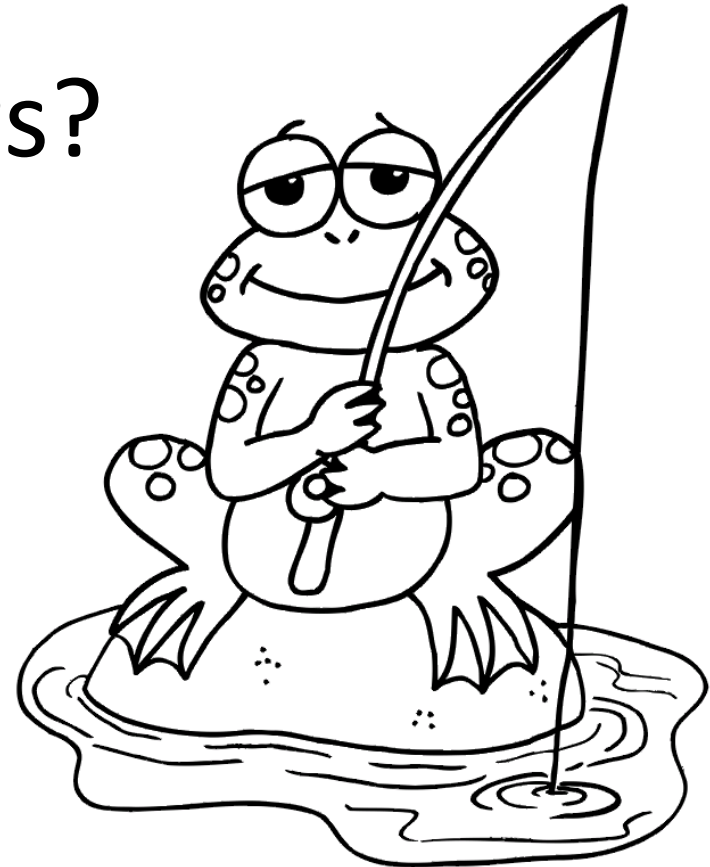


***Lex minus dixit quam voluit,
lex magis dixit quam voluit:***
norm change for legal interpretation

Guido Boella, Guido Governatori,
Nino Rotolo and
Leendert van der Torre



Or...
Fishing frogs?



No fishing

...Or...

Do frogs *count as* fish?

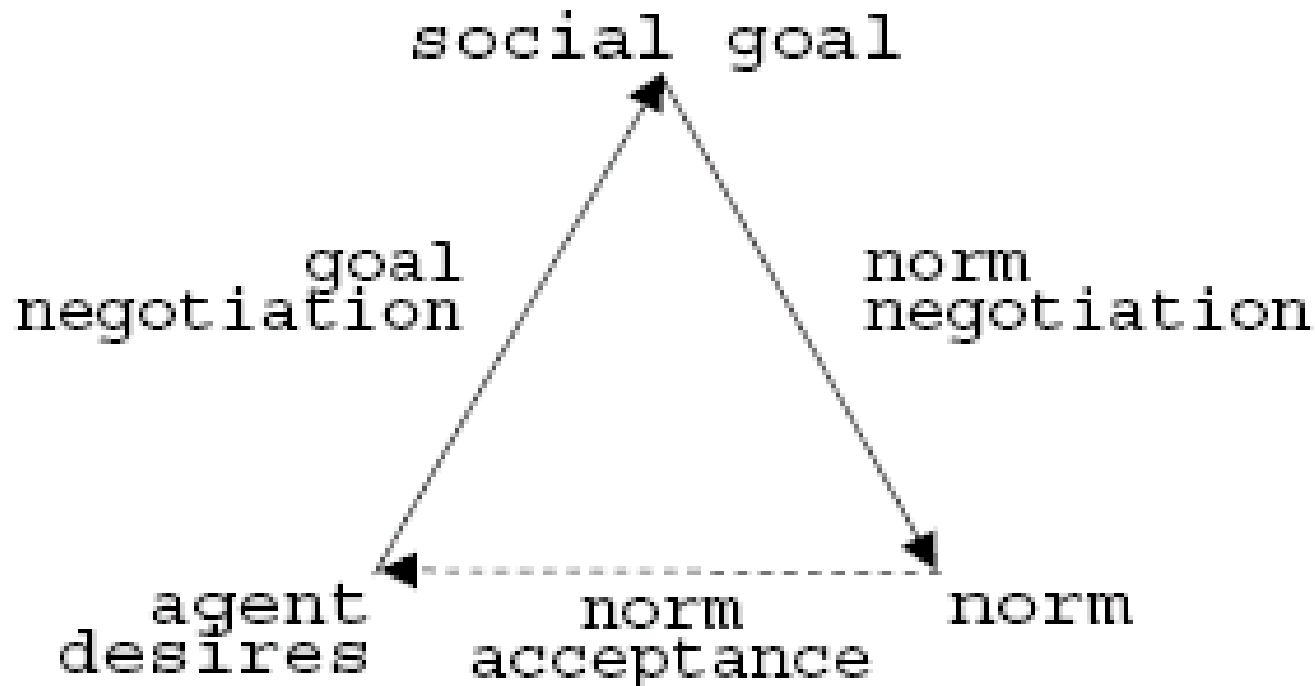
Law is a synecdoche

Law is a synecdoche

- **Synecdoche** (from Greek *synekdoche* (συνεκδοχή), meaning "simultaneous understanding") is a figure of speech in which:
 - a term denoting a part of something is used to refer to the whole thing (Pars pro toto), or
 - a term denoting a thing (a "whole") is used to refer to part of it (Totum pro parte), or
 - a term denoting a specific class of thing is used to refer to a larger, more general class, or
 - a term denoting a general class of thing is used to refer to a smaller, more specific class (Bindo pro parte), or
 - a term denoting a material is used to refer to an object composed of that material.

