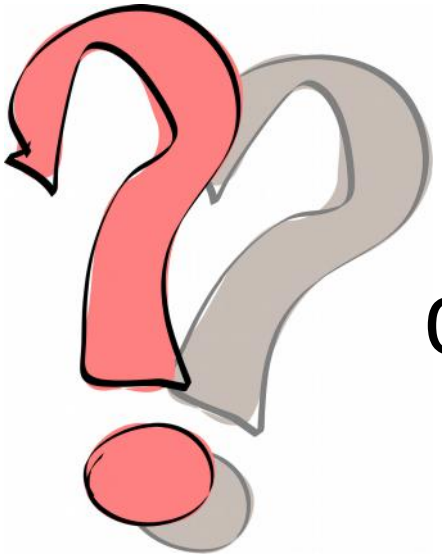
Predicting implicit and explicit questions

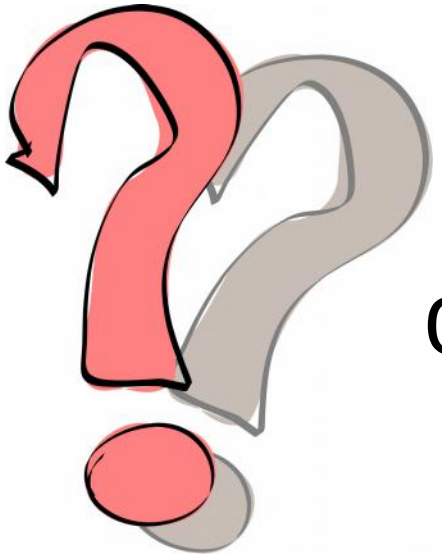


Matthijs Westera

COLT kick-off workshop

amore

Predicting implicit and explicit questions



Matthijs Westera

COLT kick-off workshop

= Computational Linguistics & Linguistic Theory

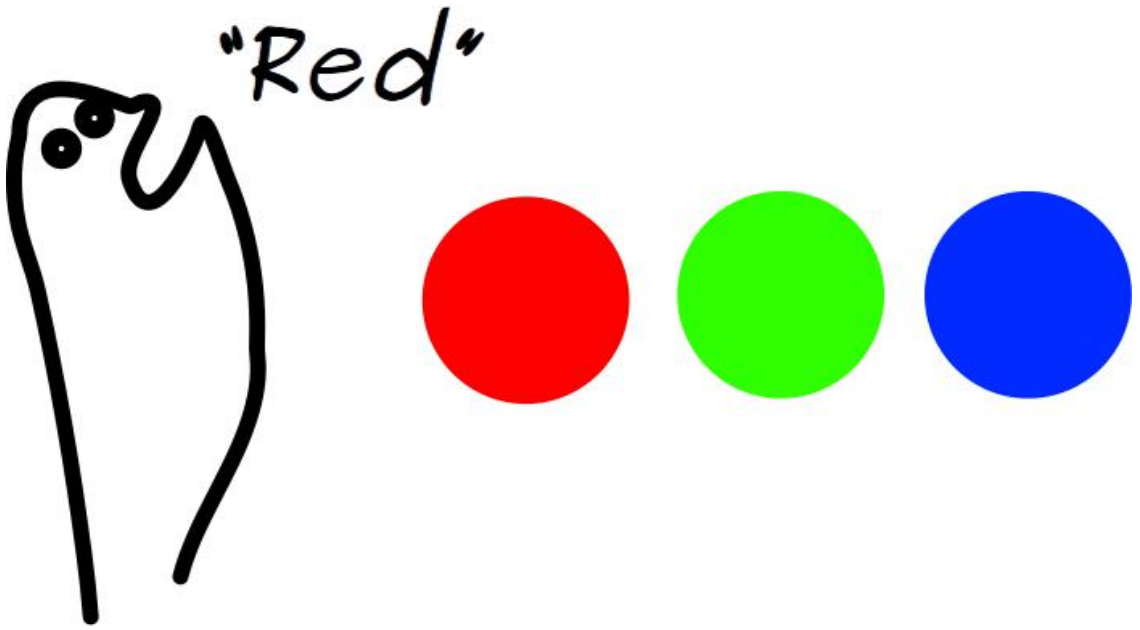
The data of linguistic theory:

The data of linguistic theory:

(Semantics & Pragmatics)

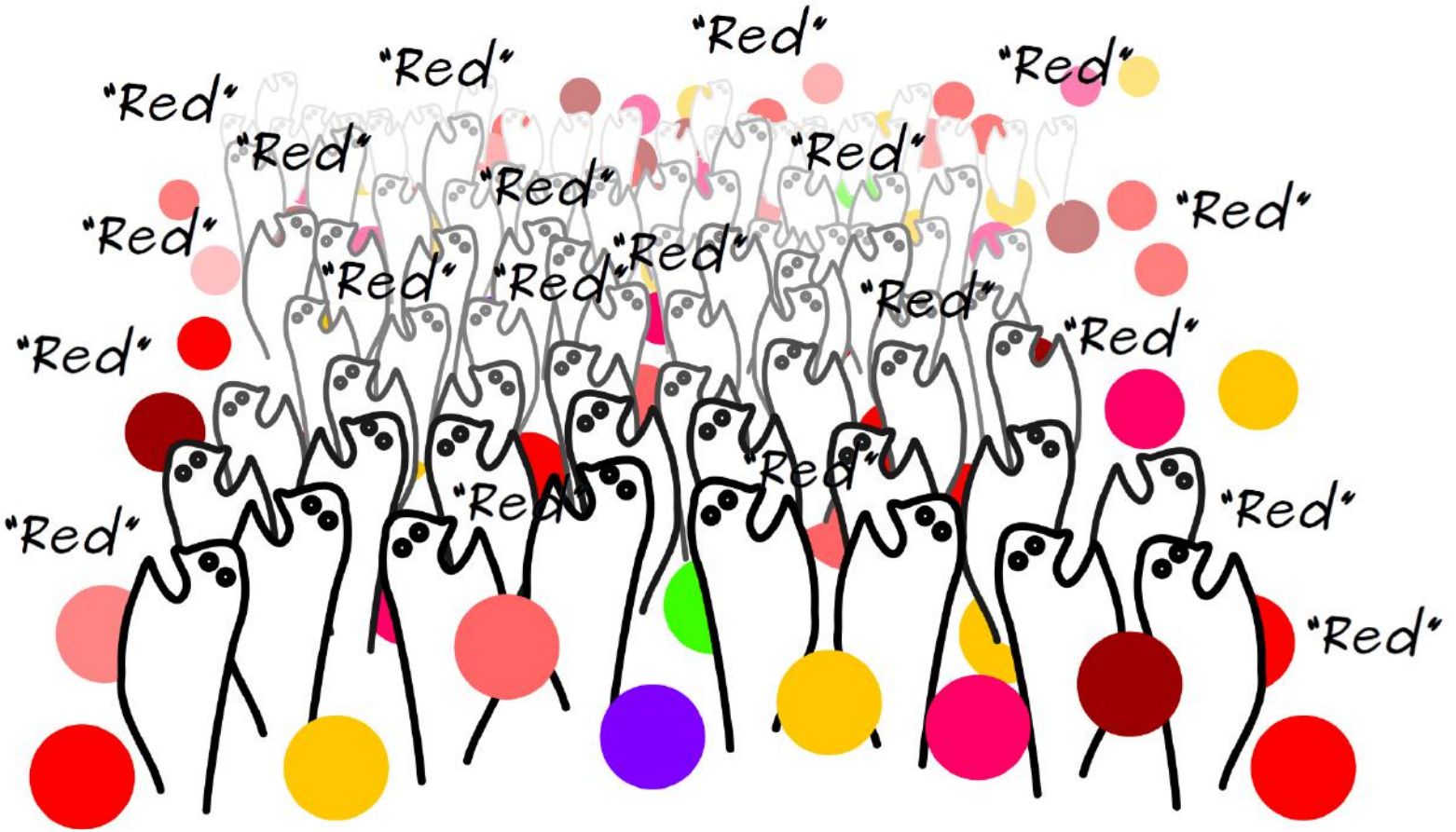
The data of linguistic theory:

(Semantics & Pragmatics)



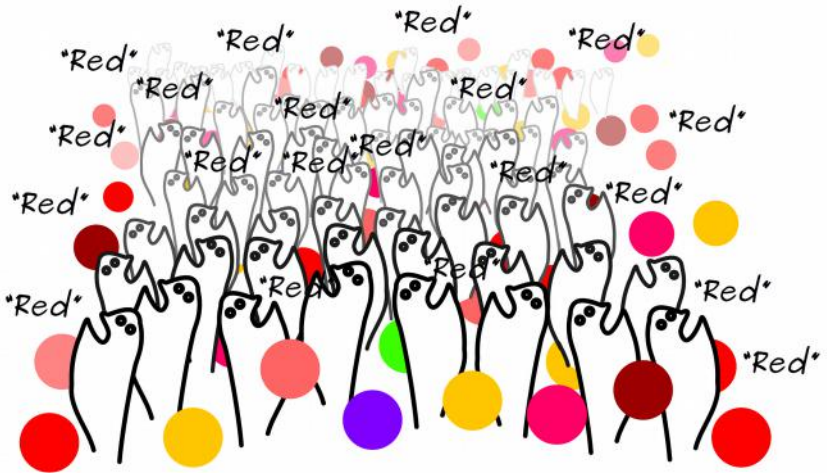
The data of computational ling:

The data of computational ling:

