Towards a Semantic UD

Siva Reddy, Matthew Lamm

Stanford University

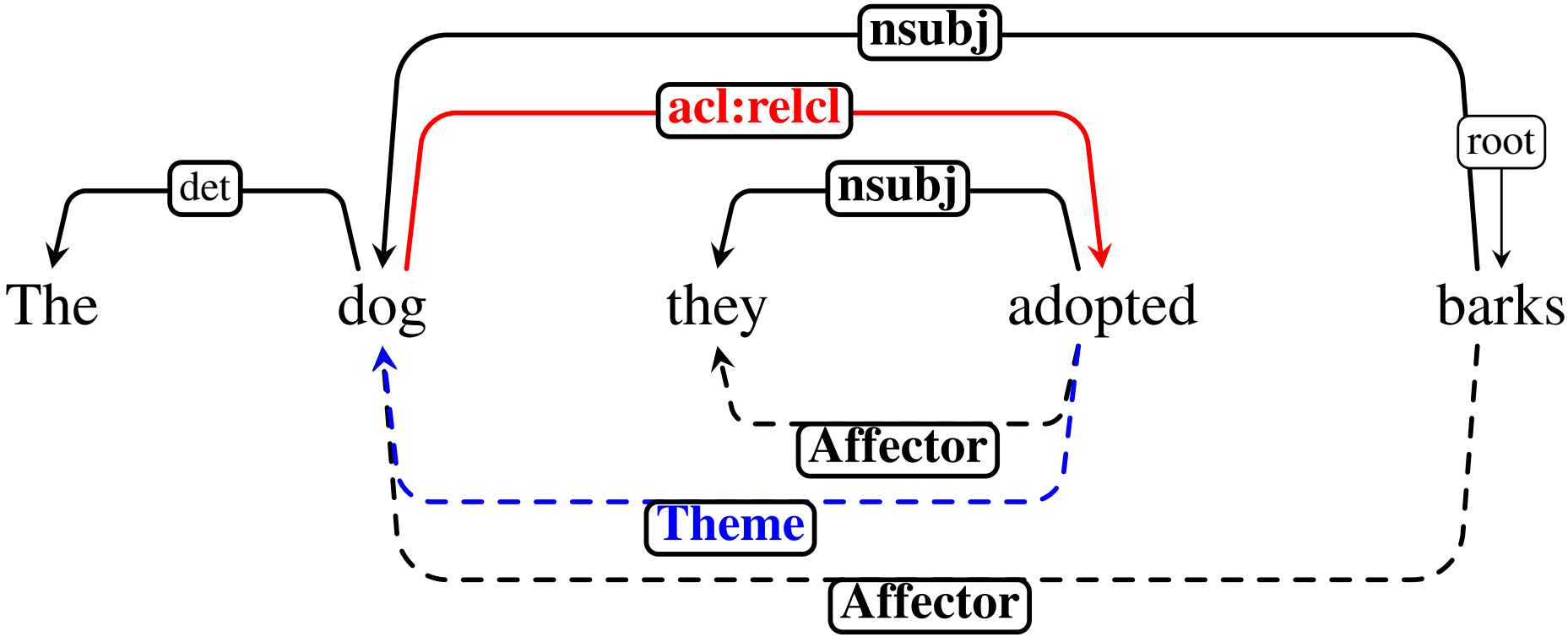
Semantic UD

Many similarities between enhanced UD and semantic dependencies

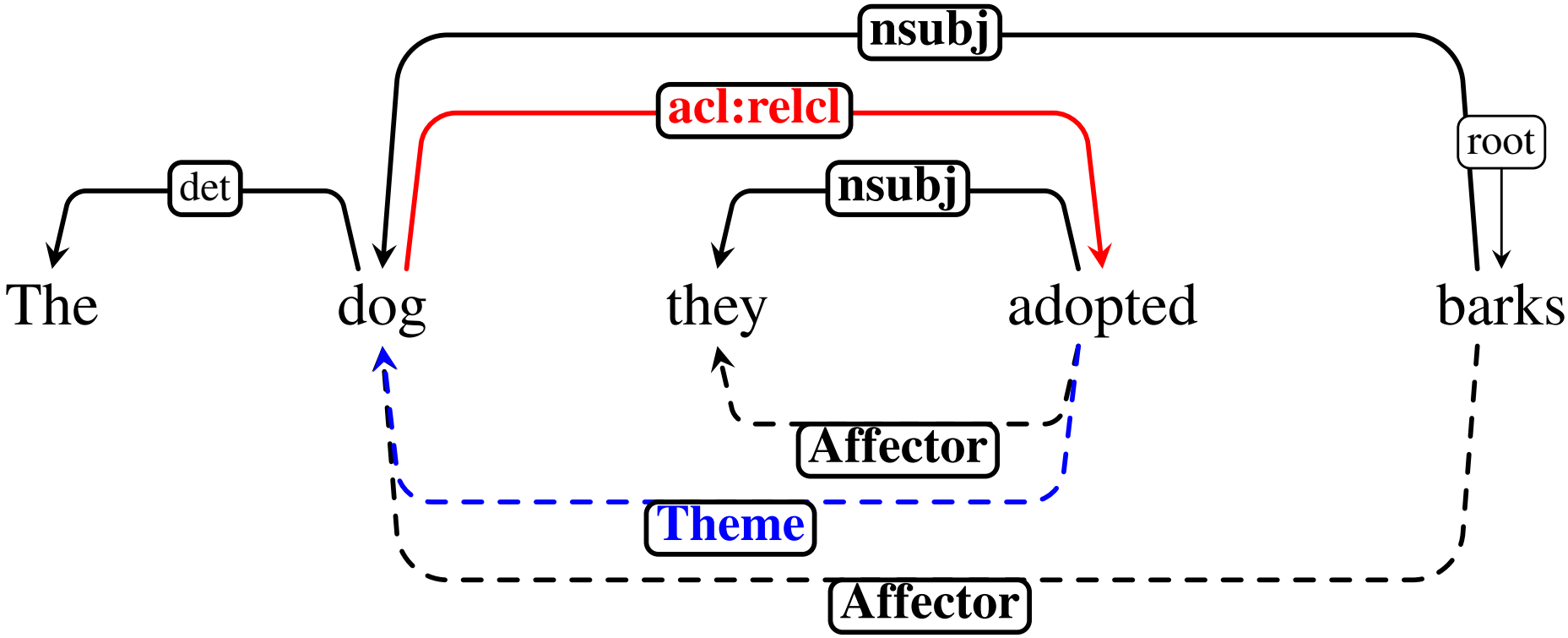
However, necessary arcs are sometimes absent in the enhanced UD

A full fledge enhanced UD enables semantic applications

Semantic UD


nsubj
acl:relcl
root
det
nsubj
The
dog
they
adopted
barks
Affector
Theme
Affector