What is law?

- Norms are means to achieve goals (see social delegation cycle, deon'06)
- They are like plans to achieve a goal



What if we go to ICAPS?
*(International Conference on
Automated Planning and Scheduling)*



Analogy with planning

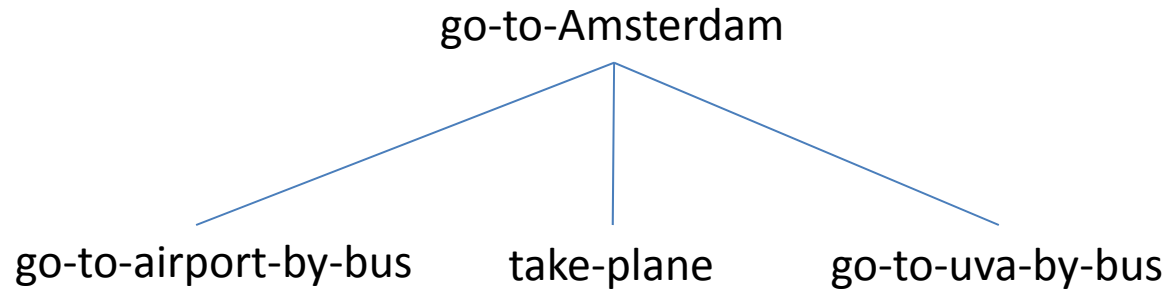
- To achieve a goal you device a plan.
- The plan is suited to what you know of the current situation, but:
 - You can be wrong
 - The world can change
- Solutions:
 - Universal planning (unfeasible)
 - ...

AI Magazine 1989

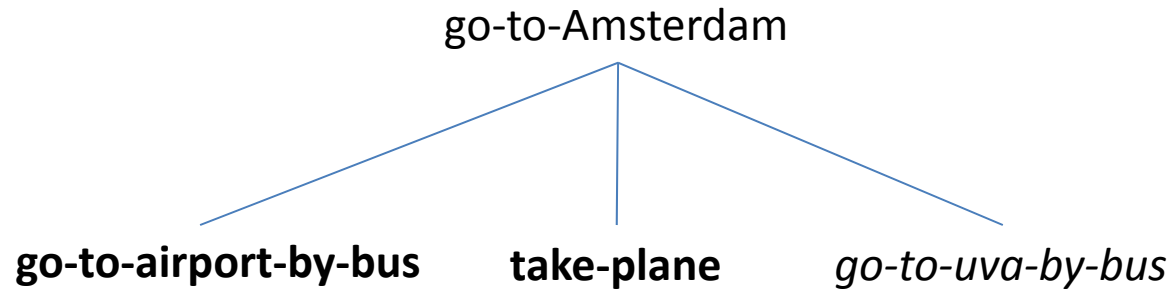
Universal Planning: An (Almost) Universally Bad Idea

Matthew L. Ginsberg

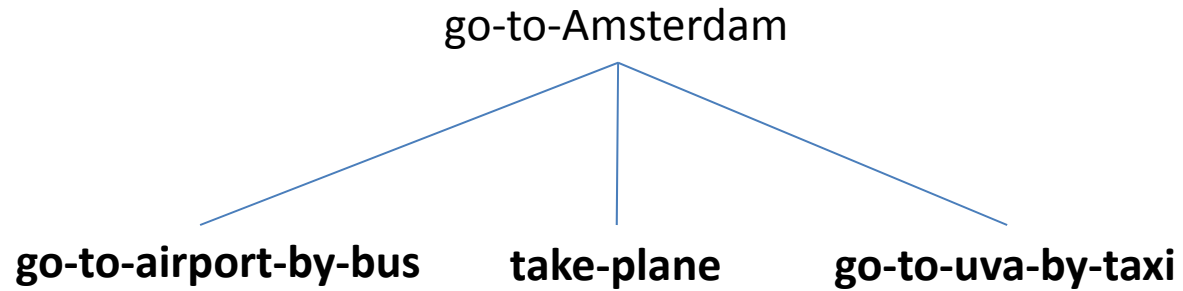
Replanning in hierarchical planning



What if bus strike?



Take a taxi!



What is law?

- Like plans to achieve a goal, norms cannot take into account:
 - All circumstances
 - Describe all applicability conditions
 - All possible changes of the world (e.g., technological innovations)

Conclusion:

- Normative multiagent systems are doomed to fail!

Conclusion:

- Normative multiagent systems are doomed to fail!
- They borrow the normative system metaphor only partially
- NorMAS are too rigid: no human would accept to work with them
- NorMAS ignore that normative systems have a built in mechanism to deal with this problem

The perils of normativism

- Law cannot be reduced to what is written in the norms.
- There is more in law, for example, interpretation

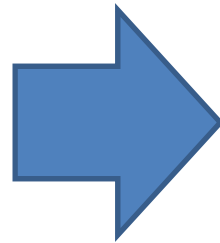
Alternative: **interpretation**

- Normchange is used not only to introduce/remove/modify norms, but above all to dynamically adapt them to new situations.
- PROBLEMS:
 1. Who is going to do this normchange?
 2. How it is possible?
 3. What are the limitations to the power of interpreting norms?

1. Who is going to do this norm change?

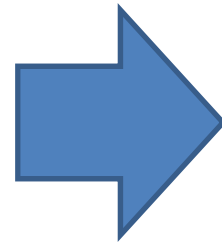
- Not only legislators have the power to change norms.
- E.g., citizens signing contracts create new rules (within boundaries) which are recognized as having the strength of law.
- In interpretation judges have the power to interpret norms.