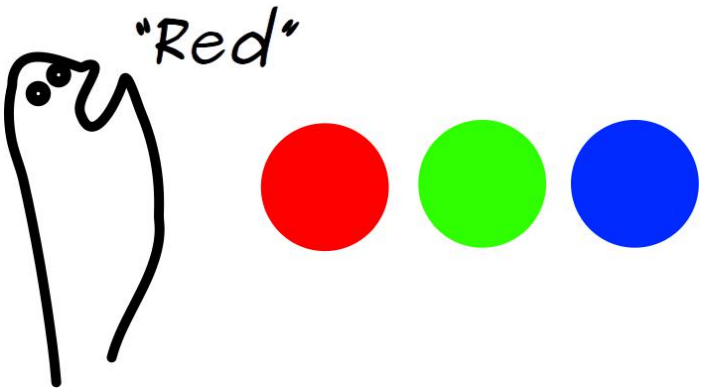


Main interest

messy

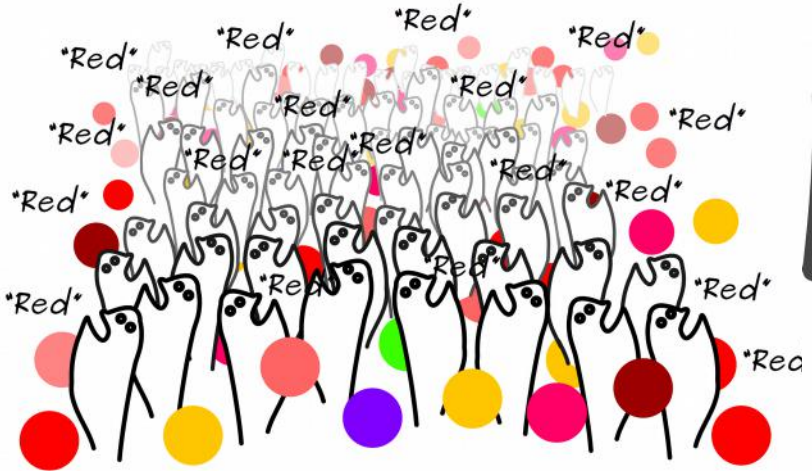


crisp



Main interest

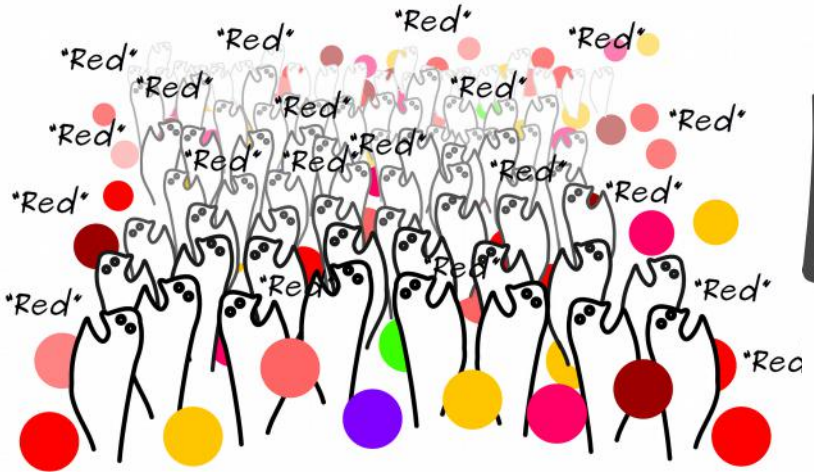
messy

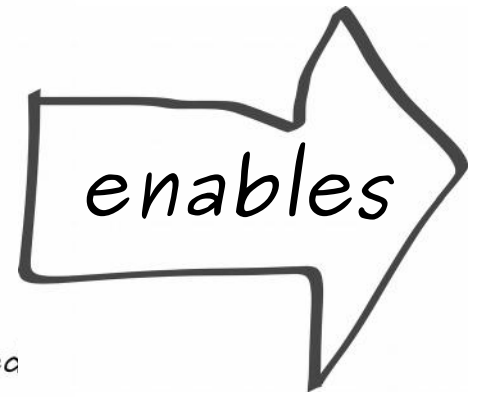

"Red"
"Red"
"Red"

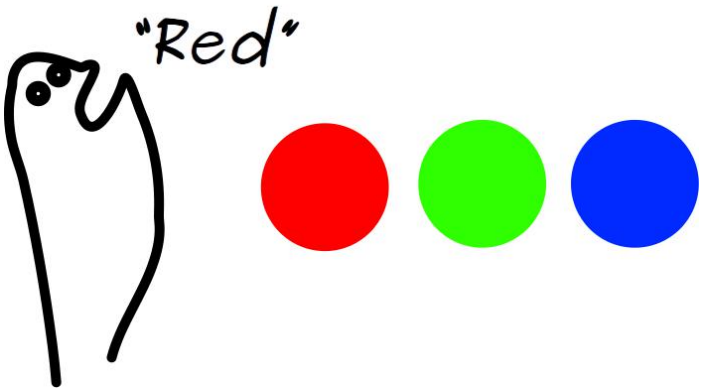
Main interest

messy

crisp





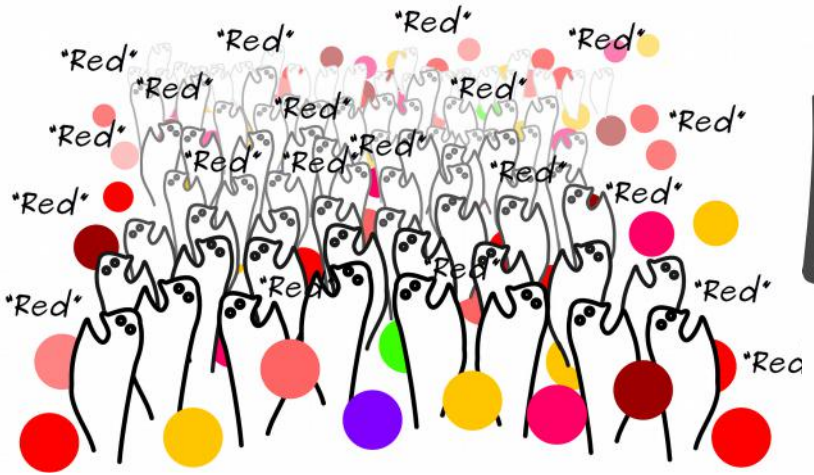


How?

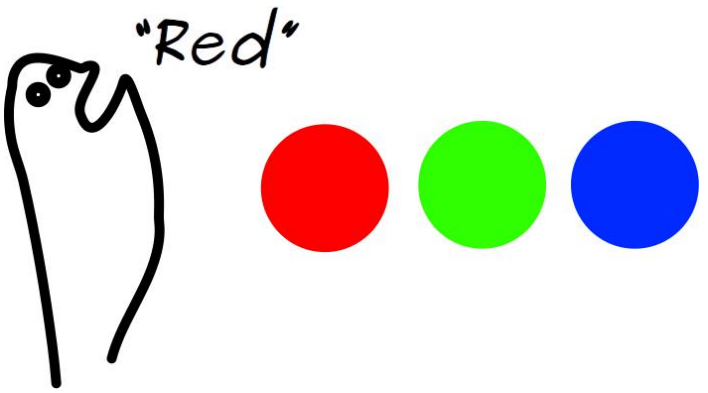
Main interest

messy

crisp



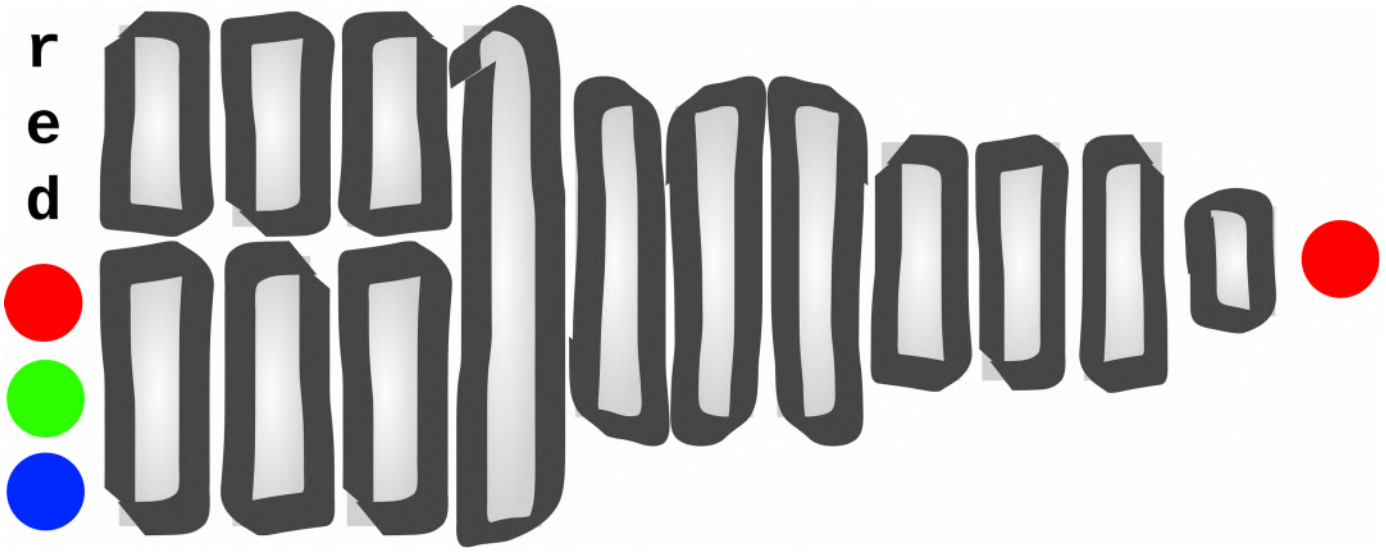
enables



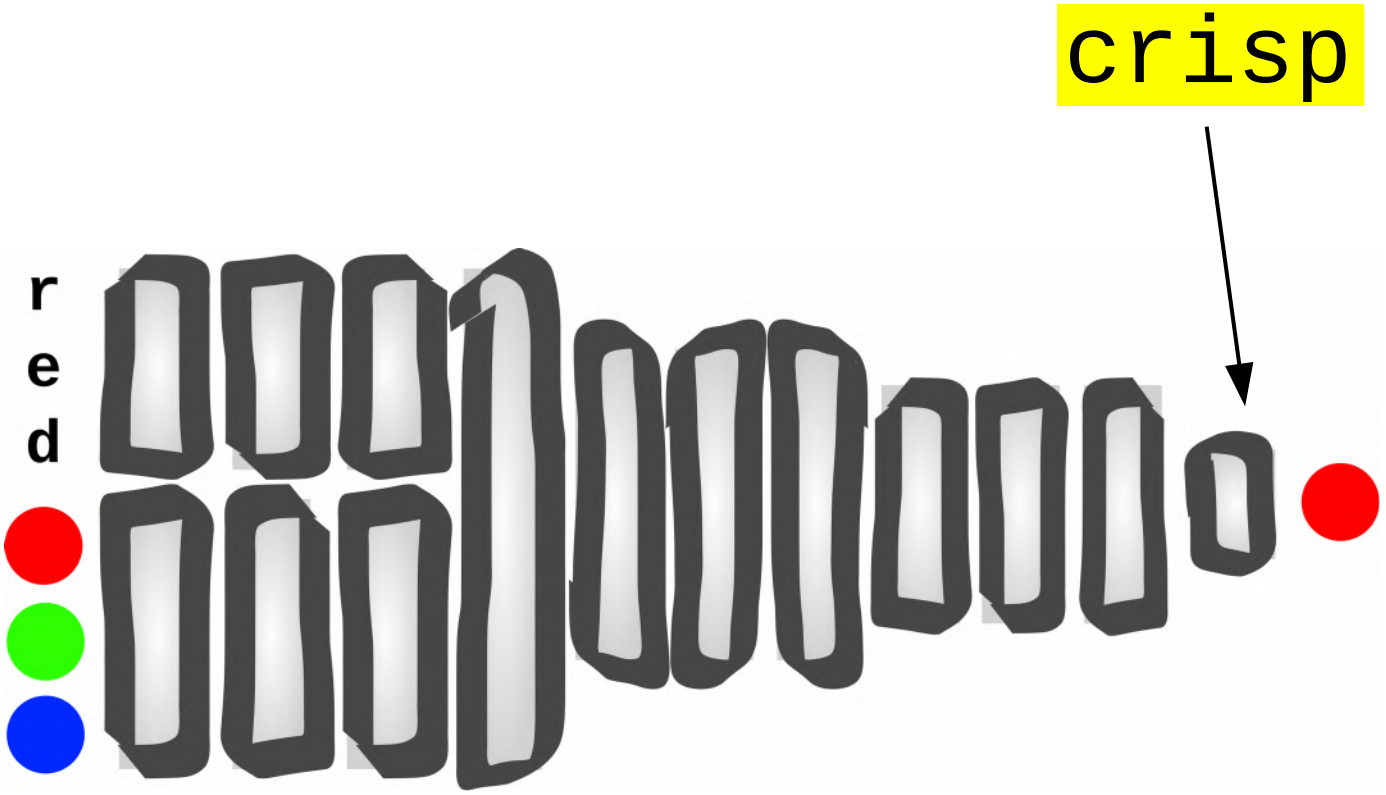
How?

- ...?
- ...?
- ...?