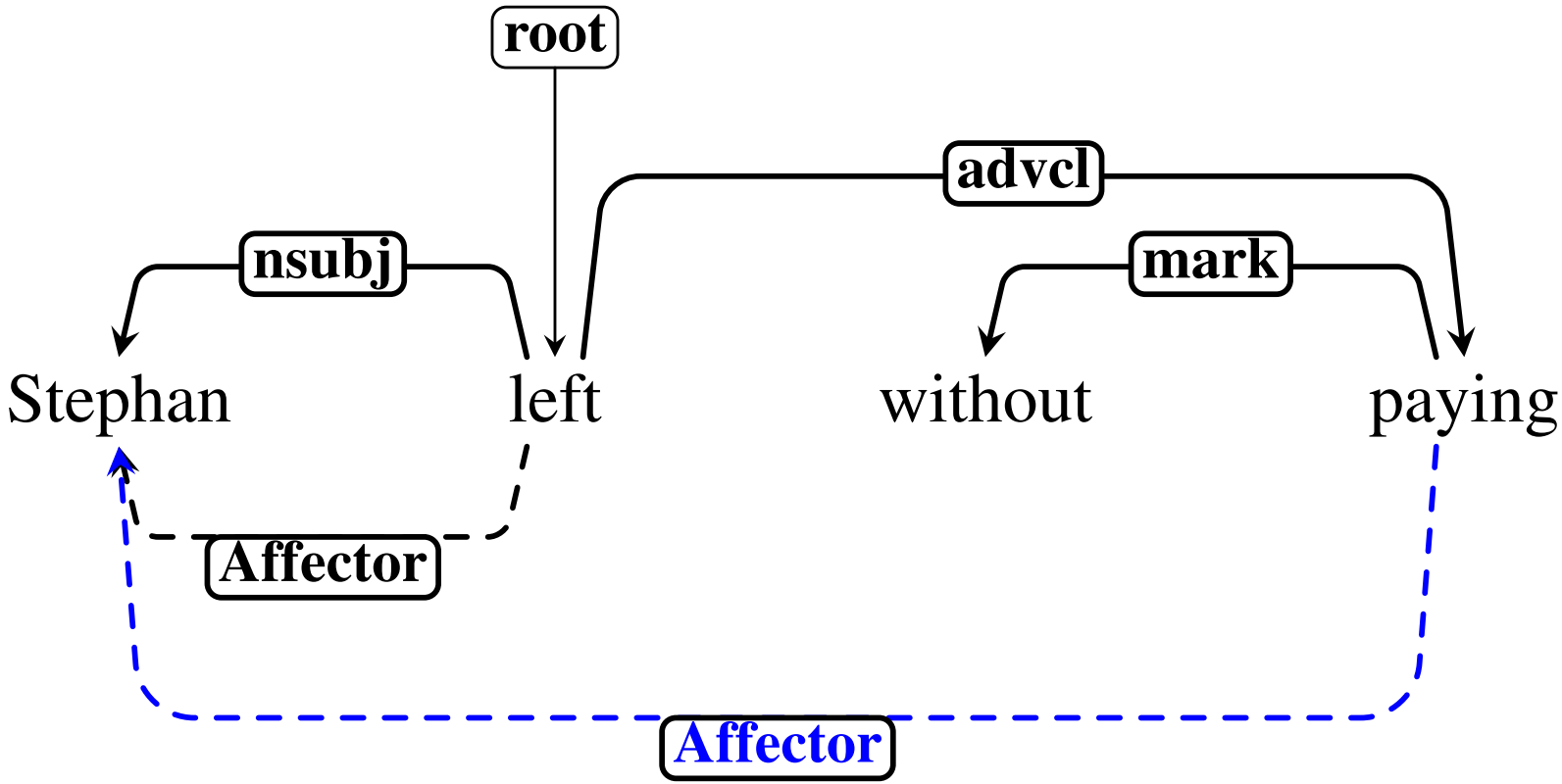
Semantic UD



Another example: The dog they thought we admired barks.

Discrepancy: obj(admired,dog)?

Semantic UD


root
advcl
nsubj
mark
Stephan
left
without
paying
Affector
Affector

Other constructions

The guy we talked to arrived.