And under which conditions?



No fishing

Under which conditions?



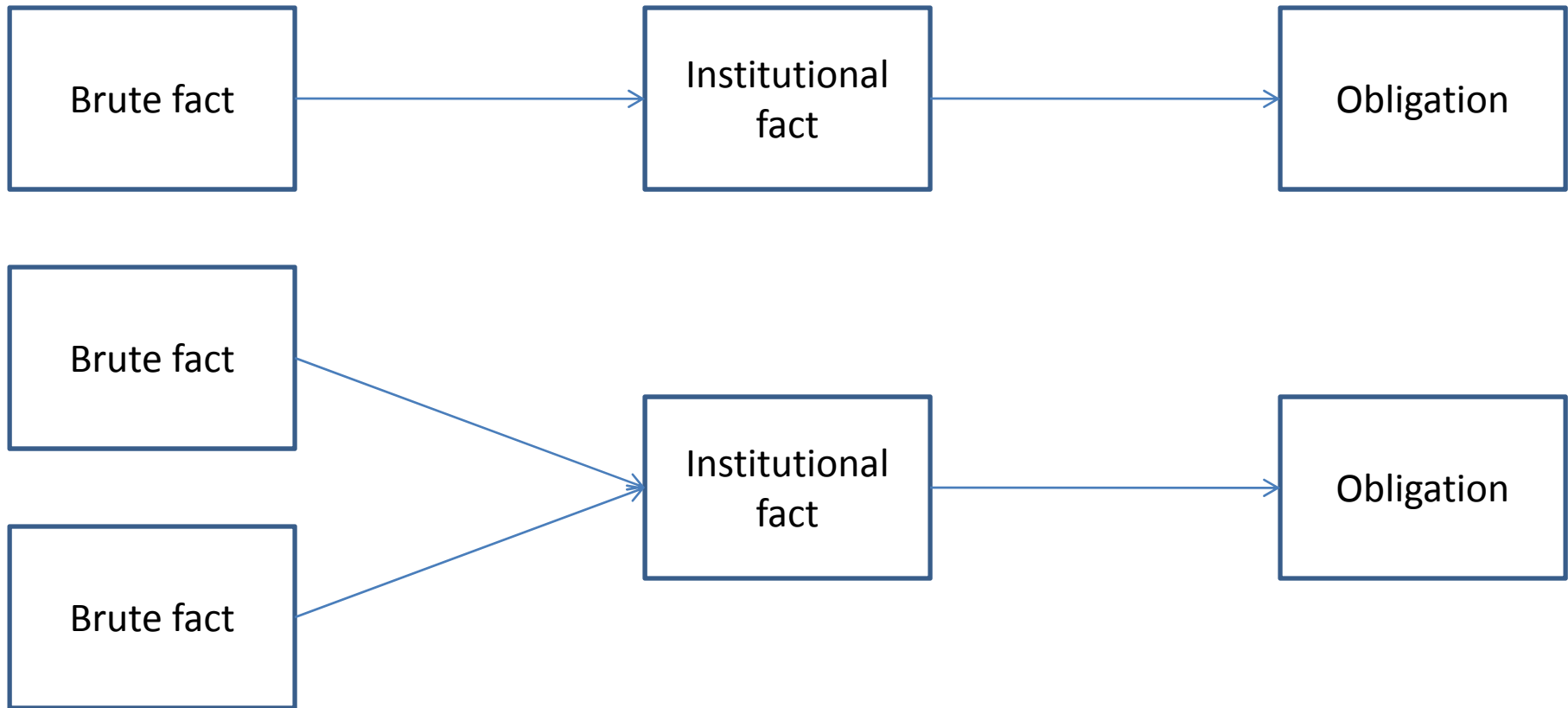
No fishing

No fishing

2. How possible? 3. Which limitations?

- Giving judges the power to change norms would be too dangerous.
- But law is structured in a suitable way:
 - Regulative rules describe prescriptions.
 - Constitutive rules describe applicability.
 - Each regulative rule promotes a goal (the ratio of the norm)
- Interpretation can only change the constitutive rules.
- Limitations given by the goal of the norm.

Constitutive and regulative rules



Two sources of Constitutive Rules

- The law itself (terms defined in legal document), i.e., 'An adult is a person whose age is at least 18 year' (if one does not have the power to do so, cannot change the definition/classification of the term).
- Usual meaning of the terms, as they appear in a law according to the normal (day to day) meaning and intention of the lawmaker.
'Good Pater Familiae', 'Due diligence'.

Constitutive rules

- Ross (tu tu) and (then) Sartor: constitutive rules are useless
- Grossi: counts as as contextual classification
- Boella and van der Torre: constitutive rule define powers to change legal systems

Hart's penumbra

Suppose a legal rule forbids you to take a vehicle into the public park. Plainly this forbids an automobile, but what about bicycles, roller skates, toy automobiles? [...] If we are to communicate with each other at all, and if, as in the most elementary form of law, we are to express our intentions that a certain type of behavior be regulated by rules, then the general words we use like “vehicle” in the case I consider must have some standard instance in which no doubts are felt about its application. There must be a core of settled meaning, but there will be, as well, a **penumbra** of debatable cases in which words are neither obviously applicable nor obviously ruled out. [. . .] We may call the problems which arise outside the hard core of standard instances or settled meaning “problems of the **penumbra**”; they are always with us whether in relation to such trivial things as the regulation of the use of the public park or in relation to the multidimensional generalities of a constitution

Grossi's penumbra

“We propose therefore to analyze these ‘problems of the penumbra’ in terms of the notion of context: according to (in the context of) the public parks regulation of the first municipality bicycles are not vehicles, according to (in the context of) the public parks regulation of the second one bicycles are vehicles.