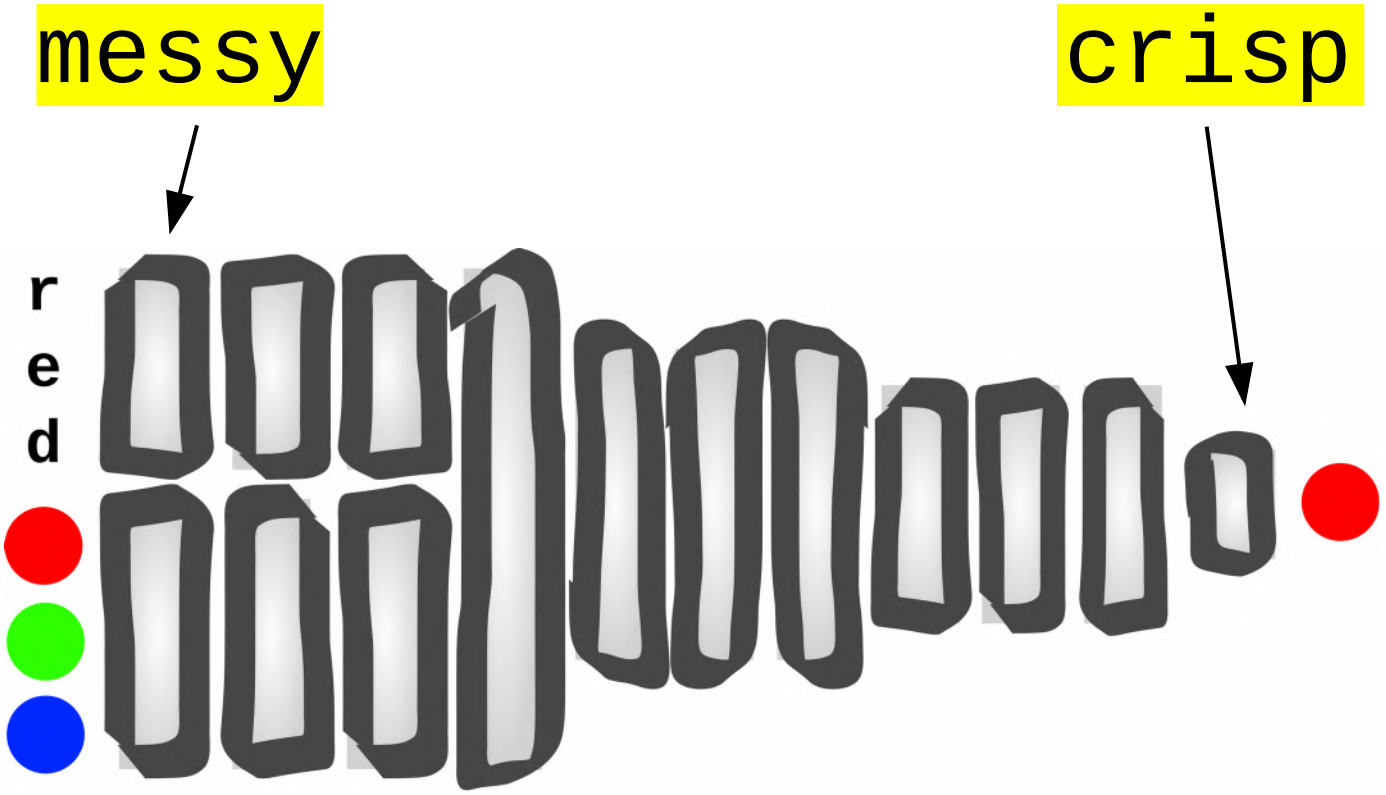
Neural networks



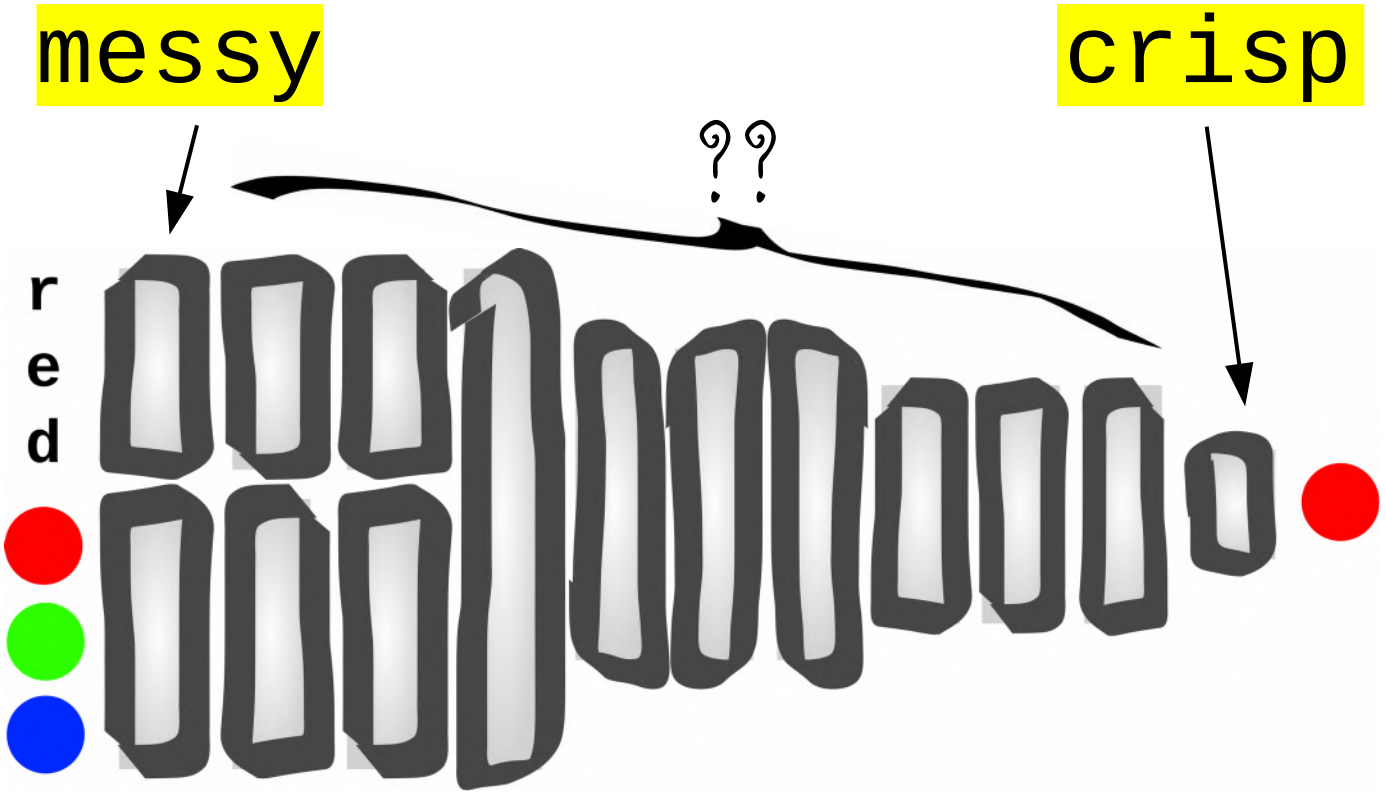
Neural networks



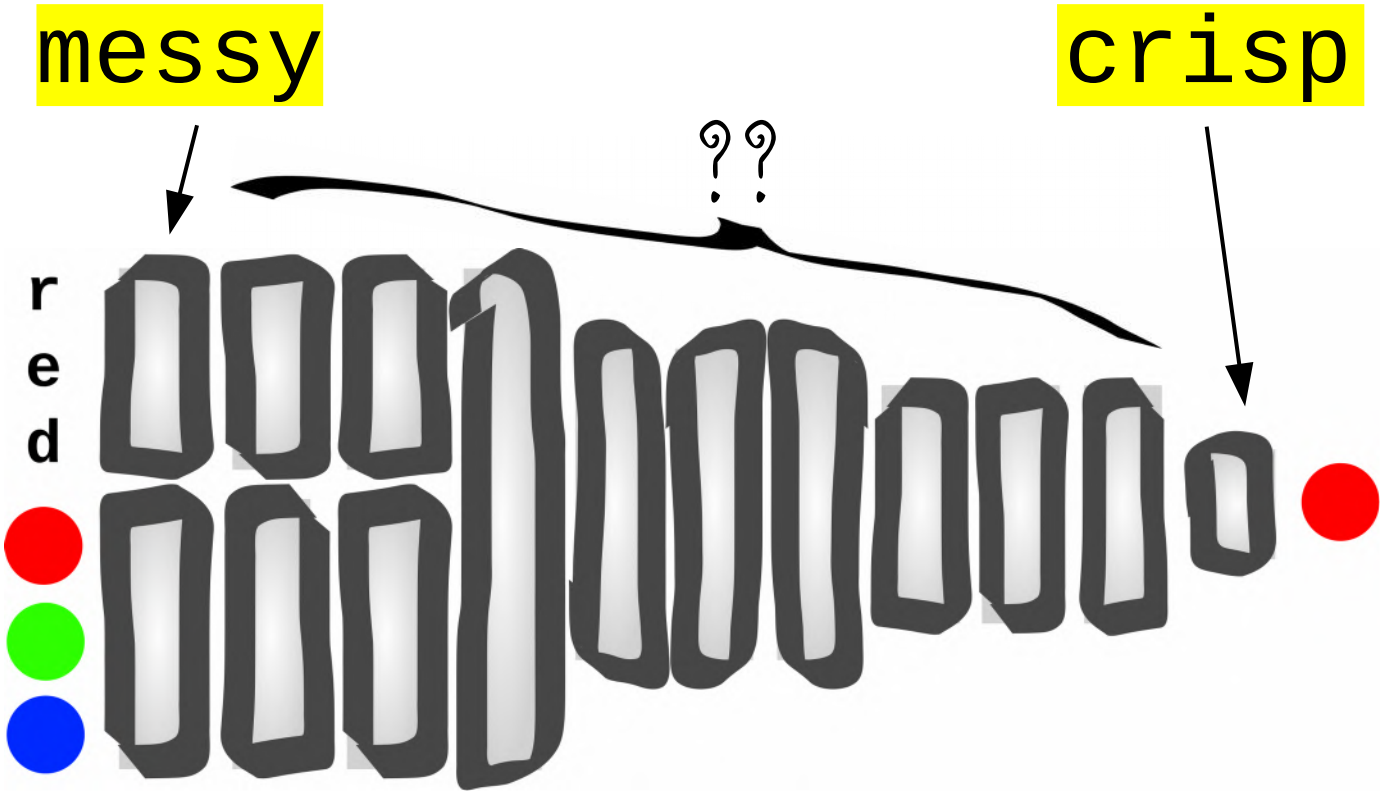
Neural networks



Neural networks



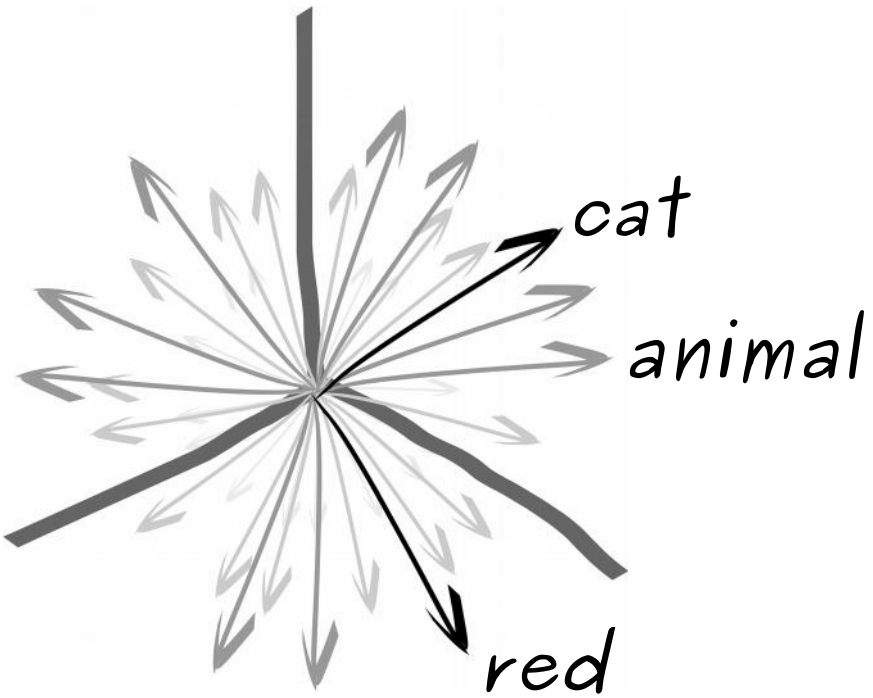
Neural networks



cf. Aina et al. (2018) [SemEval]

