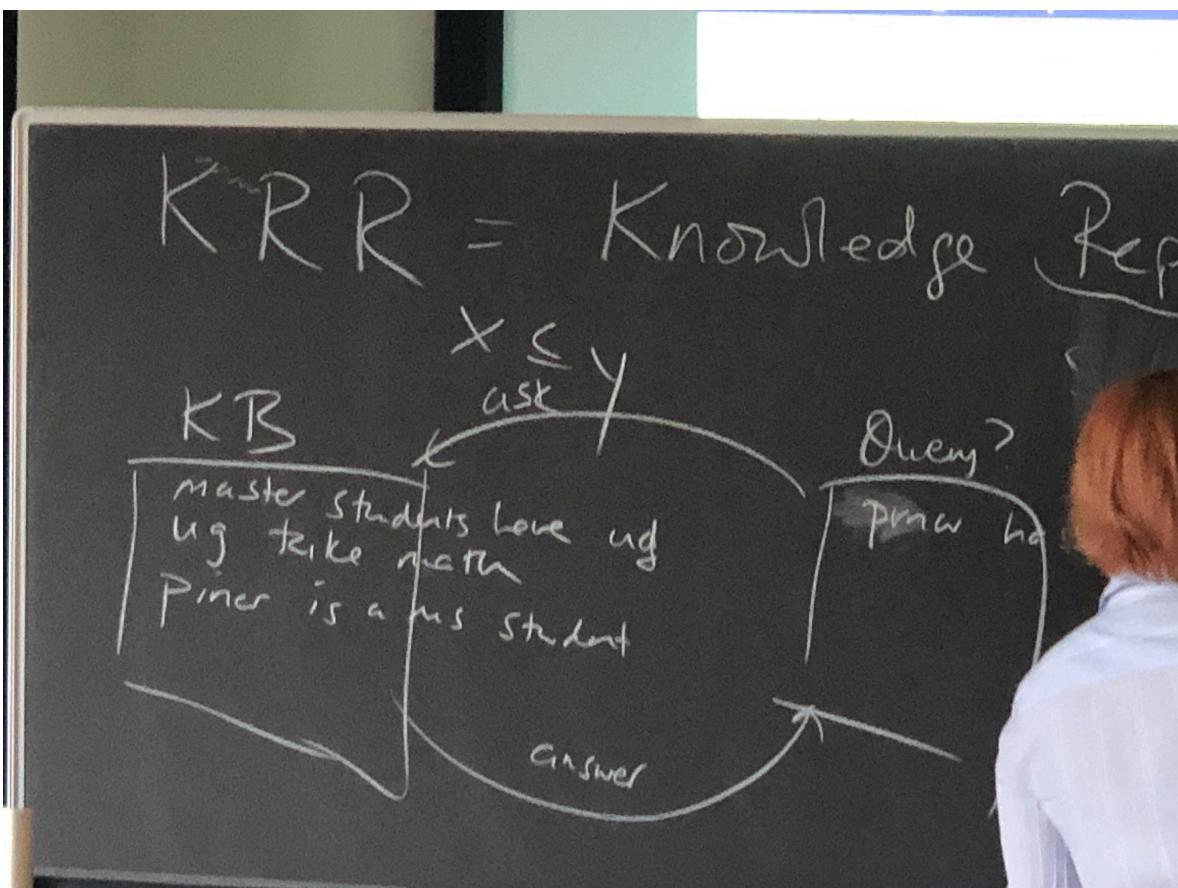


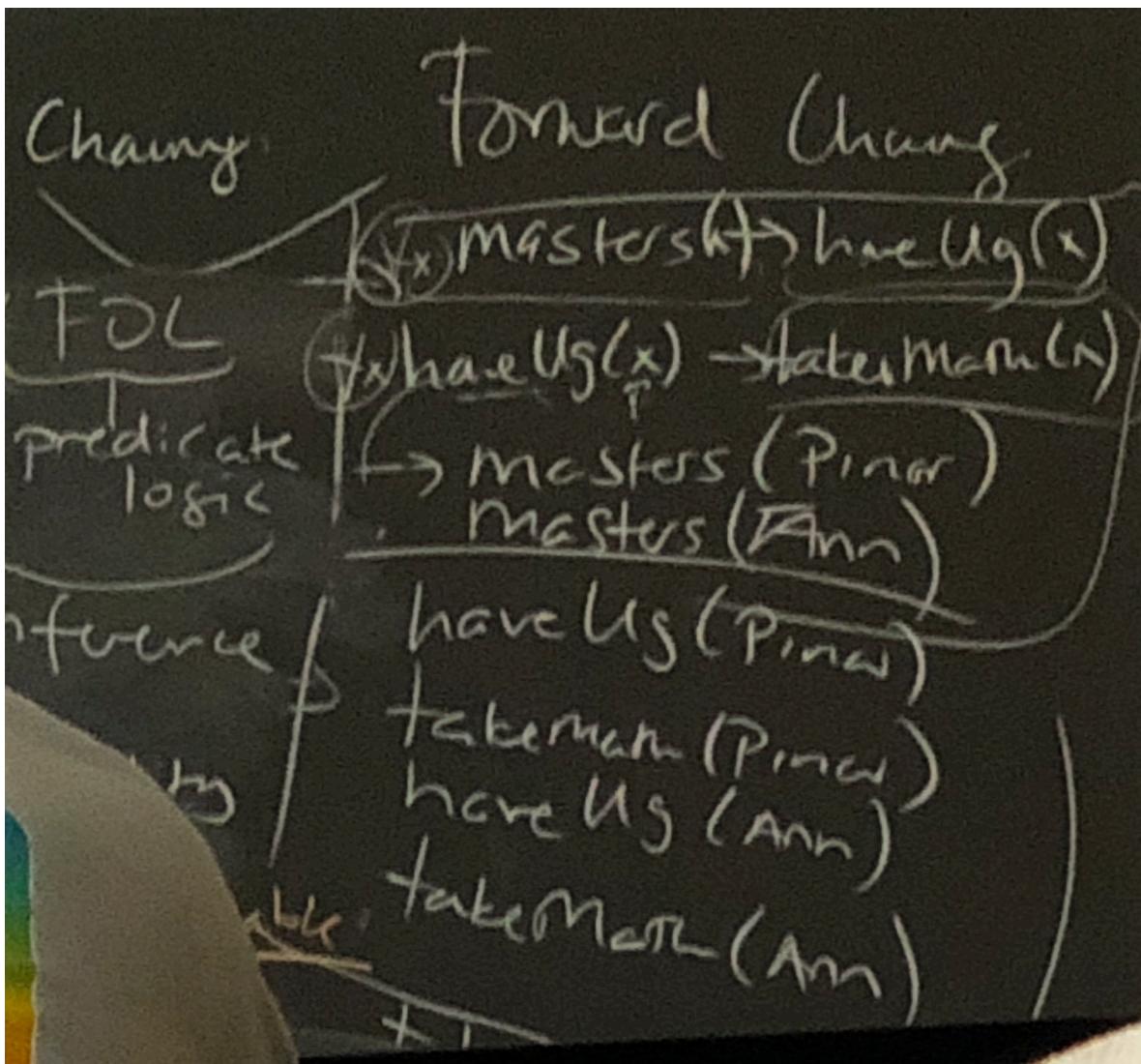
L2 Knowledge Representation (KRR)



