

# Multi-modal Logics for the Conceptual Analysis of Epistemic Rights

Réka Markovich

Department of Computer Science, University of Luxembourg

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- I'm responsible for the AI&Law projects in the Individual and Collective Reasoning (ICR) group in the Interdisciplinary Lab for Intelligent and Adaptive Systems (ILIAS) within the Department of Computer Science

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- these papers: joint work with Olivier Roy (University of Bayreuth)

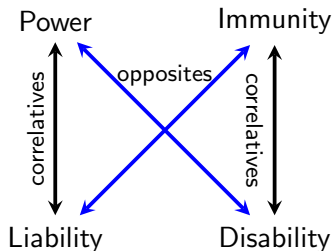
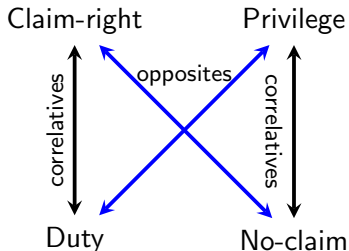
# Rights and Duties

W.N.Hohfeld: Fundamental Legal Conceptions (1913)



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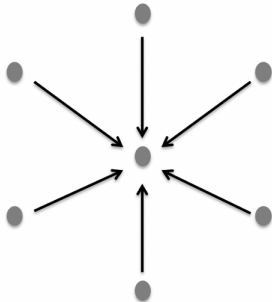
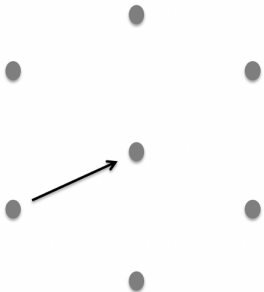
- logical formalization of the Hohfeldian rights and duties
- started by Kanger&Kanger and Lindahl, critiques by Makinson(1986) and Sergot(2013)
- recent approaches with agent-based multi-modal logic and DEL: Dong and Roy (2017, 2021), Markovich (2019, 2020)

# Normative Positions

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- Hohfeld: paucital and multital rights



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- starting point of Hohfeld: 'right' is overused
- legal language today still uses 'right' to different atomic positions
- sometimes to their molecular combination
- e.g. the freedom of thought consists of:
  - a multital claim-right
  - a multital privilege
  - a multital immunity

# Epistemic Rights

- the patient has a right to know the result of her tests, also a right to *not* know them
- citizens have a right to know that the prime minister has an offshore account
- consumers have a right to not be misled by advertisements
- everyone has a freedom of thought
- the detained person has a right to know his rights

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# Epistemic Rights as Normative Positions

- new approach in epistemology: Lani Watson
- Wenar (SEP Rights entry): "epistemic realms contain no claims, powers, or immunities"
- our goal: to show that all normative positions can be found among epistemic rights
- our goal: using and developing different formal approaches of epistemic, deontic, and action logics to describe them and to reason with them

# Epistemic Rights as Normative Positions

## **Definition – narrow sense**

rights that concern the epistemic state of the right-holder  
(right to know, right to believe, right to explanation, etc.)



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## **Definition – narrow sense**

rights that concern the epistemic state of the right-holder  
(right to know, right to believe, right to explanation, etc.)

## **Definition – broader sense**

also rights that concern the epistemic state of the duty-bearer  
(right to privacy, right to be forgotten, etc.)

# Freedom of Thought

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Article 18: Everyone has the right to freedom of thought, conscience and religion; this right includes freedom to change his religion or belief

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Article 19: Everyone has the right to freedom of opinion (...); this right includes freedom to hold opinions without interference (...).

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Article 18: Everyone has the right to freedom of thought, conscience and religion; this right includes freedom to change his religion or belief

Article 19: Everyone has the right to freedom of opinion (...); this right includes freedom to hold opinions without interference (...).

\*questions raised by natural law vs. legal positivism

# Freedom of Thought

## UN's Office of the High Commissioner for Human Rights (OHCHR)

The right to freedom of thought, conscience and religion (which includes the freedom to hold beliefs) in article 18.1 is far-reaching and profound; it encompasses freedom of thought on all matters, personal conviction and the commitment to religion or belief (...). [Article 18] does not permit any limitations whatsoever on the freedom of thought and conscience or on the freedom to have or adopt a religion or belief of one's choice. These freedoms are protected unconditionally, as is the right of everyone to hold opinions without interference in article 19 (...).

# Freedom of Thought

## UN's Office of the High Commissioner for Human Rights (OHCHR)

The Committee observes that the freedom to "have or to adopt" a religion or belief necessarily entails the freedom to choose a religion or belief, including the right to replace one's current religion or belief with another or to adopt atheistic views, as well as the right to retain one's religion or belief. Article 18 bars coercion that would impair the right to have or adopt a religion or belief, including the use of threat of physical force or penal sanctions to compel believers or non-believers to adhere to their religious beliefs and congregations, to recant their religion or belief or to convert.