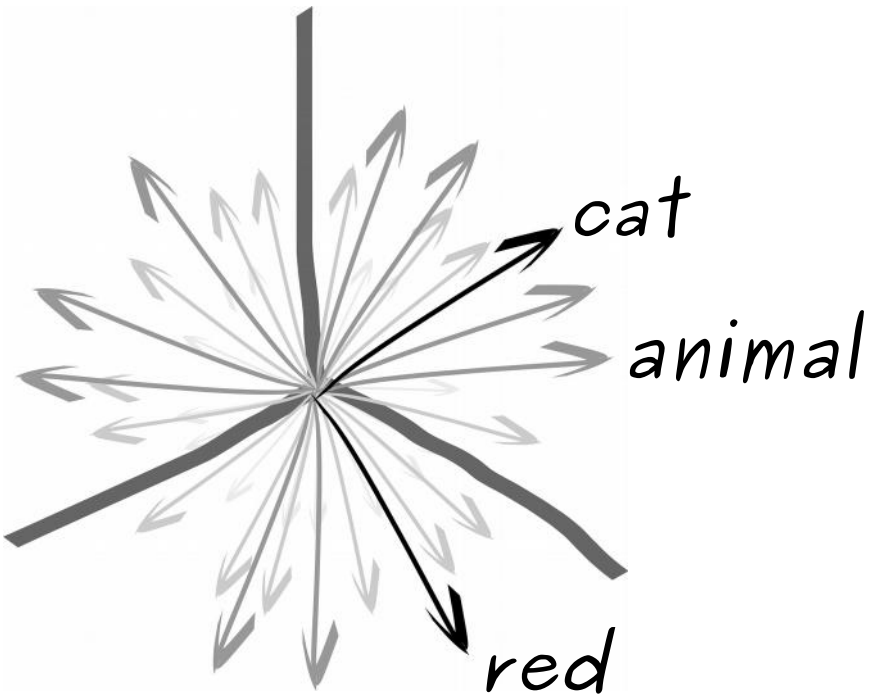
Distributional & formal semantics

Distributional & formal semantics



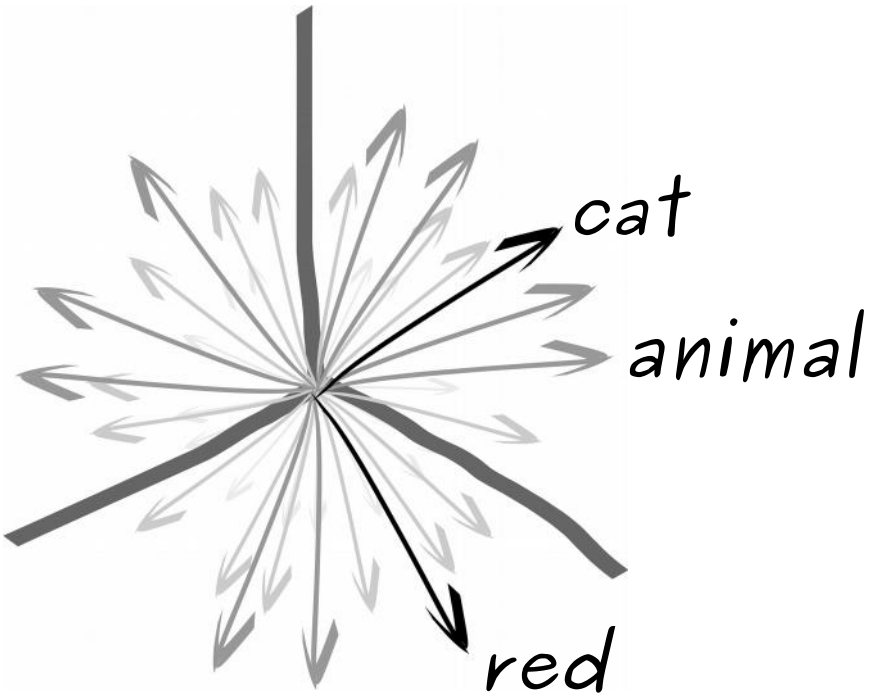
Distributional & formal semantics

messy



Distributional & formal semantics

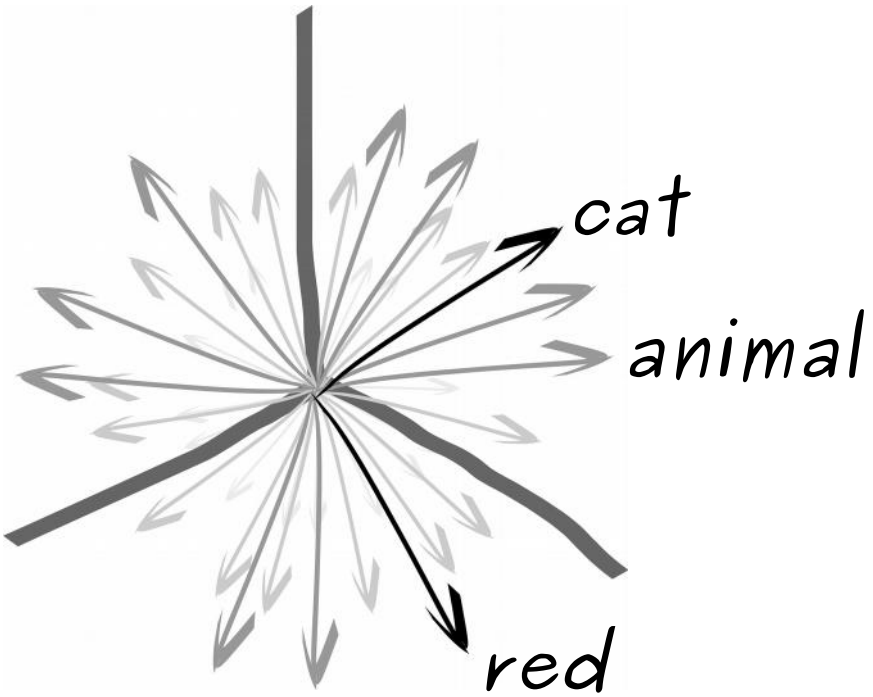
messy



$\exists x\,(\textsc{Red}(x) \wedge \textsc{Cat}(x))$

Distributional & formal semantics

messy



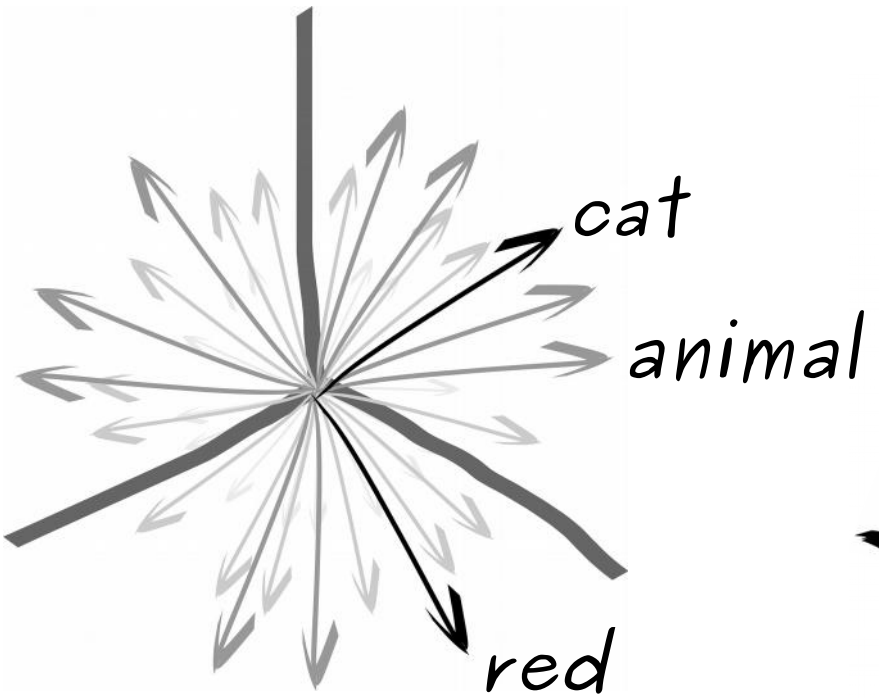
crisp

$\exists x\,(\textsc{Red}(x) \wedge \textsc{Cat}(x))$

Distributional & formal semantics

messy

crisp



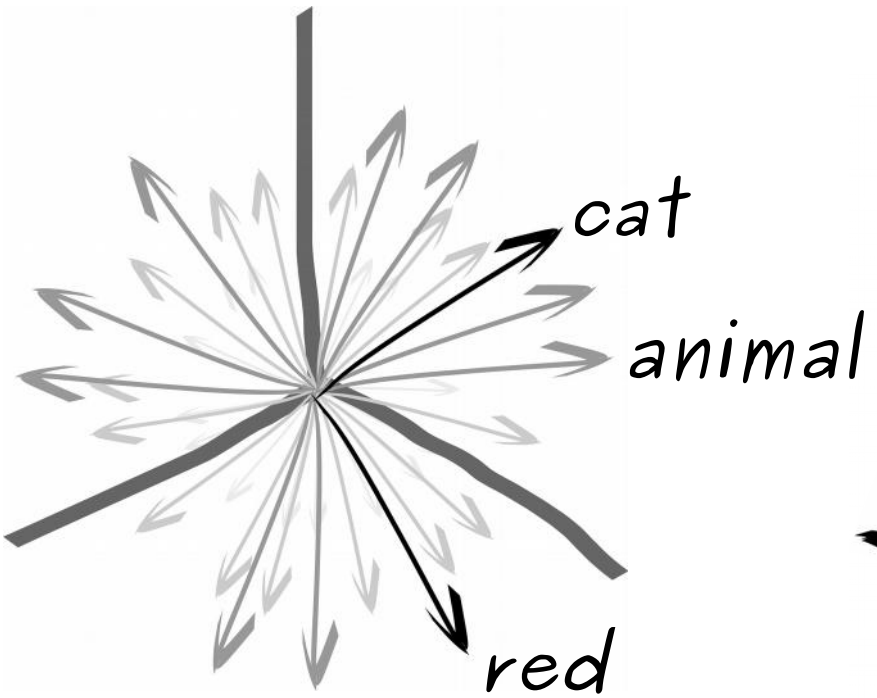
$\exists x\,(\text{RED}(x) \wedge \text{CAT}(x))$

??