A ‘penumbral meaning’ is then nothing else but the set of individuals on which the contextual interpretation of the concept varies.”

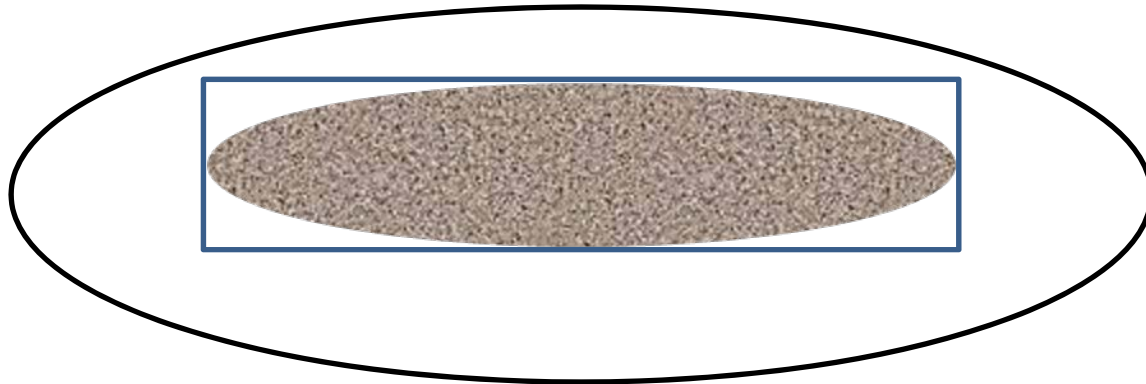
Hart's penumbra

Institutional
fact



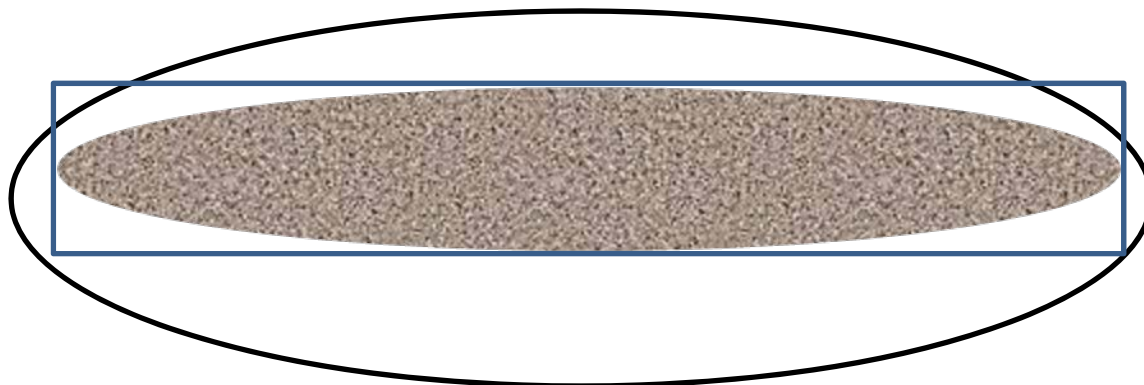
Hart's penumbra

Institutional
fact



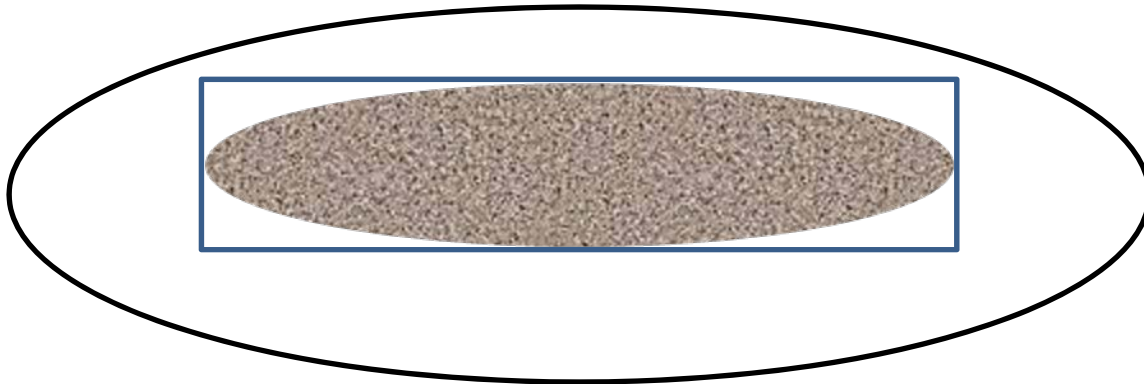
Lex minus dixit quam voluit,

Institutional
fact