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  - is it possible to force someone to believe something? (Orwell's 1984)
  - we don't need to commit, just put it's forbidden

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- "protection": multital claim-right against everyone else not to interfere with it
  - is it possible to force someone to believe something? (Orwell's 1984)
  - we don't need to commit, just put it's forbidden
- "protection": Declaration rules out the possibility of changing this freedom (for example, by a country introducing penal sanctions, that is, duties to accept some specific view): a multital immunity

# Language and Semantics

$$p \in \Phi \mid \varphi \wedge \psi \mid \neg\varphi \mid \{E_a\varphi \mid O_{a \rightarrow b}\varphi \mid B_a\varphi\}_{a,b \in A} \mid \Box\varphi$$

$$\mathfrak{F} = \langle W, \{f_a, R_{a,b}^O, R_a^B\}_{a,b \in A} \rangle$$

- $\mathcal{M}, w \models E_a\varphi \Leftrightarrow \|\varphi\| \in f_a(w)$
- $\mathcal{M}, w \models O_{a \rightarrow b}\varphi \Leftrightarrow \forall w' (wR_{a,b}^O w' \Rightarrow \mathcal{M}, w' \models \varphi)$
- $\mathcal{M}, w \models B_a\varphi \Leftrightarrow \forall w' (wR_a^B w' \Rightarrow \mathcal{M}, w' \models \varphi)$
- $\mathcal{M}, w \models \Box\varphi \Leftrightarrow \forall w', \mathcal{M}, w' \models \varphi$

# Freedom of Thought: Privilege

$$\bigwedge_{b \in A} P_{a \rightarrow b} \mathbf{B}_a \phi$$

(FoT-F- $B_a \phi$ )

# Freedom of Thought: Privilege

$$\bigwedge_{b \in A} P_{a \rightarrow b} \mathbf{B}_a \phi \quad (\text{FoT-F-}B_a\phi)$$

$$\bigwedge_{b \in A} (P_{a \rightarrow b} \mathbf{B}_a \phi \wedge P_{a \rightarrow b} \mathbf{B}_a \neg \phi \wedge P_{a \rightarrow b} (\langle \mathbf{B}_a \rangle \phi \wedge \langle \mathbf{B}_a \rangle \neg \phi)) \quad (\text{FoT-F-}a\phi)$$

## Freedom of Thought: Claim-Right

$$\bigwedge_{b \in A} \mathbf{O}_{b \rightarrow a} \neg E_b \neg B_a \phi$$

(FoT-C1)

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$$\bigwedge_{b \in A} \mathbf{O}_{b \rightarrow a} (\neg E_b \neg E_a B_a \phi \wedge \neg E_b \neg E_a B_a \neg \phi \wedge \neg E_b \neg E_a (\langle B_a \rangle \phi \wedge \langle B_a \rangle \neg \phi)) \quad (\text{FoT-C-a-}\phi)$$

## Freedom of Thought: Immunity

$$\bigwedge_{b \in A} \neg \diamond (E_b(\neg(\text{FoT-F-}a\text{-}\phi)) \vee E_b(\neg(\text{FoT-C-}a\text{-}\phi))) \quad (\text{FoT-I-}a\text{-}\phi)$$

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$$\mu x. \bigwedge_{b \in A} \neg \diamond (E_b \neg(\text{FoT-F-}a\text{-}\phi) \vee E_b \neg(\text{FoT-C-}a\text{-}\phi) \vee E_b \neg x)$$

# Freedom of Thought

$$(FoT-F-a-\phi) \wedge (FoT-C-a-\phi) \wedge (FoT-I-a-\phi) \quad (FoT-a-\phi)$$

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Even a power?



# Right to Know

## Right to Know

### **Claim-right? Power? Privilege? Immunity?**

The citizens have a right to know the MPs' declarations of property—this is a claim-right

The citizens have a right to know the local representatives' declarations of property—this is a power

## Right to Know as a Claim-right

### **Texas Senate Bill 25**

Texas Senate Bill 25 in 2017 to eliminate the 'wrongful birth' cause of action: parents cannot sue doctors for failing to warn the parents in advance about the fetus' illness

# Right to Know as a Claim-right

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## **Right to know whether**

the expectant parents have a right to know whether the fetus is ill (whether it would be a healthy child)

# Language and Semantics

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$$\mathfrak{F} = \langle W, \{R_a, \leq_{a \rightarrow b}, f_a\}_{a,b \in A}, R_\Box \rangle$$

- $\mathfrak{M}, w \models E_a\varphi \Leftrightarrow \|\phi\| \in f_a(w)$ .
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# Dynamic Modalities

Given a set of indexes  $I$ , an *action model*  $\mathcal{A}_a$  for agent  $a$  is a tuple

$$\langle A, \{R_i\}_{i \in I}, Pre \rangle$$

- $A$  is a non-empty, finite set of actions.
- Each  $R_i$  is binary relation on  $A$ .
- $Pre : A \rightarrow \mathcal{L}$  is a precondition function.

$\mathfrak{M}, w \models [\mathcal{A}_i, a]\phi$  iff if  $\mathfrak{M}, w \models Pre(a)$  then  $\mathfrak{M}' \otimes \mathcal{A}_i, (w, a) \models \phi$

Where  $\mathfrak{M}' \otimes \mathcal{A}_i$  is obtained by product update on the relevant relations.