Distributional & formal semantics

messy

crisp



$\exists x\,(\text{RED}(x) \wedge \text{CAT}(x))$

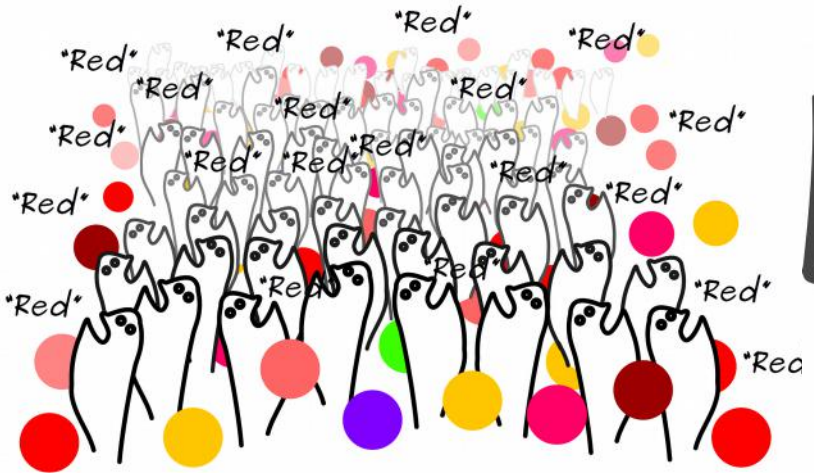
??

Westera & Boleda (under review)

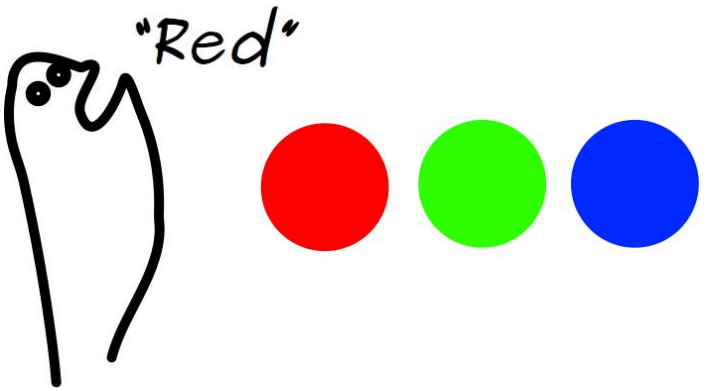
Main interest

messy

crisp



enables

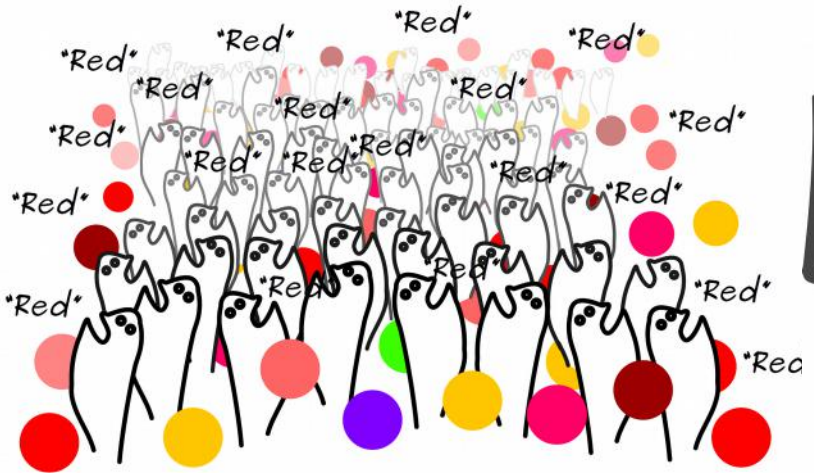


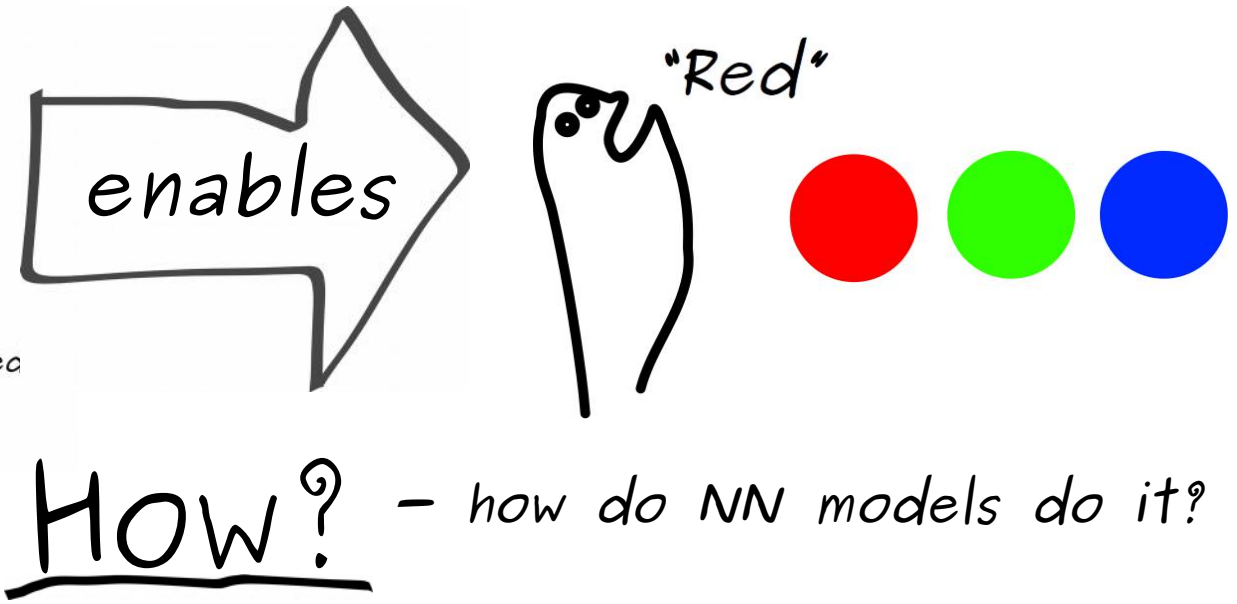
How?

Main interest

messy

crisp

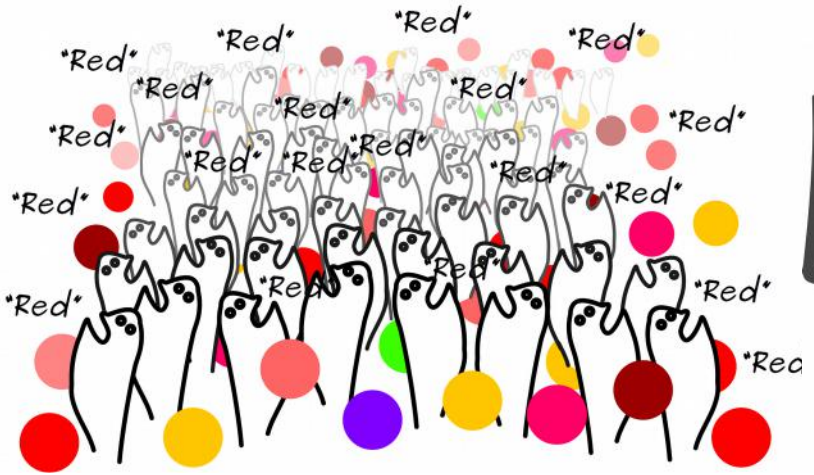




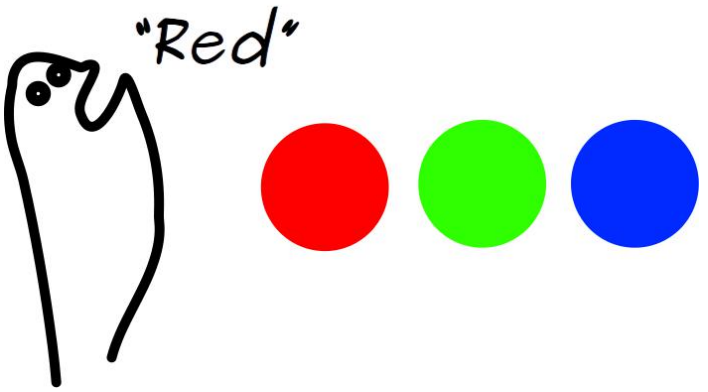
Main interest

messy

crisp



enables

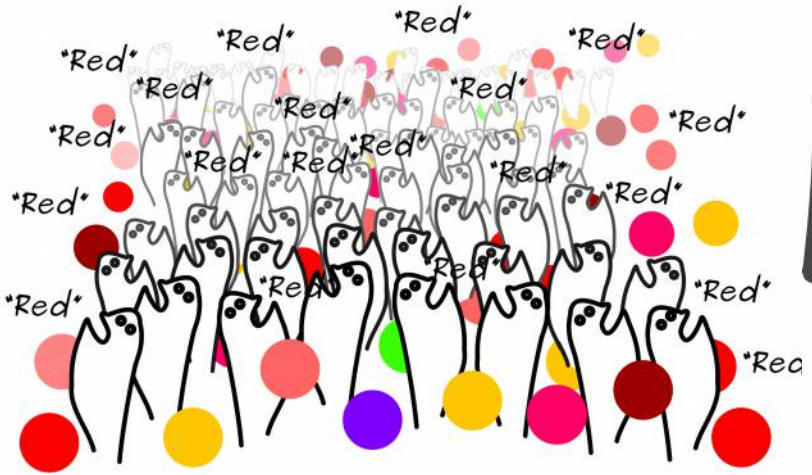


How? – how do NN models do it?
– how do DS and FS relate?

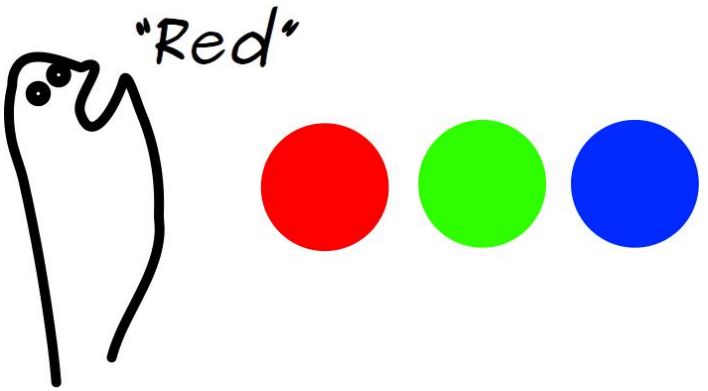
Main interest

messy

crisp



enables



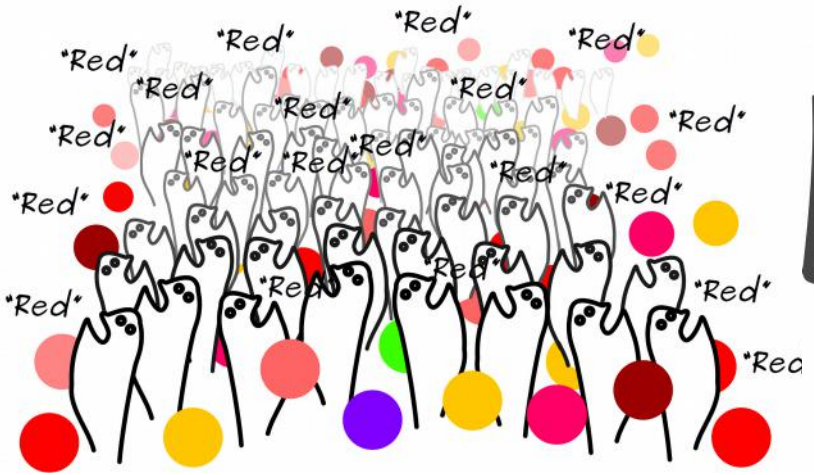
How?