- We have used propositional logic in the example.

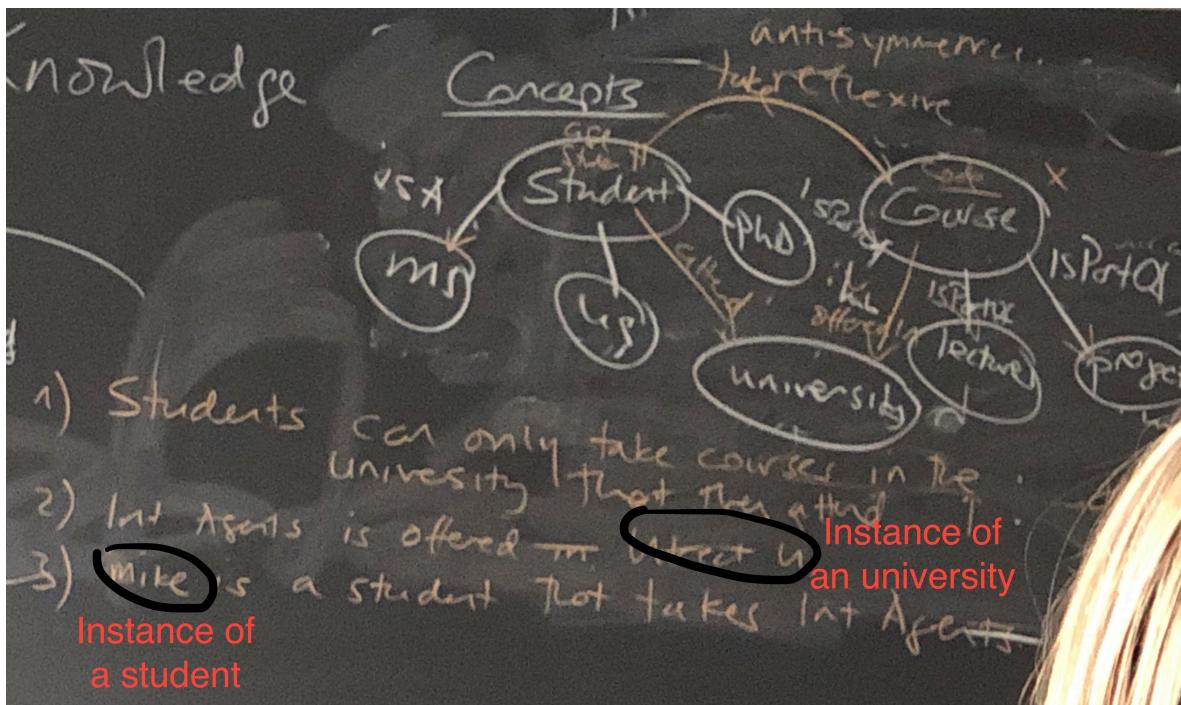
First Order of Logic (FOL)