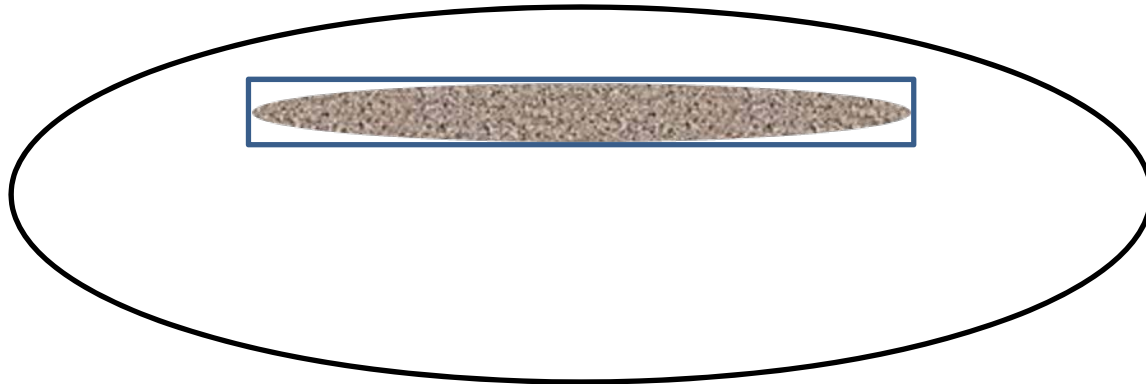
Hart's penumbra

Institutional
fact



Lex magis dixit quam voluit

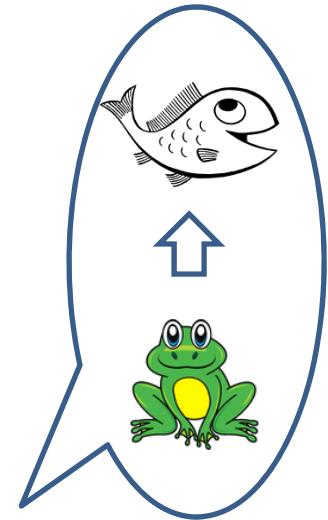
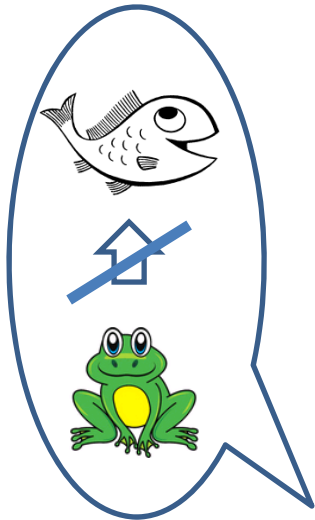
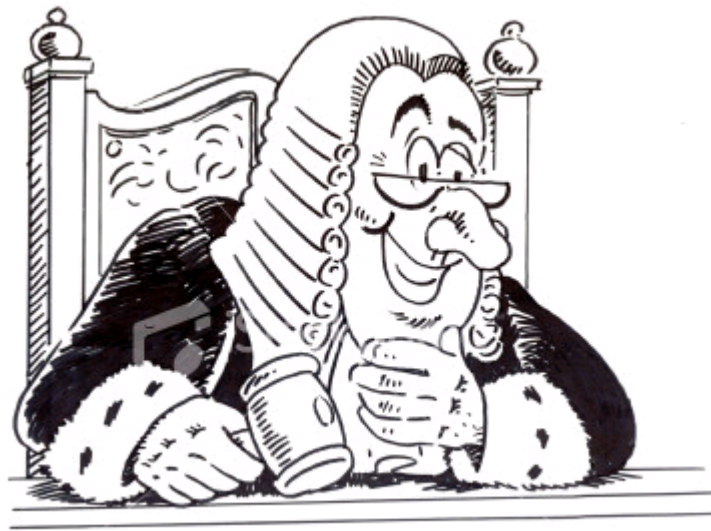
Institutional
fact



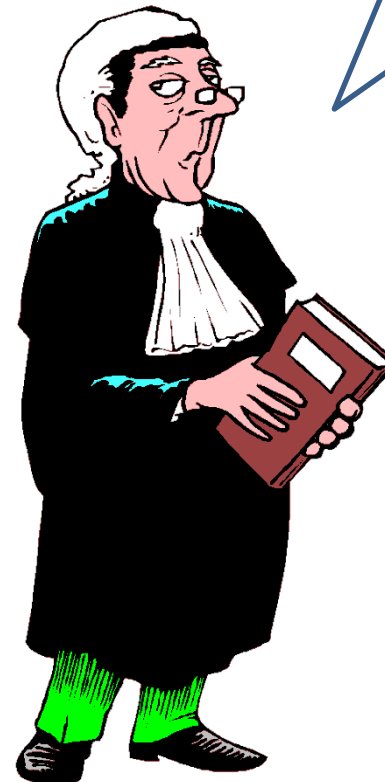
Scenario



The trial

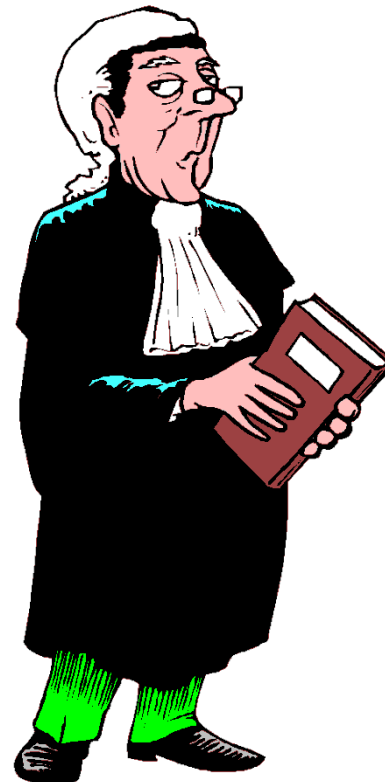
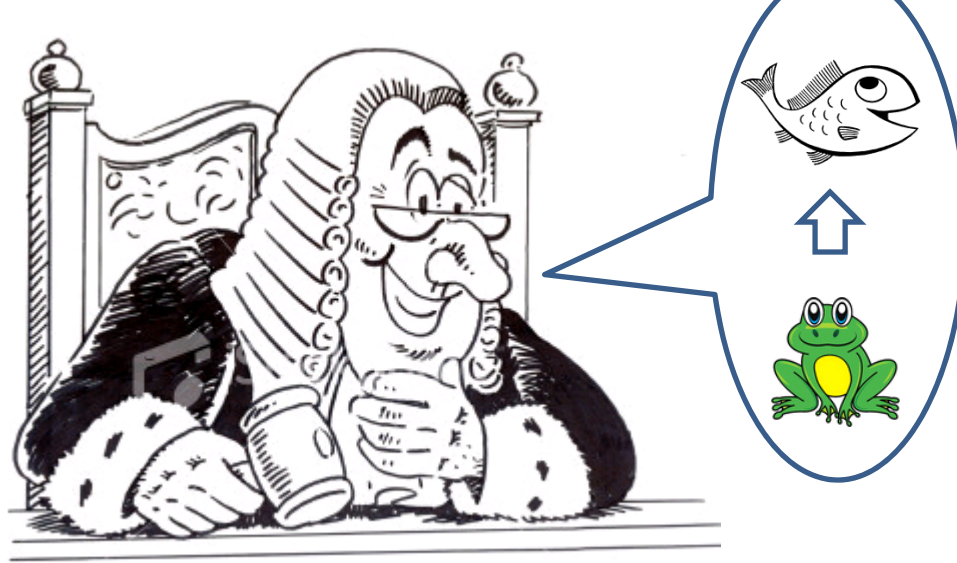