- how do NN models do it?
- how do DS and FS relate?
- what does ling. theory say?

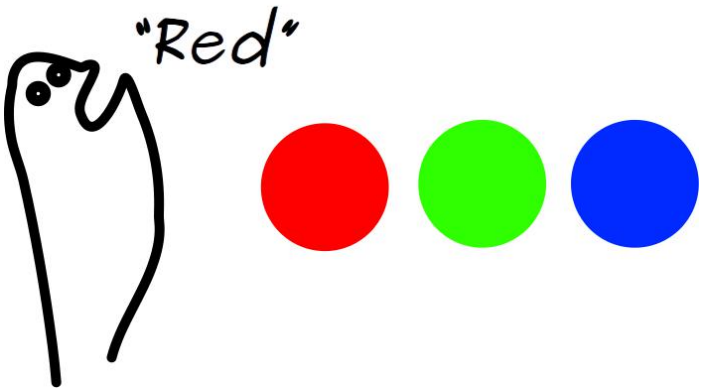
Main interest

messy

crisp



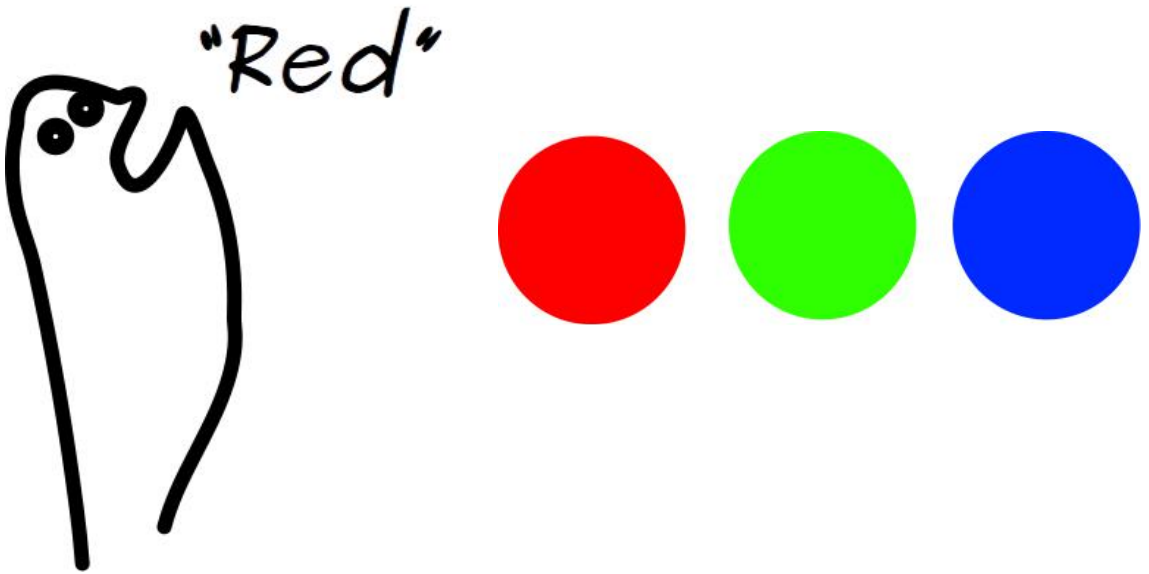
enables



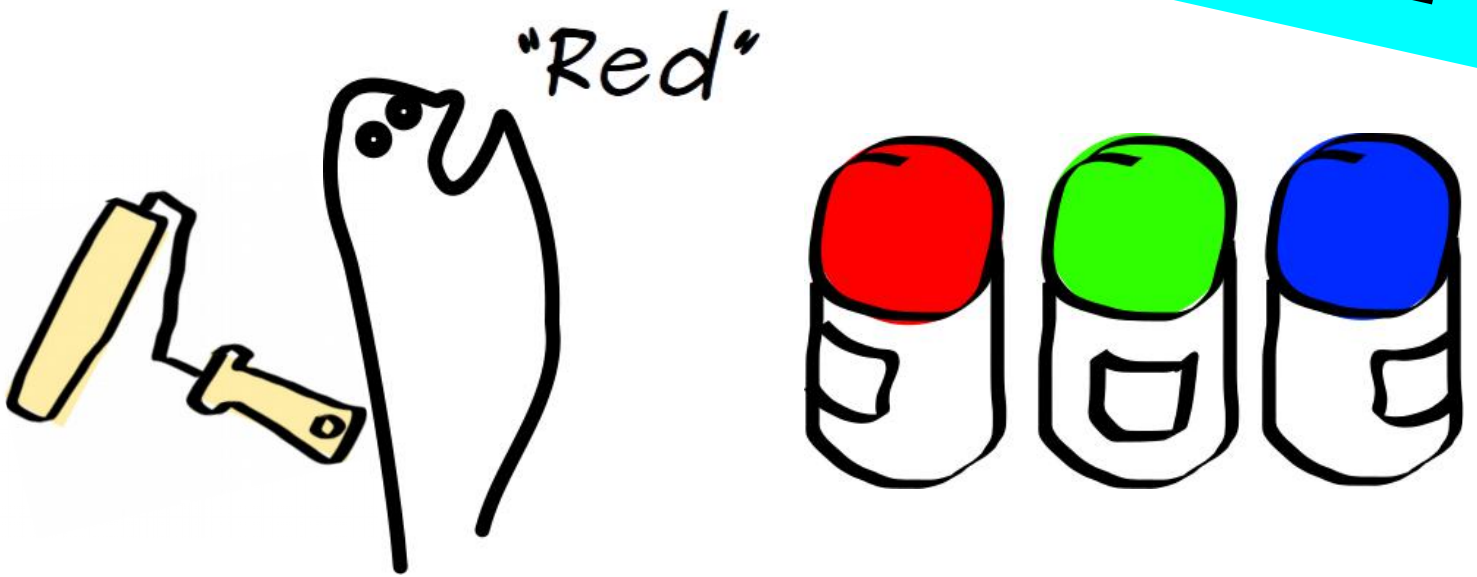
How?

- how do NN models do it?
- how do DS and FS relate?
- what does ling. theory say?