Affector(talked, we); ✓

Theme:to(talked, guy) ✗

Theme(arrived,guy) ✓

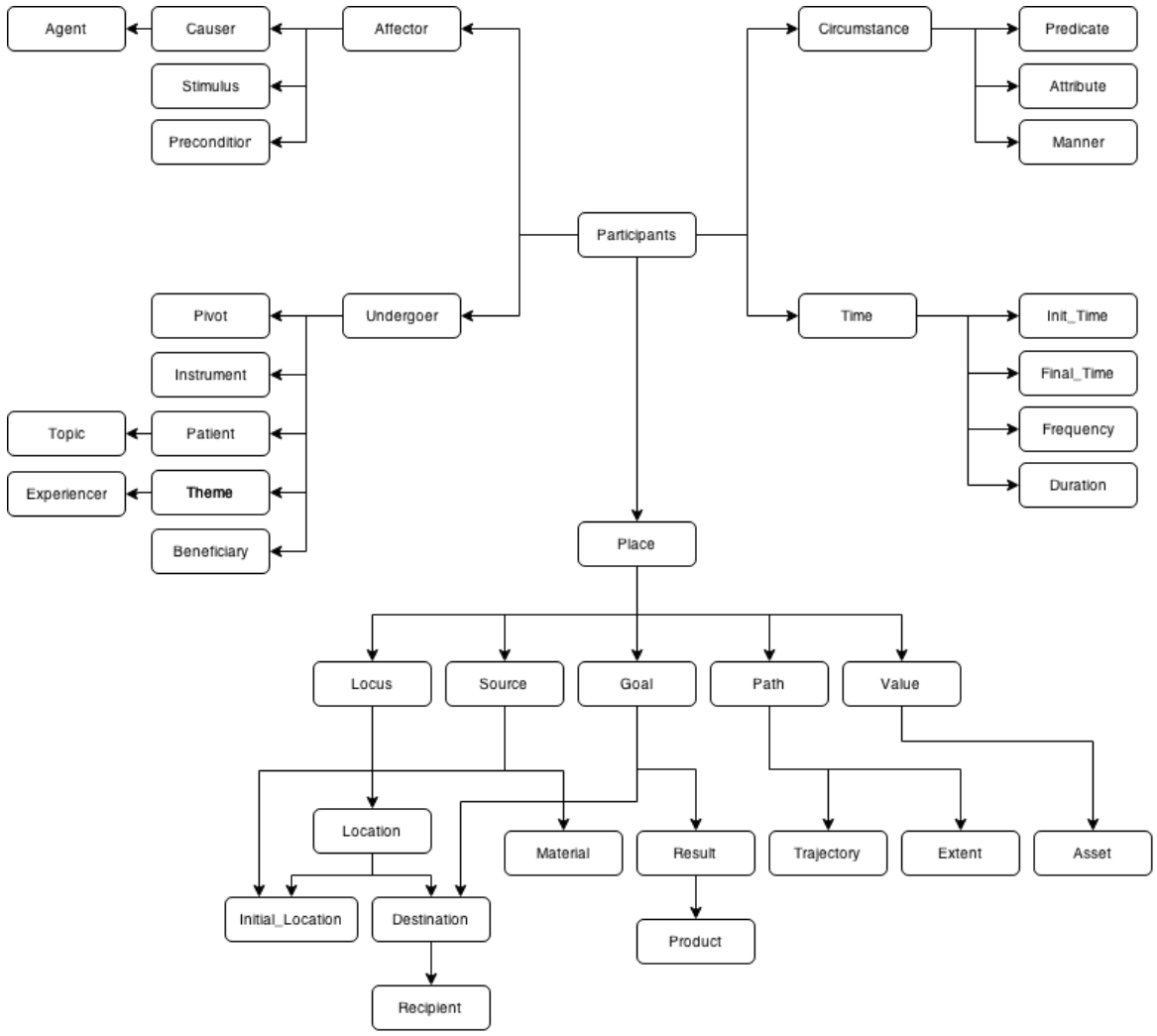
We used the car to go to Oslo.