DEFENDANT



PROSECUTOR

The trial



“You can not be serious!”



“Are frogs really fish? This is a fishy example!”



- **WHAT, IF ANYTHING, IS A ZEBRA?**

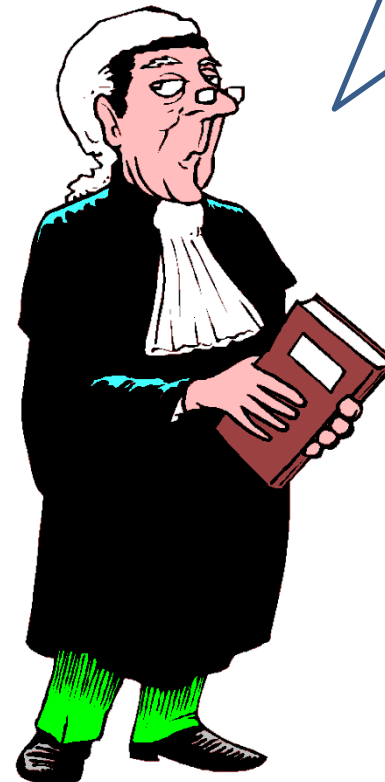
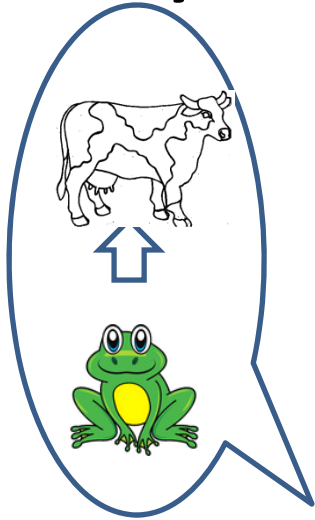
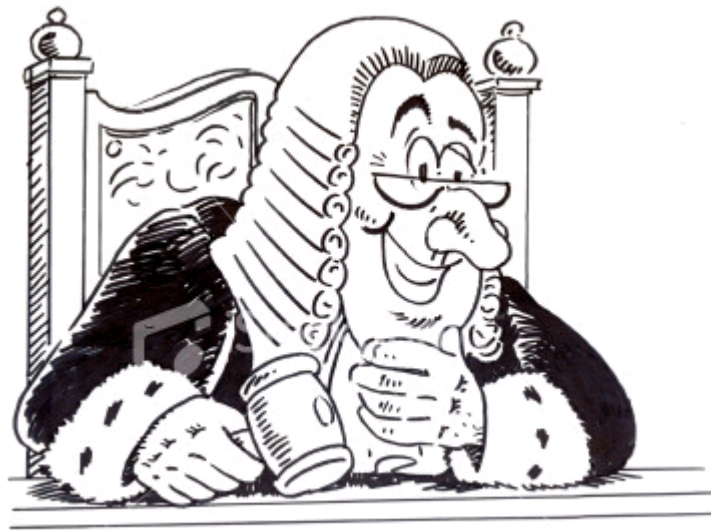
Stephen Gould, 1984

- Birds are dinosaurs
- Biological classification does not give us any guidance.
- Here classification seems based on affordances: ways we interact with classes of entities
- But this is another story

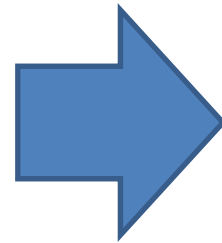
Frogs are fish only in the norm

- The constitutive rule holds only in the context in which the regulative rule is applied
- In this case a prohibition to fish in polluted water
- Frogs are still not fish for all other purposes

Why not..