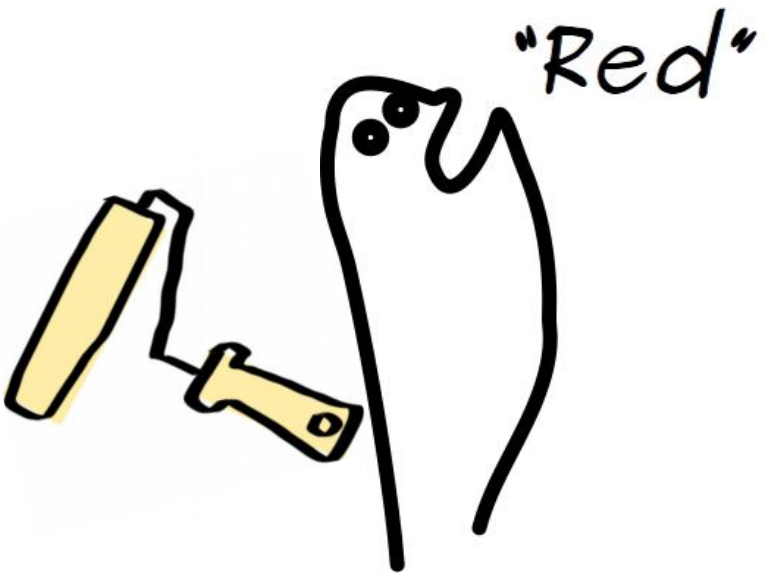
Pragmatics



Pragmatics

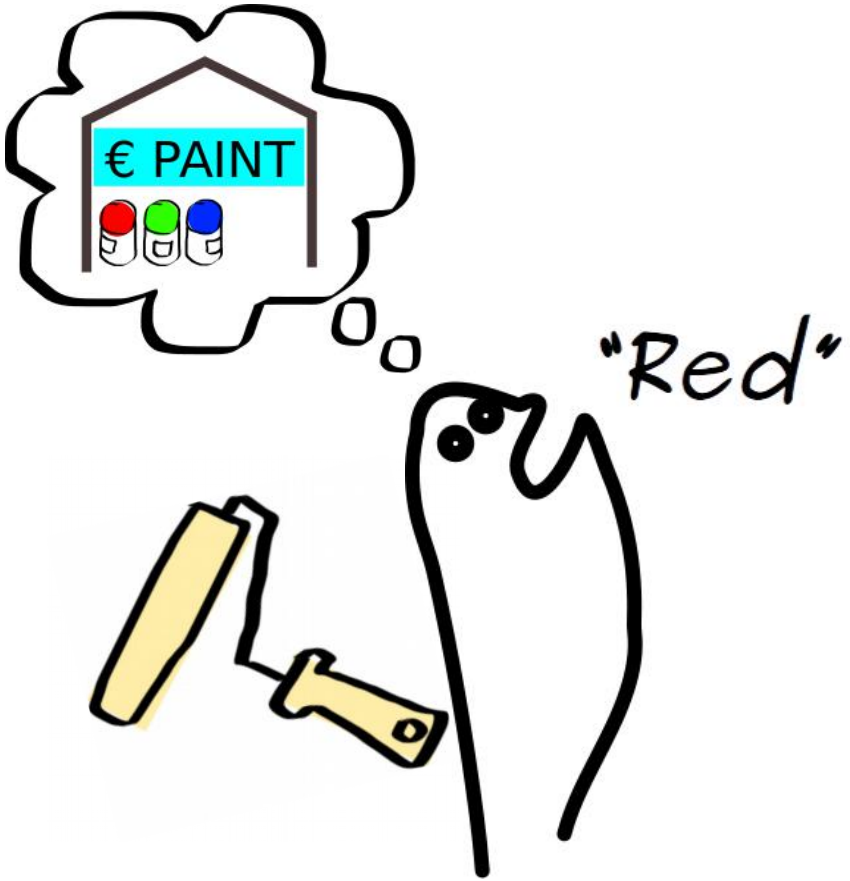


Pragmatics

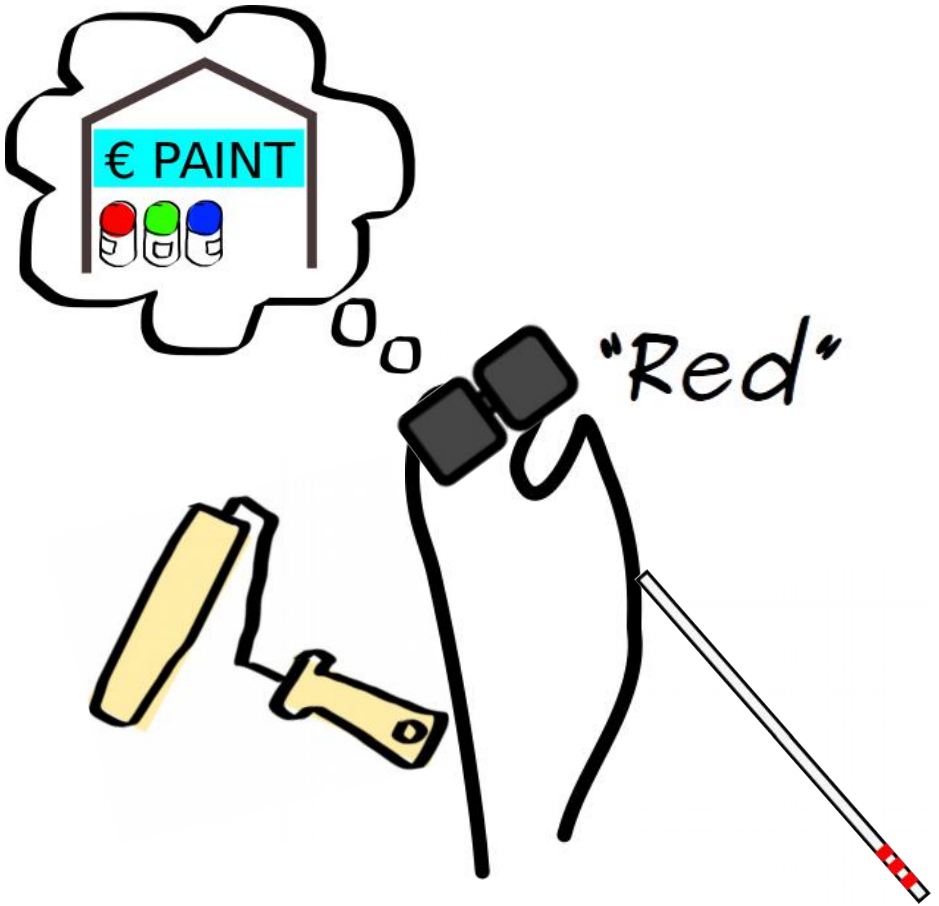


€ PAINT

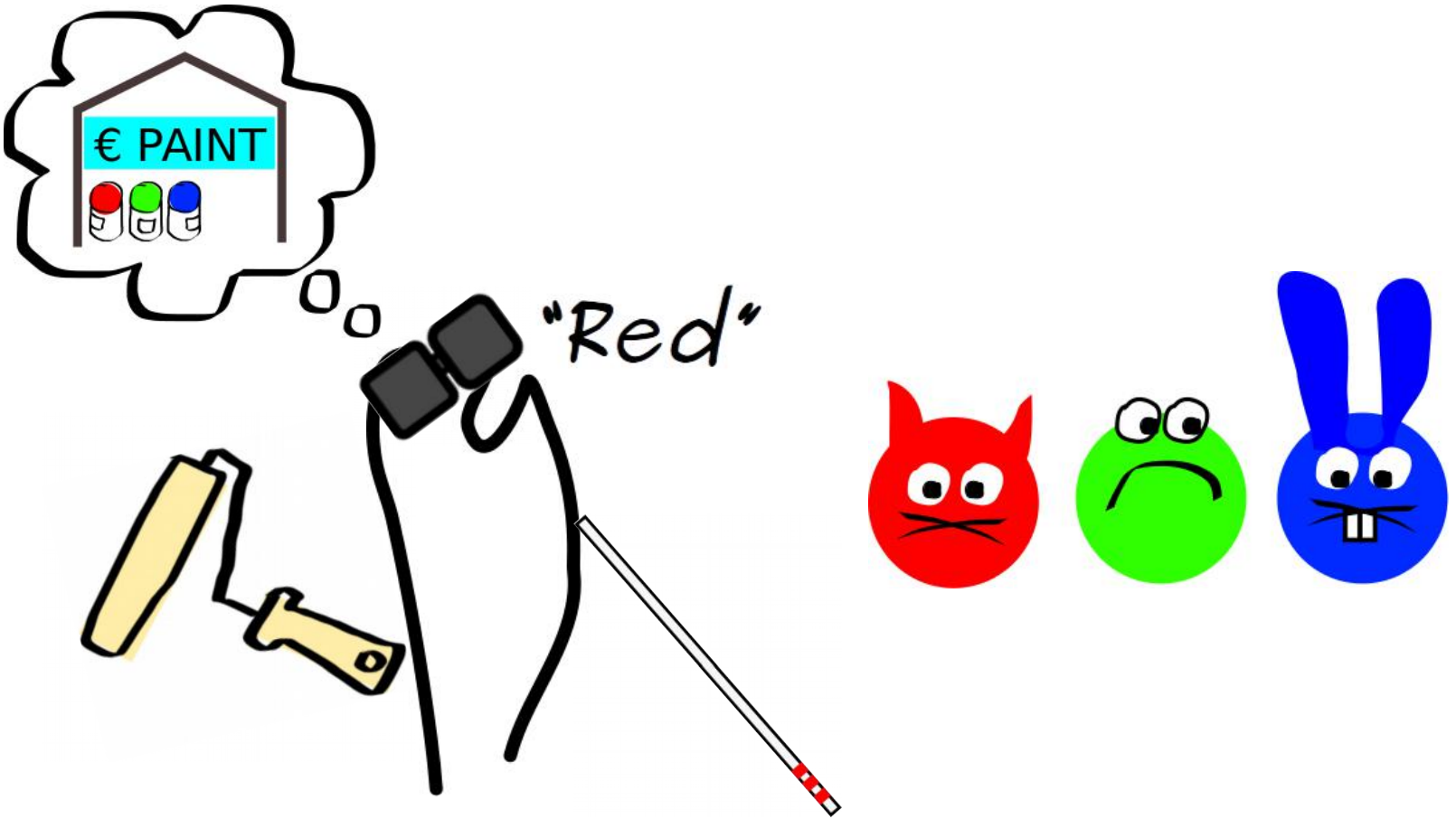
Pragmatics



Pragmatics

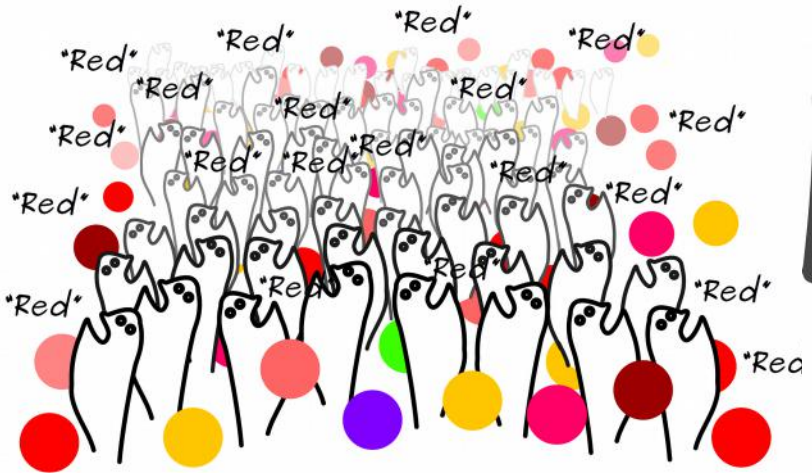


Pragmatics



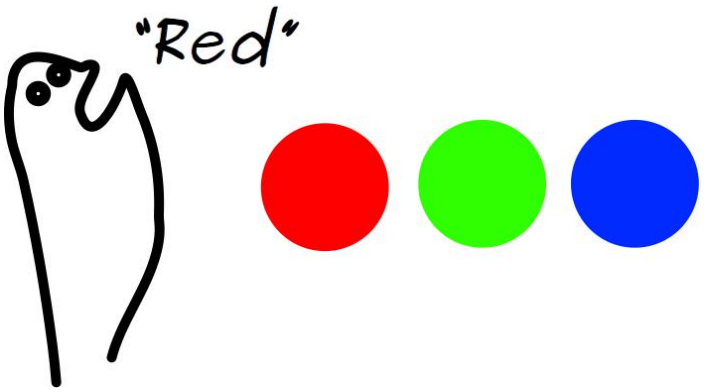
Main interest

messy



enables

crisp



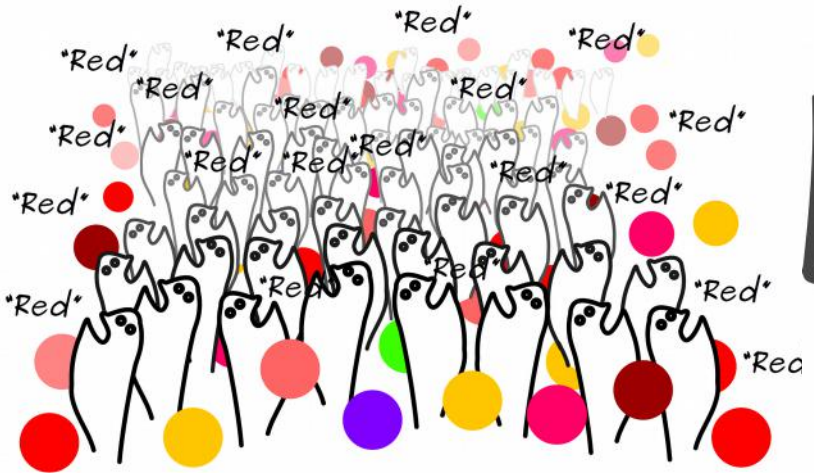
How?

- how do NN models do it?
- how do DS and FS relate?
- what does ling. theory say?

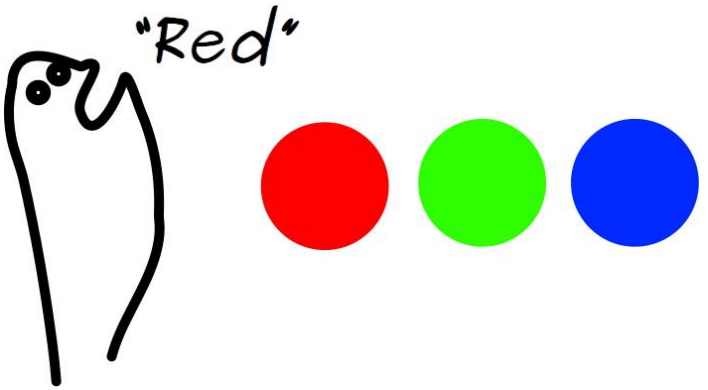
Main interest

messy

crisp



enables



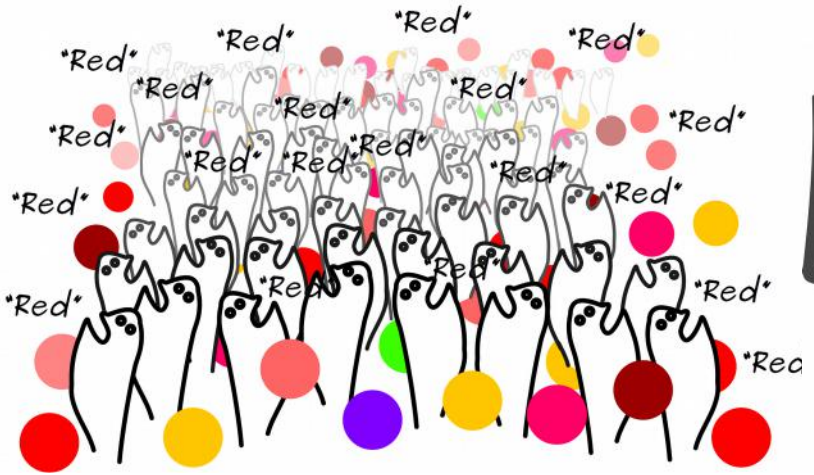
How?

