

On the Automation of Legal Reasoning about Responsibility

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1. INTRODUCTION

In the framework of the Functional Ontology of Law [5] (FOLaw, in the following) we are developing a knowledge representation language dedicated to the assessment of legal responsibility. FOLaw distinguishes between six main types of knowledge used in the (complete) analysis of a legal case: Definitional, Causal, Normative, Responsibility, Reactive and Meta-legal knowledge. Functional (i.e., input/output) relations connect all these types of knowledge. In other words, FOLaw not only individuates six knowledge modules, but it also suggests a preferred order of application of such modules.

The present abstract illustrates our research effort in specifying the module for Responsibility knowledge. At the moment, we still have a rather philosophical attitude to the problem of responsibility, defining what in principle is necessary and sufficient for the attribution of responsibility. Nevertheless, we look forward to reaching significant computational results, (possibly) in the form of an algorithm.

As far as related work is concerned, we have two main reference points in the vast literature about (the attribution of) responsibility: [1] and [2]. We see the first as our competitor, because we would like to produce a language that is conceptually richer than Åqvist's. On the other hand, we consider Hart as our "causal backup". In FOLaw terms, we assume that Responsibility knowledge takes as one of its inputs the output of Causal knowledge, i.e. the chain of causation of the case, reconstructed according to the common-sense causal inference scheme proposed by Hart. Additional inputs for Responsibility knowledge, are legally qualified events (e.g., harm or fault), which are provided either by Definitional or Normative knowledge.

2. INITIAL MODEL OF A CASE

Given the context sketched above, we propose to build the initial model of a case using the eight following predicates (the notation is explained after the list):

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1. object(o).
2. agent(a: [age = n; believes = b; desires = d; knows = k; mental-state = ms; social-status = ss]).
3. event(e: [actor = agent(a); process = p; object = o]).
4. causes(e, e').
5. legal-status(x). This is actually a meta-predicate, because it stands for the list of all legally qualified statuses within a given legal system (e.g., policeman(x)).
6. legal-relation(x, y). This is also a meta-relation, because it stands for the list of all legally qualified relations within a given legal system (e.g., owns(x, y)).
7. harm(e).
8. fault(e).

From our present standpoint (once more: Responsibility knowledge), we see the meaning of the predicates above and their correct definition as unproblematic. All the theoretical questions related to the notions of object, events, cause, fault, etc., are assumed to be solved in the modules that functionally precede Responsibility knowledge. Furthermore, the following conventions are adopted: a column and square brackets are used for introducing deeper descriptors of our predicates; distinct descriptors are separated by a semicolon; small letters indicate non instantiated variables, e.g. x; words starting with small letters indicate predicate and relational constants, e.g. agent(x); capital letters and words starting with capital letters indicate individual constants, e.g. agent(Caius); we sometimes use dummy constants symbols, e.g. Sane, the actual value of which is domain dependent; all the variables are universally quantified; we adopt the rule of negation by failure.

3. ELEMENTS OF RESPONSIBILITY

Legal theoretical analyses of the conception of legal responsibility [2, 3] often revolve around the connection between an agent and some undesirable event, i.e. the violation of a norm or an actual or potential harm. Thus, the ascription of responsibility is the application of attribution criteria to the qualified events, agents and actors in a legal case. These attribution criteria invariably include: the *accountability* of the actor, his *mens rea* and his *strict liability*. In the rest of this section we provide a short natural language definition of such

criteria and an axiom defining each of them in terms of the predicates introduced in section 2.