- very representing language (think of language constructs)
- making an inference is undecidable (query might not get an answer)
- we can describe the world



Concepts

- As in methodology, you define concepts
- For an agent to make sense of what it's doing
- Like inheritance relation (isA)
- Like part-whole relation (isPartOf)
- Are related to each other (otherwise it would be like a catalogue of unrelated information)
 - Those relations might have restrictions
 - With restrictions, you can make inferences
 - We can not infer that Mike goes to UU:



Ontology

- The method for explaining the world
- Check out <https://wiki.dbpedia.org/services-resources/ontology>
- Check out <https://www.bbc.co.uk/ontologies>

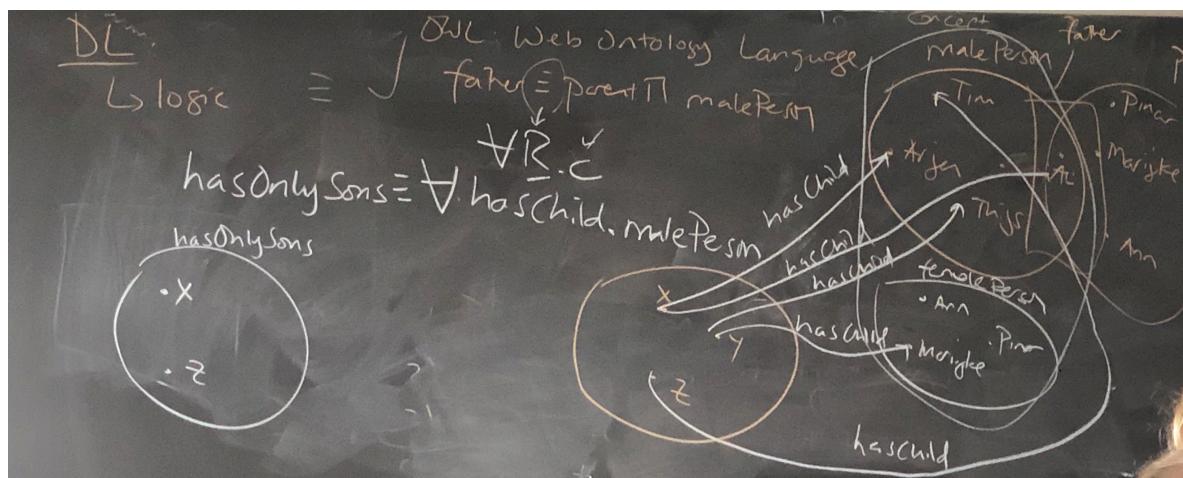
Description Logic (DL)

- subset of FOL
- it is a family of logics; you can expand on it

logic

- OWL Web Ontology language
- every concept is a set

Example of sets and restrictions



The same thing from above in FOL:

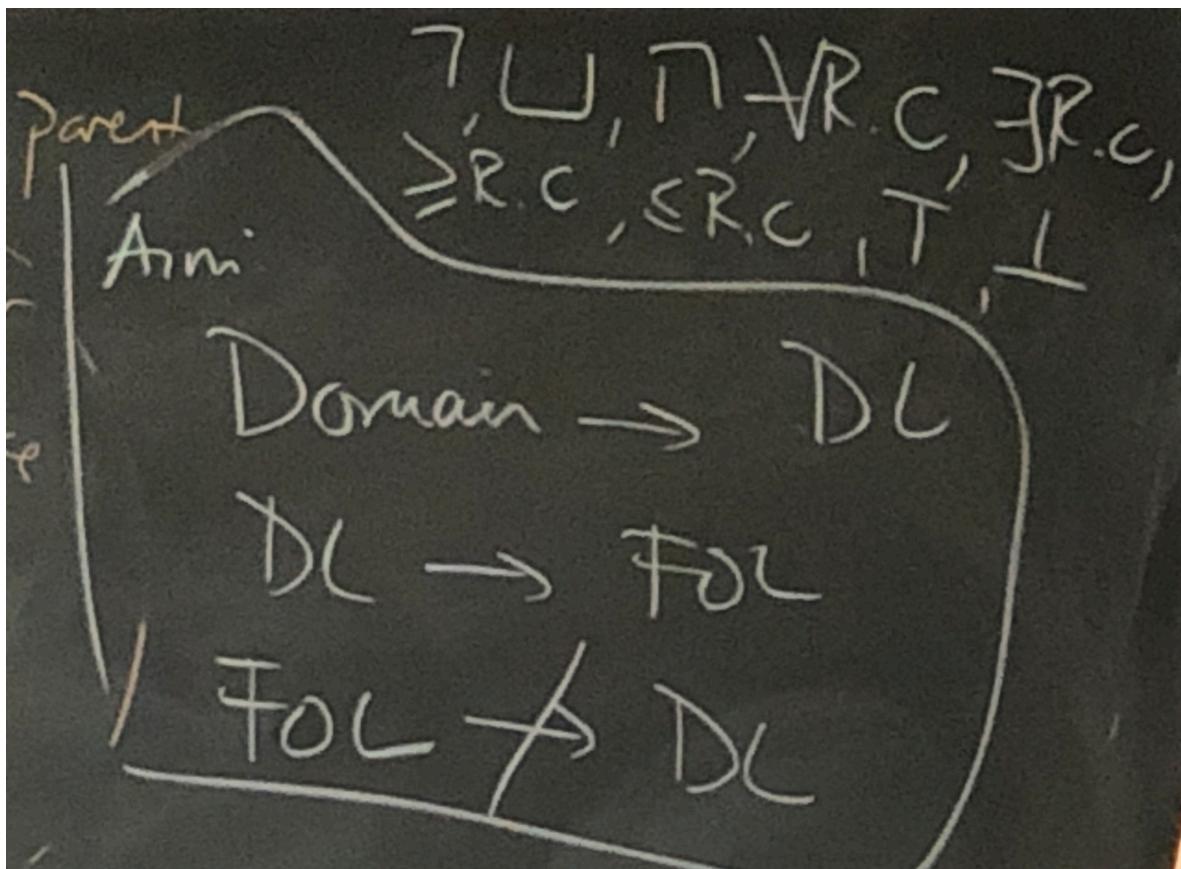
$$\text{Parent} \quad \exists, \cup, \neg,$$
$$\forall x: \text{hasOnlySons}(x) \Rightarrow$$
$$\forall y: \text{hasChild}(x, y) \Rightarrow$$
$$\text{MalePerson}(y)$$

I should be able to write these:

Domain -> DL

DL -> FOL

FOL !-> DL



Exercise

Given person, hasChild, hasFriend, malePerson, happyPerson, femalePerson, define the following:

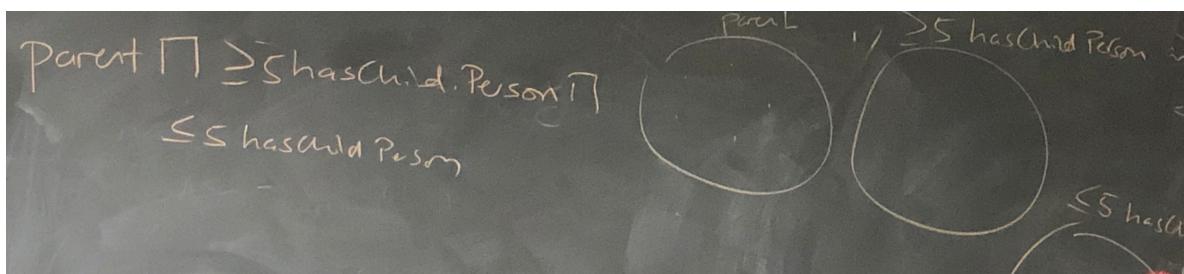
- parent has a child

$$\text{Parent} \equiv \exists \text{hasChild. Person}$$

- parents have at least one child

(See above)