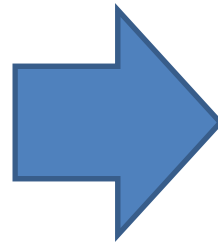
Pollution: preserve health



No fishing

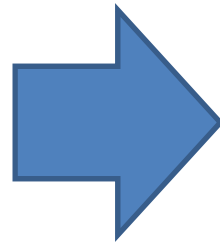
No fishing

Save fish in hachery



No fishing

Big fish is dangerous



No fishing

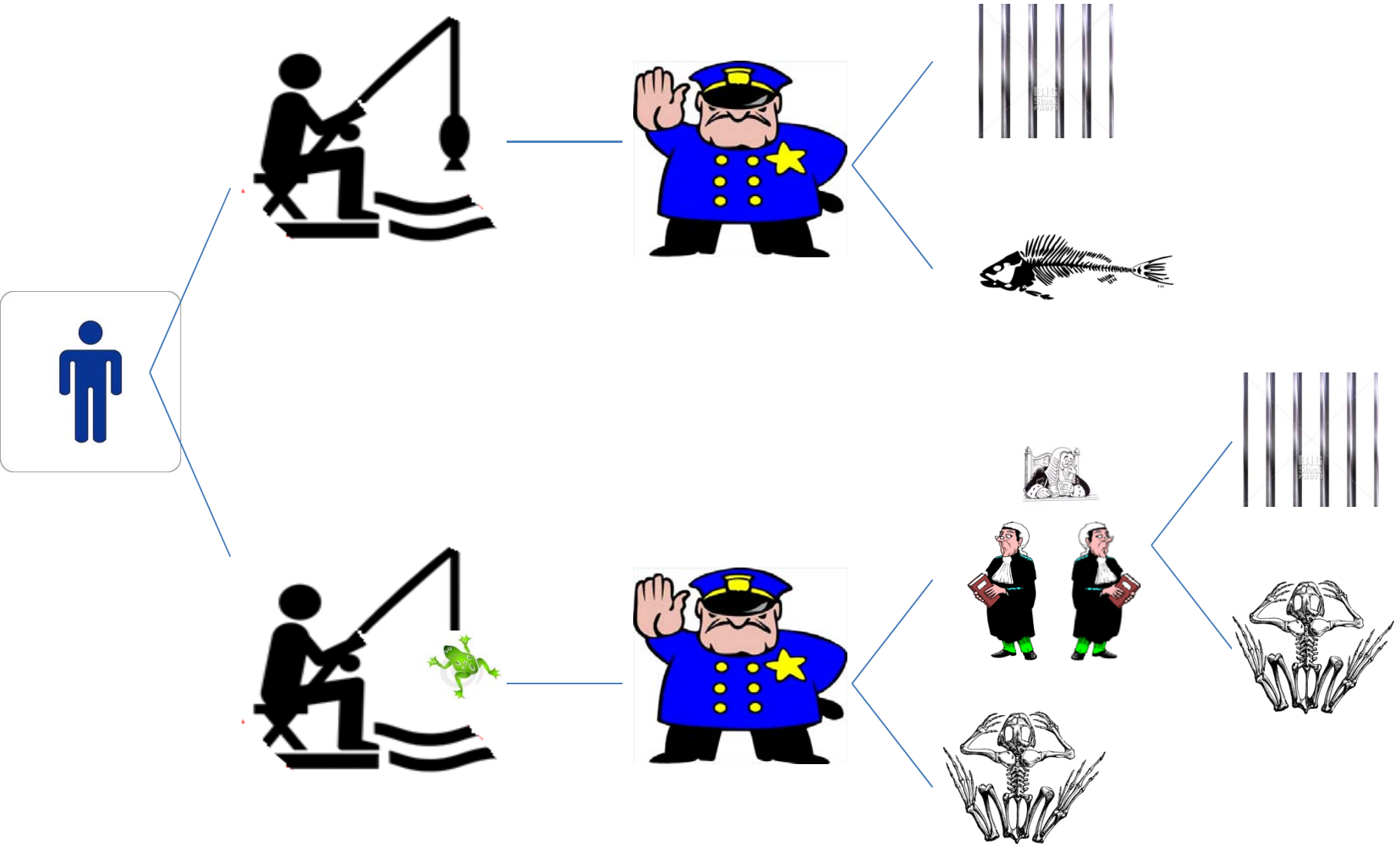
What the law says:

- Articolo 12, Pre Leggi, Codice Civile

Nell'applicare la legge non si può ad essa attribuire altro senso se non quello fatto palese dal significato proprio delle parole secondo la connessione di esse, e dall'intenzione del legislatore. Se una controversia non può essere decisa con una precisa disposizione, si ha riguardo alle disposizioni che regolano casi simili o materie analoghe; se il caso rimane ancora dubbio, si decide secondo i principi generali dell'ordinamento giuridico dello Stato.

For the application of the law it is forbidden to give it any other meaning if not that obtained from the normal understanding of the terms given by the natural relationships in which they appear and the intention of the law maker.

Norms and Games



Basics of Defeasible Logic

- Derive (plausible) conclusions with the minimum amount of information.
 - Definite conclusions
 - Defeasible conclusions
- Defeasible Theory
 - Facts
 - Strict rules ($A \rightarrow B$)
 - Defeasible rules ($A \Rightarrow B$)
 - Defeaters ($A \overset{-}{\rightarrow} B$)
 - Superiority relation over rules

Proving Conclusions in Defeasible Logic

1. Give an argument for the conclusion you want to prove
2. Consider all possible counterarguments to it
3. Rebut all counterarguments
4. Defeat the argument by a stronger one
5. Undercut the argument by showing that some of the premises do not hold

Rule Expansion

- CASE FACTS: F_1, \dots, F_n
- CASE NORM: $A_1, \dots, A_m \rightarrow OB$
- GOAL PROMOTED BY THE NORM: G
- CONSTITUTIVE RULES: \mathcal{C}
- From: $\{F_1, \dots, F_n\} \cup \mathcal{C} \not\vdash A_1, \dots, A_m$
- To: $\{F_1, \dots, F_n\} \cup \mathcal{C} \vdash A_1, \dots, A_m$

- When $F_1, \dots, F_n, \mathcal{C}, \neg B \vdash \neg G$

Rule Expansion

- We cannot change facts, we cannot change laws: we can change the interpretation behind the constitutive rules:
- $C_1, \dots, C_m \rightarrow A_1$
- $C_x, \dots, C_y \rightarrow A_2$
- For norm $A_1, \dots, A_m \rightarrow OB$

Rule Expansion

- We look for possible reasoning chains leading to unprovable literals in the applicability conditions of the norm.
- For example, we can transform defeaters in the chain leading to unprovable literals in the applicability conditions of the norm.

