Python DMRS library: pydmrs

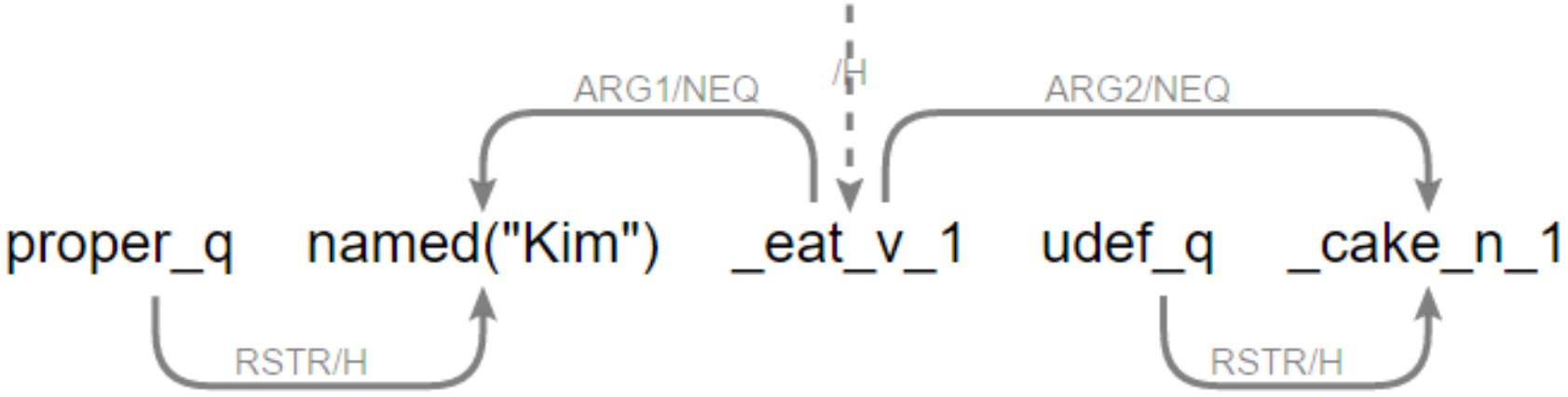
Guy Emerson Alexander Kuhnle

Computer Laboratory
University of Cambridge

DELPH-IN Summit, 2016

GraphLang

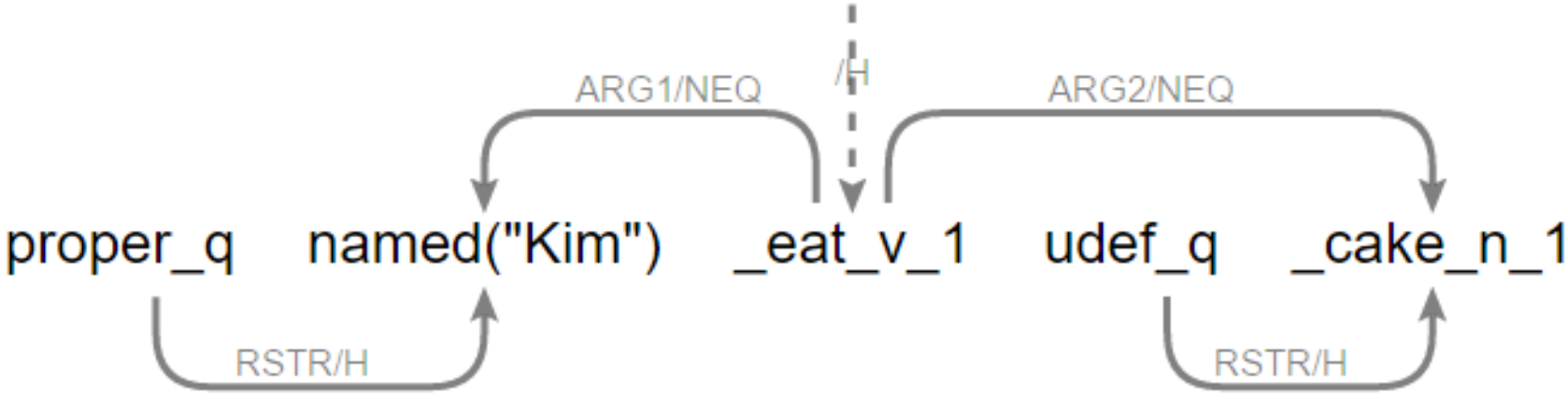
A DMRS graph description language




```
proper_q --> named(Kim) <-1- _eat_v_1 -2-> _cake_n_1 <-- udef_q
```