- how do NN models do it?
- how do DS and FS relate?
- ...

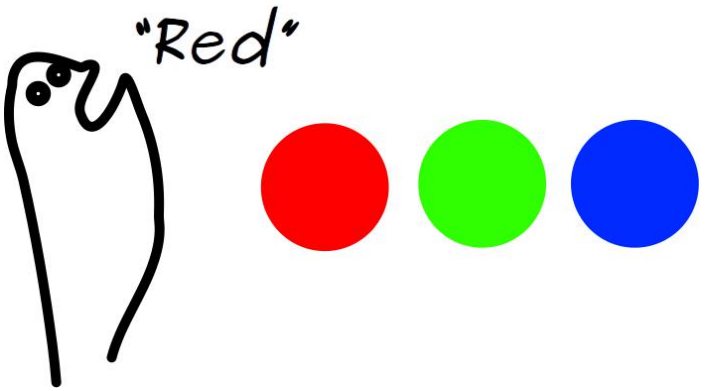
Main interest

messy

crisp



enables



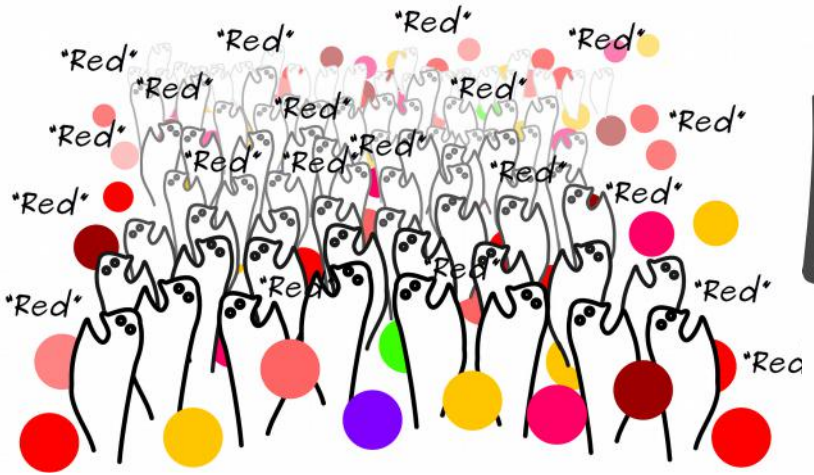
How?

- how do NN models do it?
- how do DS and FS relate?
- how are goals identified?

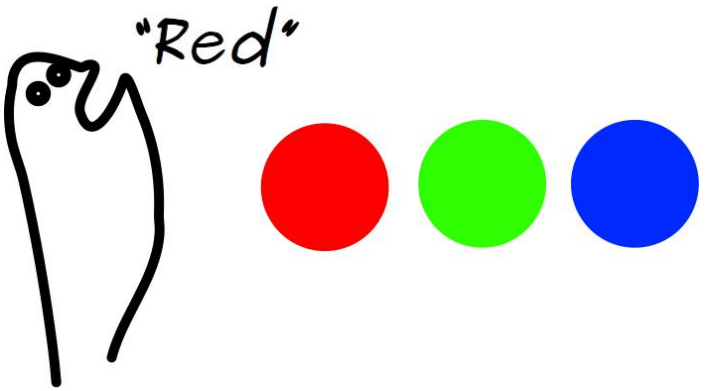
Main interest

messy

crisp



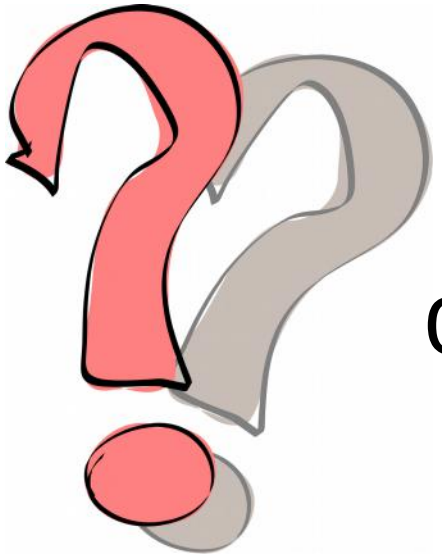
enables



How?

- how do NN models do it?
- how do DS and FS relate?
- how are goals identified?

Predicting implicit and explicit questions



Matthijs Westera

COLT kick-off workshop

amore

Discourse goals

Pragmatic theory:

Discourse goals

Pragmatic theory:

- Discourse is organized around *questions:*

Discourse goals

Pragmatic theory: e.g., Westera 2017 (PhD thesis)

- Discourse is organized around *questions:*

Discourse goals

Pragmatic theory: e.g., Westera 2017 (PhD thesis)

- Discourse is organized around *questions:*
  - Some explicit (“What color do you want?”)
  - Most are implicit:

Discourse goals

Pragmatic theory: e.g., Westera 2017 (PhD thesis)

- Discourse is organized around *questions:*
  - Some explicit (“What color do you want?”)
  - Most are implicit:

> *So, there's this party tonight...*
>
> *August, no!*
>
> *But it's perfect! It’s my last night in Aberdeen! I'll never be in this town again!*
>
> *No, we can't.*

BookCorpus/590124__come-as-you-are.txt

Discourse goals

Pragmatic theory: e.g., Westera 2017 (PhD thesis)

- Discourse is organized around *questions:*
  - Some explicit (“What color do you want?”)
  - Most are implicit:

So, there's this party tonight...

August, no!

But it's perfect! It’s my last night in Aberdeen! I'll never be in this town again!

No, we can't.

Shall we go??

BookCorpus/590124__come-as-you-are.txt

Discourse goals

Pragmatic theory: e.g., Westera 2017 (PhD thesis)

- Discourse is organized around *questions:*
  - Some explicit (“What color do you want?”)
  - Most are implicit:

So, there's this party tonight...

August, no!

But it's perfect! It’s my last night in Aberdeen! I'll never be in this town again!

No, we can't.

Shall we go??

BookCorpus/590124__come-as-you-are.txt

Question prediction

Get a model to predict *implicit* questions (goals), by training on *explicit* questions.

Question prediction

Get a model to predict *implicit* questions (goals), by training on *explicit* questions.

=free supervision!

Question prediction

Get a model to predict *implicit* questions (goals), by training on *explicit* questions.

=free supervision!

Data:

- Only *dialogue* contains enough questions.

Question prediction

Get a model to predict *implicit* questions (goals), by training on *explicit* questions.

=free supervision!

Data:

- Only *dialogue* contains enough questions.
- Extract dialogues from movie scripts and books.
  - E.g., 1M dialogues from BookCorpus.

Question prediction

Get a model to predict *implicit* questions (goals), by training on *explicit* questions.

=free supervision!

Data:

- Only *dialogue* contains enough questions.
- Extract dialogues from movie scripts and books.
  - E.g., 1M dialogues from BookCorpus.

Models (e.g.):

- Simple word-level RNN. (Westera 2018 [SemDial])

Question prediction

Get a model to predict *implicit* questions (goals), by training on *explicit* questions.

=free supervision!

Data:

- Only *dialogue* contains enough questions.
- Extract dialogues from movie scripts and books.
  - E.g., 1M dialogues from BookCorpus.

Models (e.g.):

- Simple word-level RNN. (Westera 2018 [SemDial])
- Sentence-level RNN on pre-trained sent. embeddings.

Example (aim)

So, there's this party tonight…

August, no!

But it's perfect! It's my last night in Aberdeen! I'll never be in this town again!

No, we can't.

Example (aim)

So, there's this party tonight…

Shall we go?

August, no!

But it's perfect! It's my last night in Aberdeen! I'll never be in this town again!

No, we can't.

Example (aim)

So, there's this party tonight…

Shall we go?

August, no!

Why do you even bring it up?

But it's perfect! It's my last night in Aberdeen! I'll never be in this town again!

No, we can't.

Example (aim)

So, there's this party tonight…

Shall we go?

August, no!

Why do you even bring it up?

But it's perfect! It's my last night in Aberdeen! I'll never be in this town again!

Can we go?

No, we can't.

Example (aim)

So, there's this party tonight…

Shall we go?

August, no!

Why do you even bring it up?

But it's perfect! It's my last night in Aberdeen! I'll never be in this town again!

Can we go?

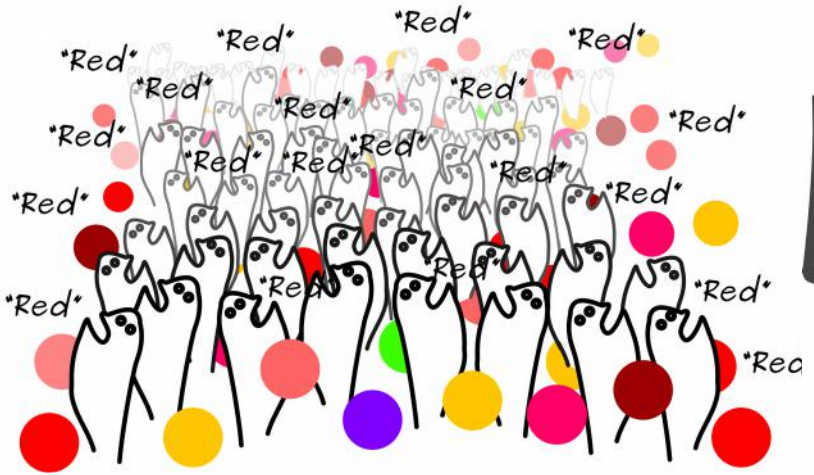
No, we can't.

Why can't we go?

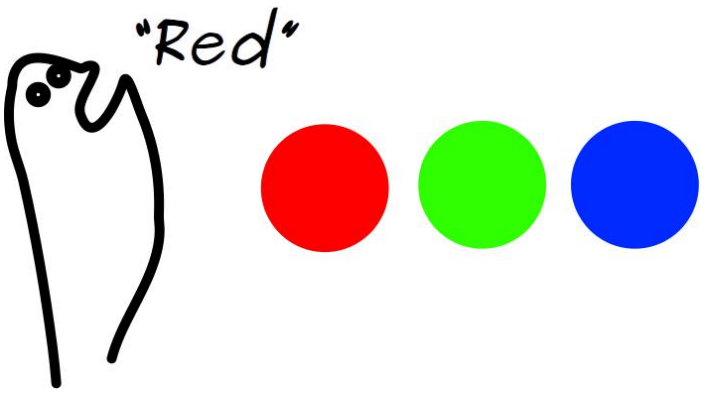
Summary

messy

crisp



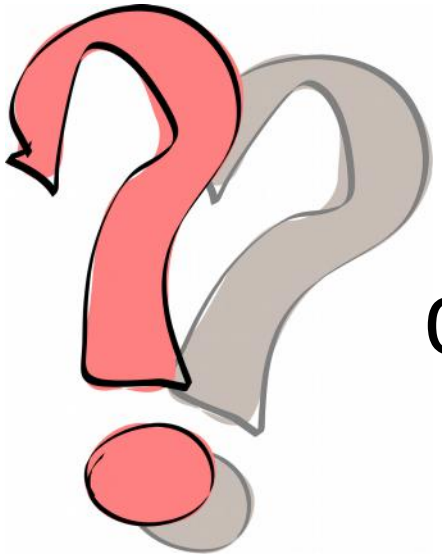
enables



How?

- how do NN models do it?
- how do DS and FS relate?
- can we predict discourse goals?

Predicting implicit and explicit questions



Matthijs Westera

COLT kick-off workshop

amore