3.1 Accountability

Accountability relates to the proportionality of the application of certain legal reactions to actors or legal subjects who have certain, predefined legal statuses. These legal statuses are descriptions referring to attributes such as the age of the actor, his mental state and his social or institutional status. Formally:

$accountable(x) \leftrightarrow (agent(x: [age > C1]) \wedge agent(x: [mental-state = Sane]) \wedge agent(x: [social-state = C2]))$

3.2 Mens Rea

Mens rea refers to the contribution of rather specific psychological attributes of the actor in a given event. These psychological attributes consist of the knowledge and desires of the actor. Knowledge (for the moment) refers both to the actual knowledge he possesses and to the knowledge he is presumed to possess by the legal system, as in foreseeability. Clearly, the presumed knowledge of an agent may conflict with his believes or desires in a given event. Formally:

$intent-of(x, e') \leftrightarrow (agent(x: [desire = event(e:[process: p; object: o]) \wedge event(e: [actor = x]) \wedge event(e': [actor = -; process = p; object: o]) \wedge causes(e, e')) \vee (agent(x: [knows = event(e:[process: p; object: o]) \wedge event(e: [actor = x]) \wedge event(e': [actor = -; process = p; object: o]) \wedge causes(e, e'))$

3.3 Strict Liability

The predominant conception of strict liability, driven largely from civil law, refers to the attribution of responsibility to an agent who is not involved in a causal chain of events resulting in a fault or harm. This is the sense in which 'vicarious liability' is often discussed in the legal literature. We informally define strict liability as a criteria for responsibility attribution by virtue of which responsibility is attributed to an agent not involved in the causal chain of events but is bound by a legal relation to the actor who is thus involved in that causal chain. Formally:

$strictly-liable(y) \leftrightarrow (agent(x) \wedge event(e: [actor = x]) \wedge event(e') \wedge causes(e, e') \wedge \neg accountable(x) \wedge legal-relation(x, y))$

3.4 Responsibility

Finally, we provide the following formal definition of legal responsibility:

$responsible-of(e', x) \leftrightarrow ((agent(x) \wedge event(e) \wedge event(e')) \wedge (causes(e, e') \wedge (event(e: [actor = x]) \wedge accountable(x)) \vee ((accountable(x) \wedge intent-of(x, e)) \vee ((accountable(x) \wedge strictly-liable(x, e))$

4. AN EXAMPLE

In this section we apply the predicates and the axioms introduced above for describing and analyzing a toy example case taken from [1] and partially modified.

Case: X, who is 25 and mentally sound, drives a car, which crashes against Y's fence and damages it.

Step1: Individuation of common sense elements

Agents: X: agent([age = 25; mental-state = Sane]), agent(Y).

Objects: object(Car), object(Fence)

Events: event(E1: [actor = X; process = Driving; object = Car]), event(E2: [actor = - ; process = Crashing; object = Car]), event(E3: [actor = - ; process = Breaking; object = Fence])

Relations: causes(E1, E2), causes(E2, E3), in(X, Car)

Step2: Legal qualifications

Agent's status: driver(X)

Events: harm(E3)

Relations: owns(Y, Fence)

Step 3: Attribution of responsibility

Test for causation and agency of E3:

Query: causes(e, E3)

Output: E2

Query: event(E2: [actor = a])

Output: X

Test for accountability of X:

Query: accountable(X)

Output: Yes

Test for responsibility

Query: responsible-of(E3, X)

Output: Yes, justification = (causes(E2: [actor = X], E3), accountable(X))

5. CONCLUSION

In this abstract we presented the core definitions of a formal language for representing a legal case and a stepwise methodology for handling the problem of the attribution of responsibility. Following Hart and Honoré's legal theoretical approach to the problem of responsibility, we centered our methodology on the (here assumed) common-sense causal reconstruction of the events. Such reconstruction must be legally qualified and, finally, tested according to the criteria for the attribution of legal responsibility. We proposed four such basic criteria: causation (i.e., the agent who caused the fault or the harm is responsible), accountability (which depends on the domain, i.e. on the specific legislation), *mens rea* (i.e., the agent who knew or intended the fault or the harm is responsible), strict liability (i.e., the agent which has a specified legal status with respect to the wrongdoing, e.g. a parent for his child's fault, is responsible). For reasons of brevity, we presented an example of the application of just the first two criteria.

Finally, the problems we will face in the future, working under this framework, are of three types: the augmentation of the number of the events in the case; the relations between actors and agents, the definition of negligence.

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