GraphLang

A DMRS graph description language



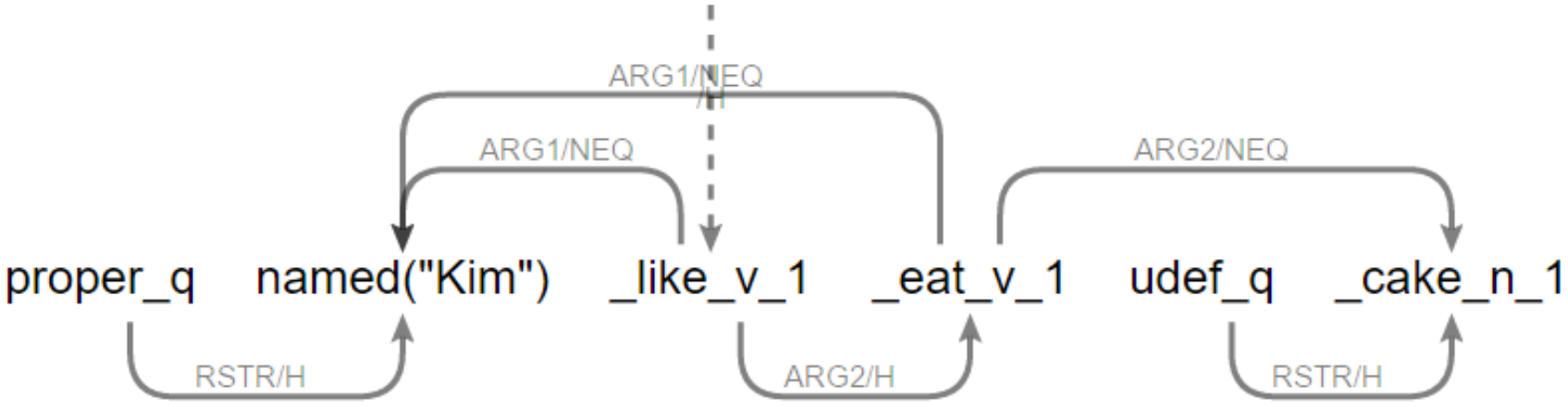

```
proper_q --> named(Kim) <-1- _eat_v_1 -2-> _cake_n_1 <-- udef_q
```

Motivation:

- Succinct and easily read-/writeable representation for DMRS
- DMRS formalism similar to MRS formalisms like Oepen et al. (2004)
- Useful if one wants to quickly specify a DMRS graph, e.g. for debugging

GraphLang

A DMRS graph description language



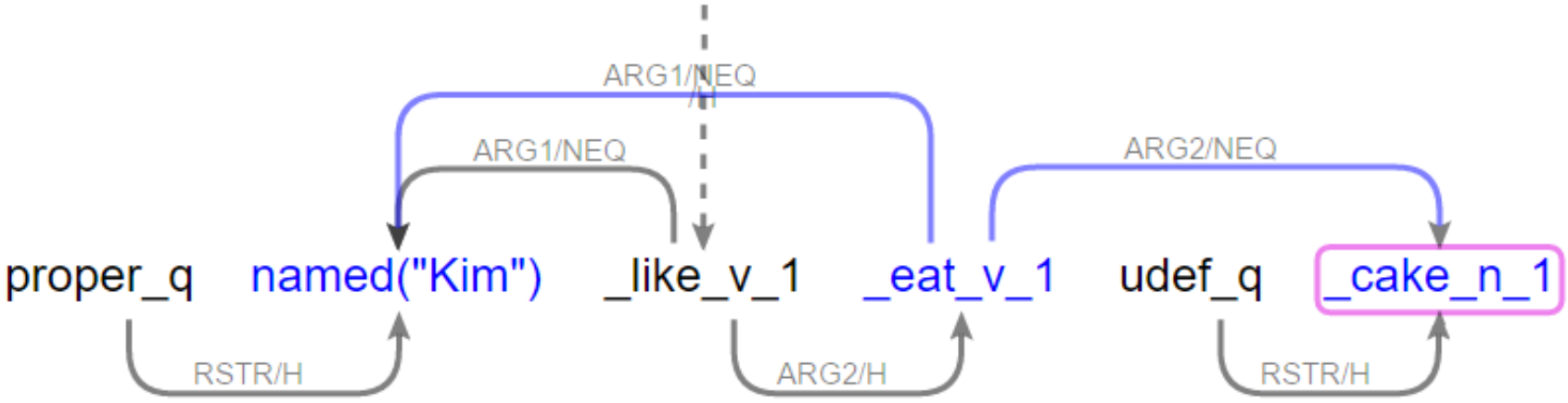

```
proper_q --> subj:named(Kim) x[3s_+_] <-1- _like_v_1 e[ppi--];

:_like_v_1 -2h-> _eat_v_1 e[pui--] -2-> _cake_n_1 x[3s___] <-- udef_q;

:_eat_v_1 -1-> :subj
```