Affector(go, we); ✗

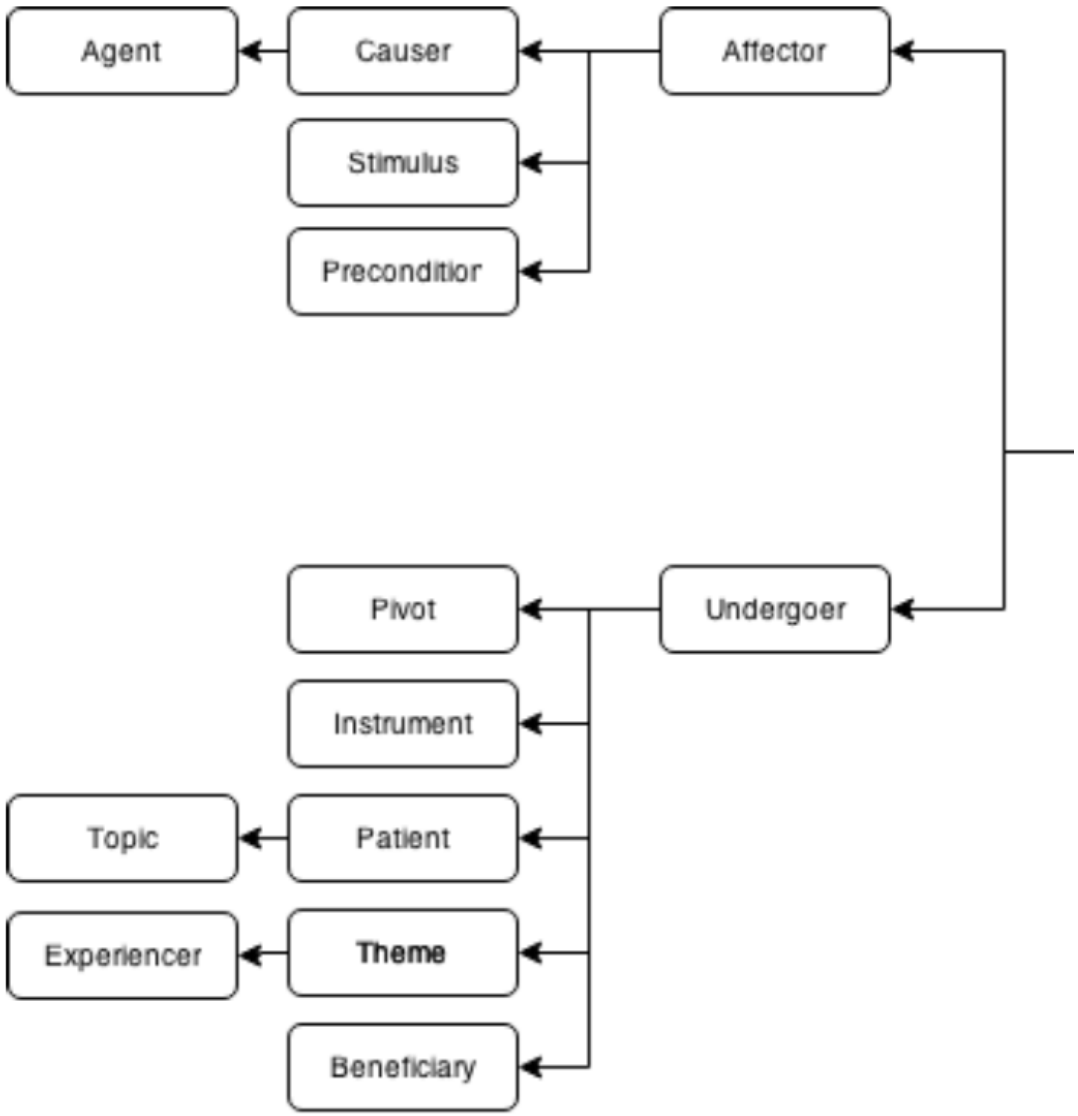
Towards a Semantic UD Role Set

We know for certain that a semantic representation will capture (universal) predicate argument structure, which suggests we should take stock of what's already out there.

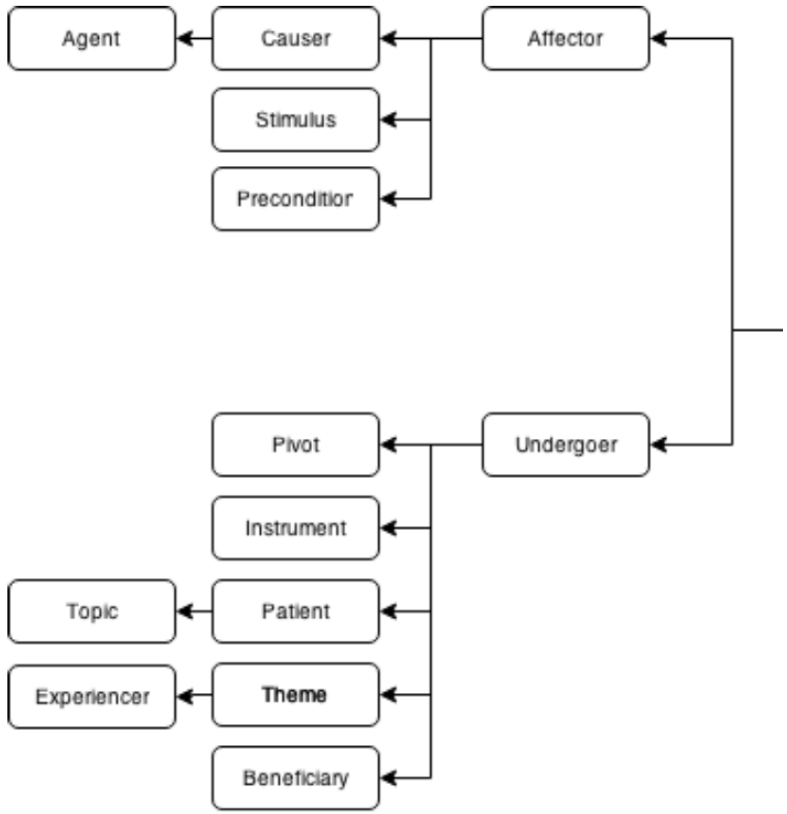
VerbNet Hierarchy



VerbNet Hierarchy



VerbNet Hierarchy



VerbNet approach is explicit, and thus intelligible, but is quite granular!