# Right to Know as a (Conditional) Claim-right

Right to know whether:

- Static (KWS):

$$\mathbf{O}_{d \rightarrow p} E_d(\mathbf{K}_p(ill) \vee \mathbf{K}_p(\neg ill))$$

- Dynamic (KWD):

$$\mathbf{O}_{d \rightarrow p} \bigwedge_{a \in \mathcal{A}_d} [\mathcal{A}_d, a](\mathbf{K}_p(ill) \vee \mathbf{K}_p(\neg ill))$$

# Right to Know as a (Conditional) Claim-right

Pairs of conditional obligations:

- Static (COS):

$$\mathbf{O}_{d \rightarrow p}(E_d \mathbf{K}_p(\textit{ill})/\textit{ill}) \wedge \mathbf{O}_{d \rightarrow p}(E_d \mathbf{K}_p(\neg \textit{ill})/\neg \textit{ill})$$

- Dynamic (COD):

$$\mathbf{O}_{d \rightarrow p}\left(\bigwedge_{a \in \mathcal{A}_d} [\mathcal{A}_d, a] \mathbf{K}_p(\textit{ill})/\textit{ill}\right) \wedge \mathbf{O}_{d \rightarrow p}\left(\bigwedge_{a \in \mathcal{A}_d} [\mathcal{A}_d, a] \mathbf{K}_p(\neg \textit{ill})/\neg \textit{ill}\right)$$



# Right to Know as a (Conditional) Claim-right

Pair of wide-scope conditionals:

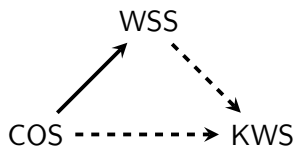
- Static (WSS):

$$\mathbf{O}_{d \rightarrow p}(ill \rightarrow E_d \mathbf{K}_p(ill)) \wedge \mathbf{O}_{d \rightarrow p}(\neg ill \rightarrow E_d \mathbf{K}_p(\neg ill))$$

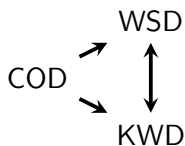
- Dynamic (WSD):

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# Logical Relationships



**Figure 1:** Static formalizations



**Figure 2:** Dynamic formalizations

## Further Questions

- Detachment Principles (factual, necessary, deontic).
- Aqvist Paradox.
- Right to know as a power.

## Cause of action

Relationship between a claim-right and a power

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Makinson (1986):

*x bears an obligation to y that F under the system N of norms iff in the case that F is not true then y has the power under the code N to initiate legal action against x for non-fulfillment of F*

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Markovich (2020): power shouldn't be in the definition of claim-right

What is the relation between a claim-right and a power then?



## Cause of action

Power to initiate a legal action: possibility to put a duty on the judiciary to settle whether what is put in the cause of action holds

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## Cause of action

Power to initiate a legal action: possibility to put a duty on the judiciary to settle whether what is put in the cause of action holds 'wrongful birth': failing to warn the parents about the illness  
no such cause of action → no possibility to sue → no claim-right?

# Language and Semantics

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## Right to know

$$\mathbf{O}_{d \rightarrow p}(E_d \mathbf{K}_p(\textit{ill})/K_d(\textit{ill})) \wedge \mathbf{O}_{d \rightarrow p}(E_d \mathbf{K}_p(\neg \textit{ill})/K_d(\neg \textit{ill}))$$

Abbreviated as:

$$\mathbf{O}_{d \rightarrow p}(E_d \mathbf{K}_p(\pm \textit{ill})/K_d \pm \textit{ill})$$

## Legal action

Positive case:

$$E_j(\Box \neg E_d(KW_p(ill)))$$

Negative case:

$$E_j(\Box(\Diamond E_d(KW_p(ill)) \wedge \Diamond \neg E_d(KW_p(ill))))$$

Together:

$$E_j(\Box \neg E_d(KW_p(ill)) \vee E_j(\Box(\Diamond E_d(KW_p(ill)) \wedge \Diamond \neg E_d(KW_p(ill)))))$$

(LA)

## Power to initiate legal action

$$\diamond E_p(O_{j \rightarrow p}(LA))$$

## Power as necessary condition for claim-right

$$\mathbf{O}_{d \rightarrow p}(E_d \mathbf{K}_p(\pm ill) / K_d \pm ill) \rightarrow \diamond E_p(O_{j \rightarrow p}(LA))$$



## Further Questions

- Detachment Principles (factual, necessary, deontic).
- Aqvist Paradox.
- Right to know as a power.

# Conclusion

- Theory of normative positions is well established and understood.
- Epistemic rights had not been studied so far in that theory.
- Simple extension of the theory of normative positions allows to express complex epistemic rights, study their logical relationships and behavior.
- Next steps:
  - Recursive elements in protected liberties.
  - Alternative formalization of conditional duties for better detachment principles.
  - Mathematical characterization of the frame conditions corresponding to the constraint imposed by the Bill 25.
  - Other epistemic rights.

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