Features:

- Sortinfo syntax (short form): `e[pui--]`, `textttx[3s___]`
- Node identifier via colon prefix: `subj:named`
- Referring back to nodes via leading colon: `:_like_v_1`, `:subj`

Matching & mapping

Search



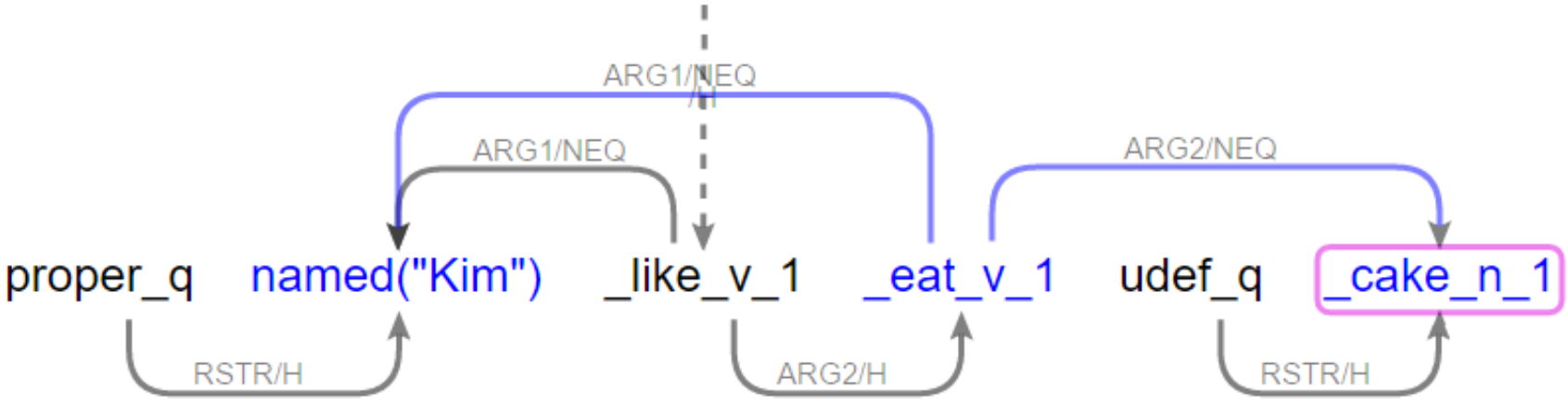

```
node <-1- _eat_v_1 e?  -2-> _?obj_n_1 x?
```

Features:

- Underspecification of nodes or parts of their properties
- Identifier suffix for querying

Matching & mapping

Search




```
node <-1- _eat_v_1 e?  -2-> _?obj_n_1 x?
```

Features:

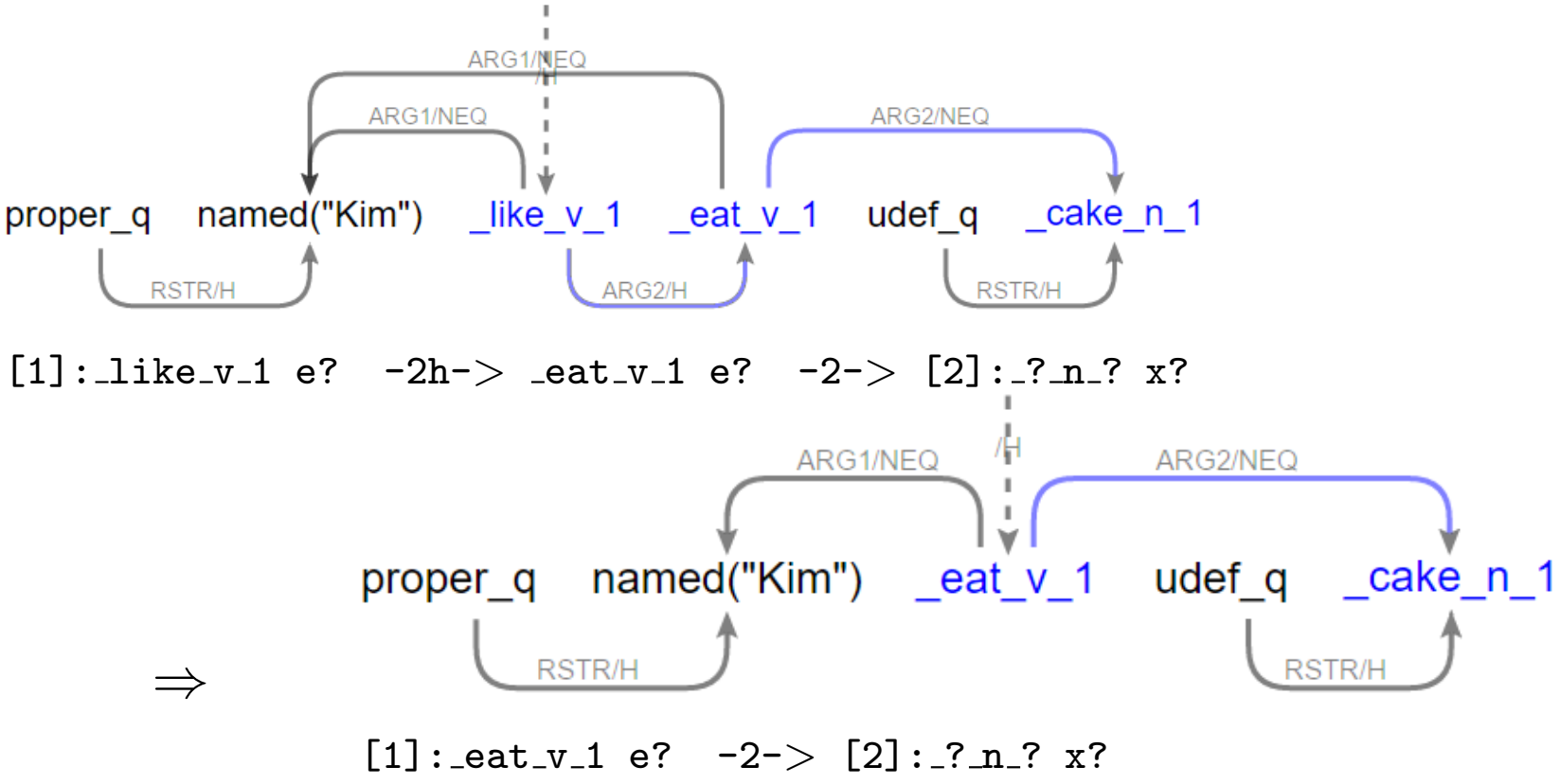
- Underspecification of nodes or parts of their properties
- Identifier suffix for querying

Query tool:

```
> python3 dmrs.py "Kim likes to eat cake."
        | python3 query.py "node <-1- _eat_v_1 e? -2-> _?obj_n_1 x?"
{'obj': 'cake'}
```