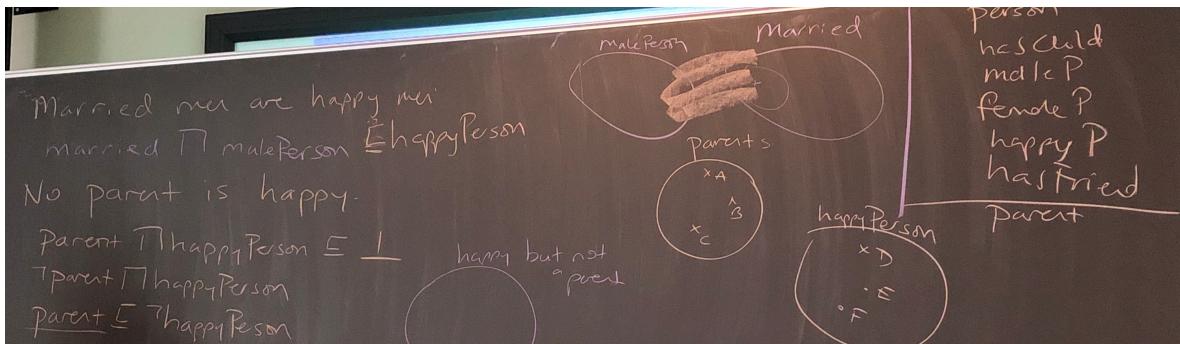
- parents with exactly five children



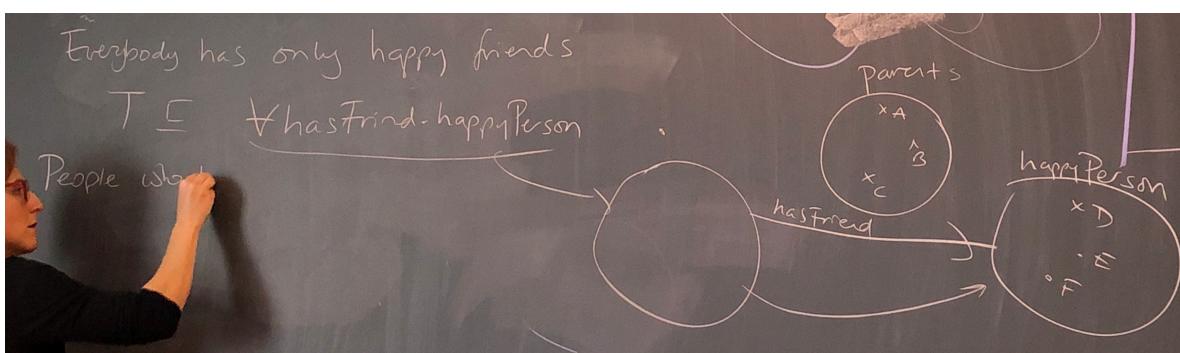
- married men are happy people



- no parent is happy



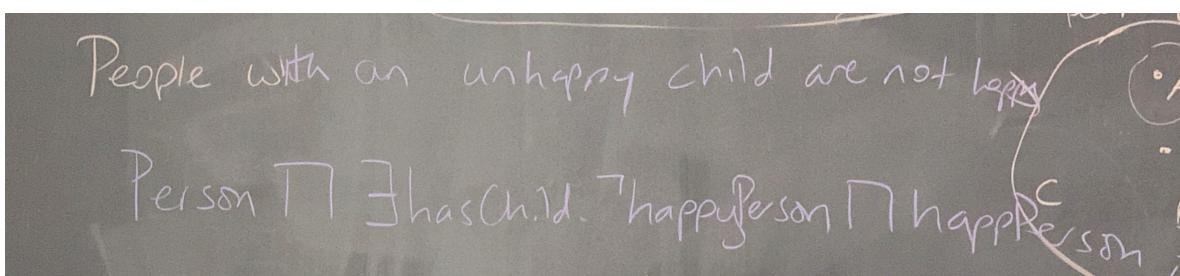
- everybody has only happy friends



- people who have the same friends are happy

You can't express this in description logic (but you can write it in FOL).

- people with an unhappy child are not happy



Use the slide "Various Syntax" (#22) later on:

https://uu.blackboard.com/bbcswebdav/pid-3298378-dt-content-rid-29262919_2/courses/BETA-2019-1-GS-INFOIAG-V/ontology-dl-lecture%281%29.pdf