Reasoning and Formal Modelling for Forensic Science Lecture 7

Prof. Dr. Benedikt Löwe

2nd Semester 2010/11

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- two sources of Greek logic (mathematics and rhetoric),
- two logical branches in many historical traditions (*logica antiqua* standing for the deductive or mathematical paradigm and *logica nova* standing for the informal or argumentative paradigm),
- two current streams of logic: formal logic and informal logic (argumentation theory).

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> *Once you have transformed a description of a scenario into mathematics, everything just becomes following an algorithm and applying the definitions correctly.*
> *The difficult step is the link between the scenario (given to you in natural language or –even worse– by personal experience) and the mathematical representation.*
> *If someone gives me a police report, how do I come up with the right individuals, properties, relations, and rules in order to do the formal assessment?*

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Is that all we can say about it? Is it just "after you have done it for a few years, you will know how to do it", or can we understand a bit better what is going on? What can informal logic or argumentation theory teach us about this?

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Syntax. The rules that tell us how to combine symbols to words, words to phrases, phrases to sentences.

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With the rules of informal logic (Toulmin Scheme and Argumentation Schemes), we are trying to bring some regularity to the seemingly chaotic world of pragmatic decisions.

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If I have a syllogistic mood like

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Some A is not C.

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I have only two ways to deny the conclusion: either I show that the mood is invalid; or I accept that the mood is valid, but show that one of the premisses is false.

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Example:

$$\frac{\begin{array}{c}\text{Every } B \text{ is } A\\ \text{Some } C \text{ is } B.\end{array}}{\text{Some } C \text{ is } A.}$$

is a valid syllogism. So, if you have two true premisses, you cannot deny the conclusion.

Defeasible reasoning: Tweety once more (1).

Every B is A
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In formal logic, we would argue that one of the premisses ("Every bird can fly") is false. But is that the right way to see it? Isn't "every bird can fly" true in some sense? What if we say "Usually, every bird can fly."

Usually, every bird can fly.
Tweety is a bird.

Tweety can fly.

A simple Toulmin scheme.

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Three ways to defeat a defeasible argument

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In the world of defeasible reasoning, it is possible to find arguments for both φ and $\neg\varphi$, and we might have to reason which one is the stronger argument. This is impossible in formal logic.

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> *Suppose x looks red to me, but I know that x is illuminated by red lights and red lights can make objects look red when they are not. Knowing this defeats the prima facie reason but it is not a reason for thinking that x is not red. After all, red objects look red in red light, too. This is an undercutting defeater.*

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The book used in our class:

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In Walton, Reed, Macagno, Argumentation Schemes come in the form of premisses (DATUM) and conclusion (CLAIM), accompanied by Critical Questions (asking for WARRANT, BACKING, QUALIFIER, or providing a REBUTTAL).

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Premiss 2. ...

Conclusion. ...

Critical Questions: ...

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CQ6 Is E's assertion based on evidence?