Matching & mapping

Replace

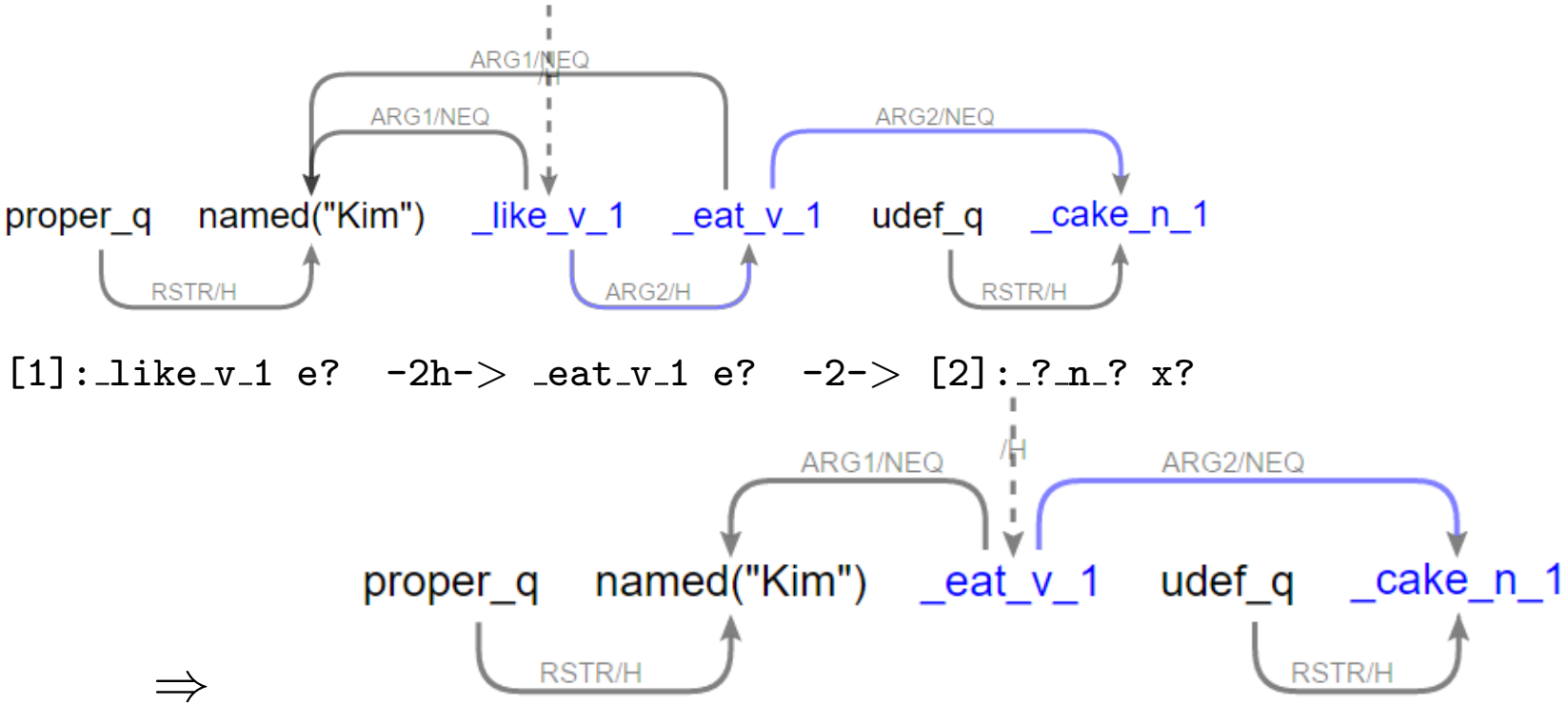


Features:

- Node identifier (with square brackets) for mapping alignment

Matching & mapping

Replace



Features:

- Node identifier (with square brackets) for mapping alignment

Paraphrase tool:

```
> python3 paraphrase.py paraphrases.txt "Kim likes to eat cake."
Kim eats cake.
```

More specialised concepts

Optional node: *"at (long) last"* → *"finally"*

Search: `[1]:_at_p e[pui--] -2-> _last_n_1 x[3s_+_] <-- idiom_q_i;`

`(2):_long_a_1 e[pui__] =1=> :_last_n_1`

Replace: `[1]:_final_a_1 e[pui--]`

More specialised concepts

Optional node: *"at (long) last"* → *"finally"*

Search:
```
[1]:_at_p e[pui--] -2-> _last_n_1 x[3s_+_] <-- idiom_q_i;
(2):_long_a_1 e[pui__] =1=> :_last_n_1
```

Replace:
```
[1]:_final_a_1 e[pui--]
```

Subgraph node: *"Kim eats apple cake."* → *"What does Kim eat?"*

Search:
```
*[1]:_v e[p????] -2-> {2}:node
```

Replace:
```
*[1]:_v e[q????] -2-> [2]:thing x <-- which_q
```

More specialised concepts

Optional node: *"at (long) last"* → *"finally"*

Search:
```
[1]:_at_p e[pui--] -2-> _last_n_1 x[3s_+_] <-- idiom_q_i;
(2):_long_a_1 e[pui__] =1=> :_last_n_1
```

Replace:
```
[1]:_final_a_1 e[pui--]
```

Subgraph node: *"Kim eats apple cake."* → *"What does Kim eat?"*

Search:
```
*[1]:_v e[p????] -2-> {2}:node
```

Replace:
```
*[1]:_v e[q????] -2-> [2]:thing x <-- which_q
```

Equality constraint: *"I think I will go."* → *"I am thinking of going."*

Search:
```
[1]:node=1 <-1- [2]:_think_v_1 e[????-] -2h-> [3]:_v e[pfi--];
:3 -1-> node=1
```

Replace:
```
[1]:node <-1- [2]:_think_v_of e[????+] -2-> nominalization x;
udef_q --> :nominalization =1h=> [3]:_v e[pui-+]
```

Applications

- Robust text query, e.g. for ontology extraction from WikiWoods
- Paraphrasing (examples in pydmrs)
- Sentence simplification/normalisation
- Machine translation, similar to the MRS transfer formalism of e.g. Bond et al. (2011) or Oepen et al. (2004)
- Mapping between graph formalisms or to/from simplified "DMRS graphs", e.g. Guy's robot language
- Other ideas?