FrameNet

Consider the EXCHANGE OF GOODS frame

Buyer [Byr]
Excludes: Exchangers

The Buyer wants the Goods and offers Money to a Seller in exchange for them.
Jess BOUGHT a coat.

Lee SOLD a textbook to Abby.

Exchangers [exch]

The Buyer and Seller considered jointly.

Goods [Gds]

The FE Goods is anything (including labor or time, for example) which is exchanged for Money in a tr
Kim BOUGHT the sweater.

Kim SOLD the sweater.

Money [Mny]

Money is the thing given in exchange for Goods in a transaction.
Pat PAID 14 dollars for a movie ticket.

Sam SOLD the car for $12,000.

Seller [Slr]
Excludes: Exchangers
Non-Core:

The Seller has possession of the Goods and exchanges them for Money from a Buyer.

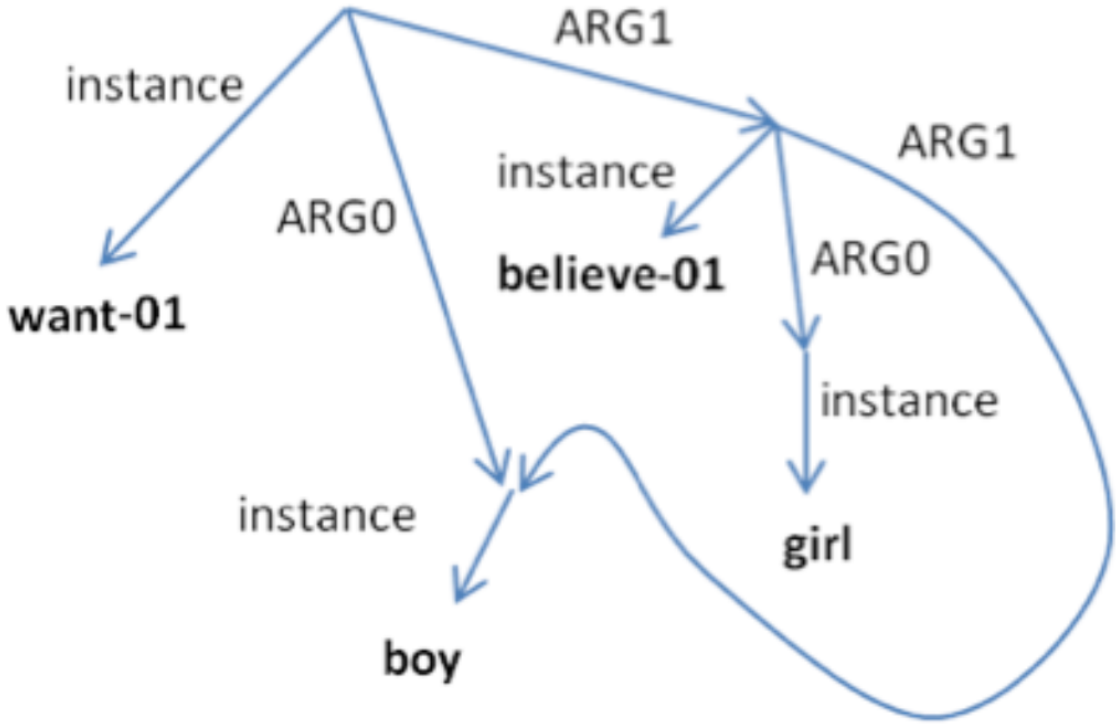
Explanation [Exp]
Semantic Type: State_of_affairs

The Explanation for which an event occurs.