Restrictive interpretation

- CASE FACTS: F_1, \dots, F_n
- CASE NORM: $A_1, \dots, A_m \rightarrow OB$
- GOAL PROMOTED BY THE NORM: G
- CONSTITUTIVE RULES: \mathcal{C}
From: $\{F_1, \dots, F_n\} \cup \mathcal{C} \vdash A_1, \dots, A_m$
- To: $\{F_1, \dots, F_n\} \cup \mathcal{C} \not\vdash A_1, \dots, A_m$

- When $F_1, \dots, F_n, \mathcal{C}, \neg B \vdash G$

Restrictive interpretation

- We use Rule contraction as proposed by (Billington, Antoniou, Governatori, Maher 1999) for belief revision of defeasible theories
- We introduce a rule in C: $F_{i_1}, \dots, F_{i_n} \text{ -}\wedge\text{ -}\rightarrow \neg C_k$

Rules of the example

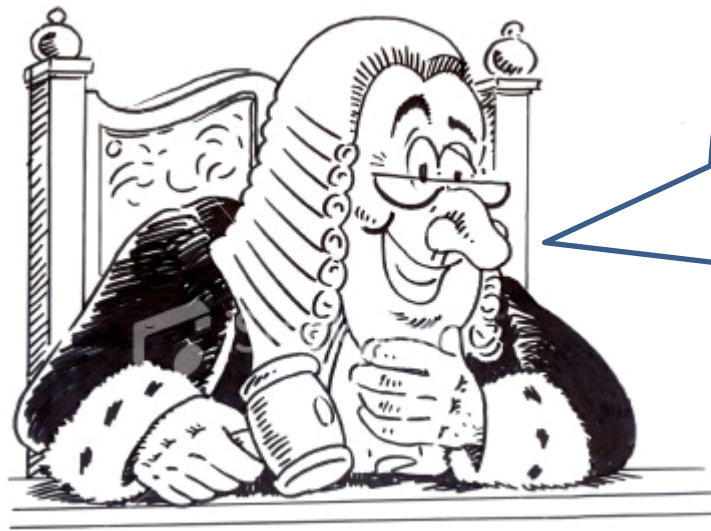
- Regulative rule:
 - fish \wedge polluted \rightarrow O(not fishing)
- Goal: G(\neg food_danger)
- Facts:
 - polluted \wedge fish \wedge fishing \rightarrow food_danger
 - polluted \wedge frog \wedge fishing \rightarrow food_danger
 - frog \wedge polluted
- Constitutive rules:
 - r1: frog \wedge polluted \rightarrow fish
 - r2: frog $\neg \rightarrow \neg$ fish
 - r1 > r2 or r1 < r2 ?

Scenario of the example

- Fisherman is fishing frogs in polluted water under the sign prohibiting fishing: $\text{frog} \wedge \text{polluted} \wedge \text{fishing}$
- By background knowledge
 $\text{polluted} \wedge \text{frog} \wedge \text{fishing} \rightarrow \text{food_danger}$
it follows that eating fished frogs is dangerous
- The fishing prohibition was decided to avoid people eat dangerous food: $G(\neg \text{food_danger})$
- If the regulative rule were applicable, there would be a violation: $\text{fishing} \wedge O(\neg \text{fishing})$

Scenario of the example

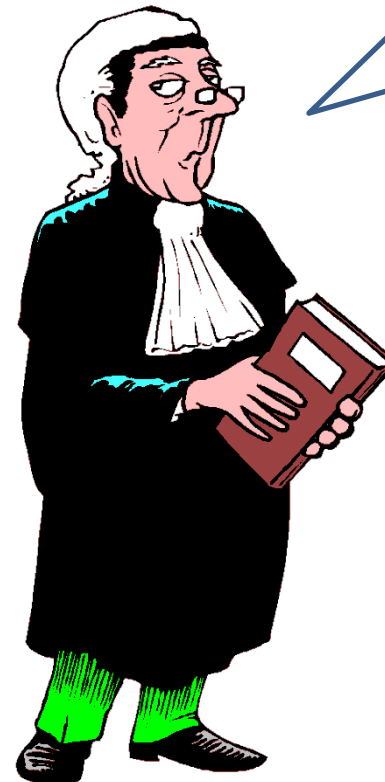
- The policeman considered the rule applicable and fined the fisherman: $r1: \text{frog} \wedge \text{polluted} \rightarrow \text{fish}$
- The fisherman contests the fine and goes to court: the policeman is ignorant in biology.
- The prosecutor supports the view of the policeman: frogs are fish.
- The defendant claims that frogs are not fish:
 $r2: \text{frog} \rightarrow \neg \text{fish}$
- However, prosecutor and defendant are not able to provide evidence which outperform his own claim:
 $r1 = r2$



$r1 < r2$

r2:
frog \neg \wedge \rightarrow
 \neg fish

r1:
frog \wedge
polluted \rightarrow
fish



Scenario of the example

- The judge takes into consideration the two positions: they agree on the fact but propose different constitutive rules r_1 and r_2 . He has to decide which is stronger.
- His argument is as follow: the goal of the rule is preventing health problems due to dangerous food from polluted water. The norm prohibiting fishing is only a partial description of what should not be done. Thus, for the purpose of the rule frogs can be considered as fish too, and thus the fisherman violated the law.
- (what if an asiatic fisherman had fished a snake?)

Future work

- How to device which constitutive rules should be added. E.g., reasoning by analogy (at least functionally): is a segway a vehicle?
- Hypothetical reasoning: not only if goal is/is not satisfied, but also what if there was no violation/satisfaction.
- Contextualization of goals and new constitutive rules: a frog is a fish only in the context of a norm prohibiting fishing in polluted waters.

Conclusions

- Interpretation of norms requires norm change.
- Model in defeasible logic: common framework for constitutive, regulative rules, goals.