FrameNet

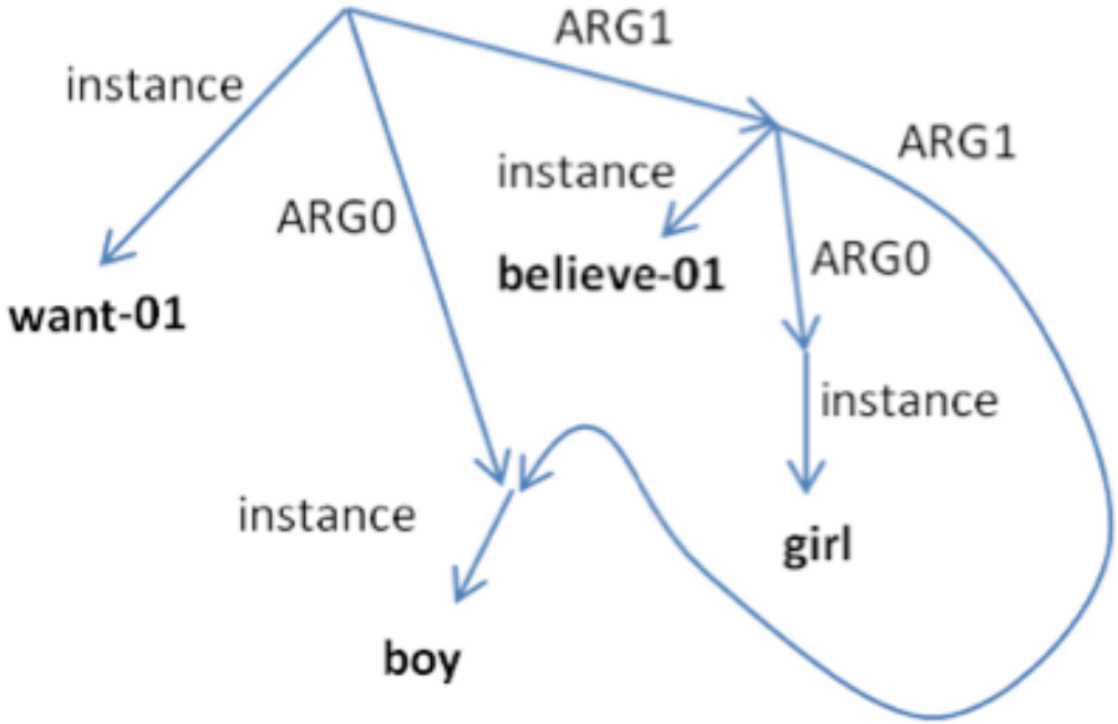
- FrameNet approach is situationist in the truest sense, but per-frame variation in the argument space induces a lot of sparsity/doesn't permit of a natural stopping point.
- An upside is that it gives you topical specificity, and is a natural starting point for commercial semantic ontologies.

Propbank-style Proto-roles (e.g. AMR)




```
(w / want-01
   :ARG0 (b / boy)
   :ARG1 (b2 / believe-01
              :ARG0 (g / girl)
              :ARG1 b))
```

Propbank-style Proto-roles (e.g. AMR)



While propbank goes beyond verbal predicates, a downside is that it uses proto-roles (e.g. Arg1 and Arg2), whose meaning in any context is only transparent when you reference an external lexicon.

The Upshot

Construct a more granular, explicit roleset from VerbNet and AMR

role	subsumes
AFFECTOR	AGENT,CAUSER,PRECONDITION
BENEFICIARY	EXPERIENCER, RECIPIENT
THEME	PATIENT, TOPIC, PREDICATE, PIVOT
INSTRUMENT	MEDIUM(AMR), MANNER(AMR)
SOURCE	MATERIAL, CONSIST-OF(AMR)
PATH	TRAJECTORY, EXTENT, DIRECTION(AMR), ...
CIRCUMSTANCE	CAUSE(AMR), CONCESSION(AMR), SUBEVENT(AMR)...
...	...

The Upshot (cont'd)

Reduced granularity means you might have overlap in roles:

I fed the [baby]$_{\text{INSTR}}$ *for [Sarah]*$_{\text{INSTR}}$

A proposed solution to this issue is to subscript with the case marking:

I fed the [baby]$_{\text{INSTR}}$ *for [Sarah]*$_{\text{INSTR.FOR}}$

Thus reflecting a distinction in similar roles without making them more granular.