

# *Pemuisi*: a constraint satisfaction-based generator of topical Indonesian poetry



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# Overview

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- ❖ Background
- ❖ Language Resources
- ❖ Constraint Satisfaction Poetry Generation
- ❖ Experiments & Evaluation
- ❖ *Pemuisi*: Up-to-date Poem Feed
- ❖ Summary

# Background



# Poetry

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Meaningfulness

Must aim to convey a message that has meaning under certain interpretation.

Poeticness

Emphasis on aesthetic aspects of phonetic phenomena and lexical choice.



Grammaticality

Text must comply with syntactic rules. Even deviations should be governed by allowable rules.

Process?

# Poetry generation

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Meaningfulness

Bag-of-words vs.  
Logical representation.

Poeticness

Rhythm, rhyme, alliteration?  
Archaic & resonant diction?

Grammaticality

Templates + canned text vs.  
deep syntactic generation

Process: hardcoded,  
evolutionary, constraint  
satisfaction, case-based.

# Pemuisi: Desiderata

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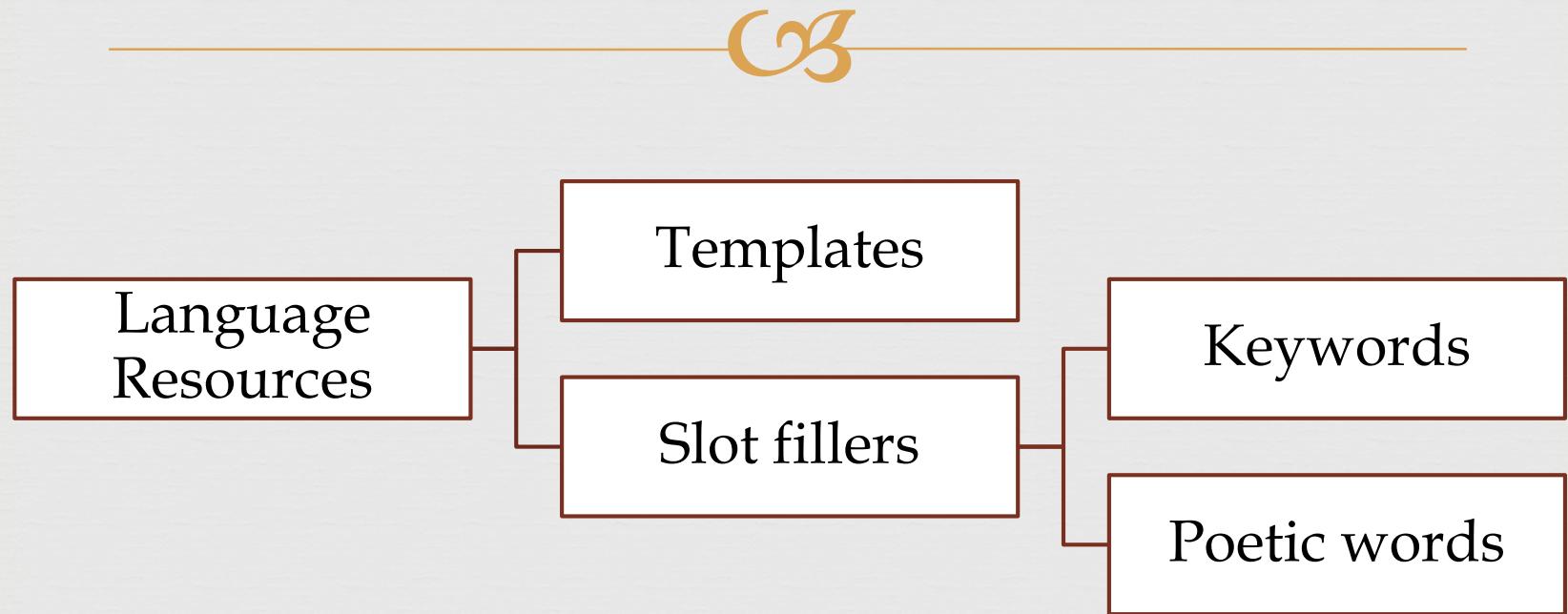
- ❖ **Indonesian** → lack of language resources.
  - ❖ Basic linguistic resources: lexicon, grammar, etc.
  - ❖ Useful for poetry: pronunciation dictionary, metaphor collections, etc.
- ❖ **Topical** → Poetry does not exist in a vacuum
  - ❖ Human poets are inspired by external events
- ❖ **Conduct human evaluation**

# Language Resources



# Language Resources

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Originating resources:

1. News websites
2. Poetry corpus
3. Lexicons
4. Part-of-speech tagger
5. Pronunciation dictionary

# Templates



Aku mencintai kamu dengan sepenuh hati

I love you with full heart  
/PR /VB /PR /CON /ADV /NN



*remove /PR & /NN*

<PR> mencintai <PR> dengan sepenuh <NN>  
<PR> love <PR> with full <NN>

## Templates manually selected to be used

1. <PR>
2. <PR> <VBI>
3. <PR> <VBI> <RB>
4. <PR> <VBT> <PR>
5. <PR> <VBI> <PR> <VBI>
6. dari <NN> ke <NN>
7. adalah <ADJ> <NN>
8. tapi <PR> <VBI>
9. <PR> dan <PR> <VBI>
10. <PR> ini hanyalah <NN>
11. <NN> dan <NN> bisa dibawa <VBI>
12. <PR> <VBT> <NN> bersama <PR>
13. <VBT> <PR> adalah <ADJ> untuk <PR>
14. dengan penuh <ADJ> dalam <NN>
15. tak ada lagi <ADJ> dan <NN>
16. adakah <NN> padaku atau <NN>
17. ada yang <VBI> ada yang <VBI>
18. mengapa <NN> <VBI>
19. oh <PR> begitu <ADJ>
20. terlalu <ADJ> bagi <PR>
21. <NN> menjadi <NN>
22. apa itu <NN>

## Illustrative translations of the templates

1. <PR>
2. <PR> <VBI>
3. <PR> <VBI> <RB>
4. <PR> <VBT> <PR>
5. <PR> <VBI> <PR> <VBI>
6. from <NN> to <NN>
7. there is <ADJ> <NN>
8. but <PR> <VBI>
9. <PR> and <PR> <VBI>
10. <PR> is just <NN>
11. <NN> and <NN> can be brought <VBI>
12. <PR> <VBT> <NN> with <PR>
13. <VBT> <PR> is <ADJ> for <PR>
14. with full <ADJ> in <NN>
15. no more <ADJ> and <NN>
16. is there <NN> with me or <NN>
17. some are <VBI> some are <VBI>
18. why <NN> <VBI>
19. oh <PR> is so <ADJ>
20. too <ADJ> for <PR>
21. <NN> becomes <NN>
22. what is <NN>

# Keywords

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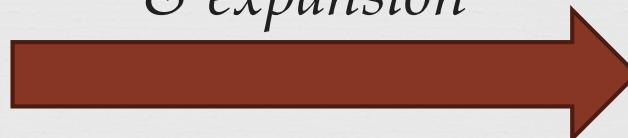


## Article

- most recent,
- most commented on, or
- most read



*Keyword extraction  
& expansion*

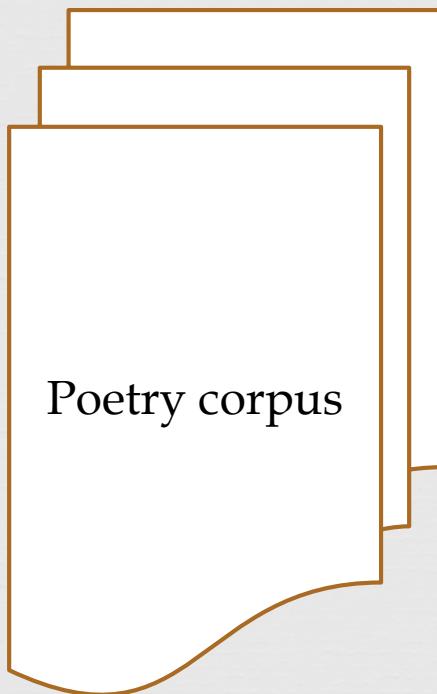


WORTSCHATZ  
UNIVERSITÄT LEIPZIG

(<http://corpora.uni-leipzig.de>)

Keyword 1  
Keyword 2  
Keyword 3  
Keyword 4  
Keyword 5  
Keyword 6  
Keyword 7  
.....

# Poetic words



*Term frequency*

Bayang (*shadow*)  
Mimpi (*dream*)  
...  
Menghilang (*disappear*)  
Melayang (*float*)  
...  
Pahit (*bitter*)  
Sepi (*lonely*)

# Language Resources



## Template

**TEMPLATE : SYLLABLE COUNT, SLOT COUNT**

**<nn> dan <nn> bisa dibawa <vbi> : 6, 3**

**<pr> <vbi> <pr> <vbi> : 0, 4**

## Keyword

**WORD: POS, PRONOUNCE, SYLL.COUNT, FLAG**

**senja: nn, [s, eu, n, j, aa], 2, keyword**

## Poetic word

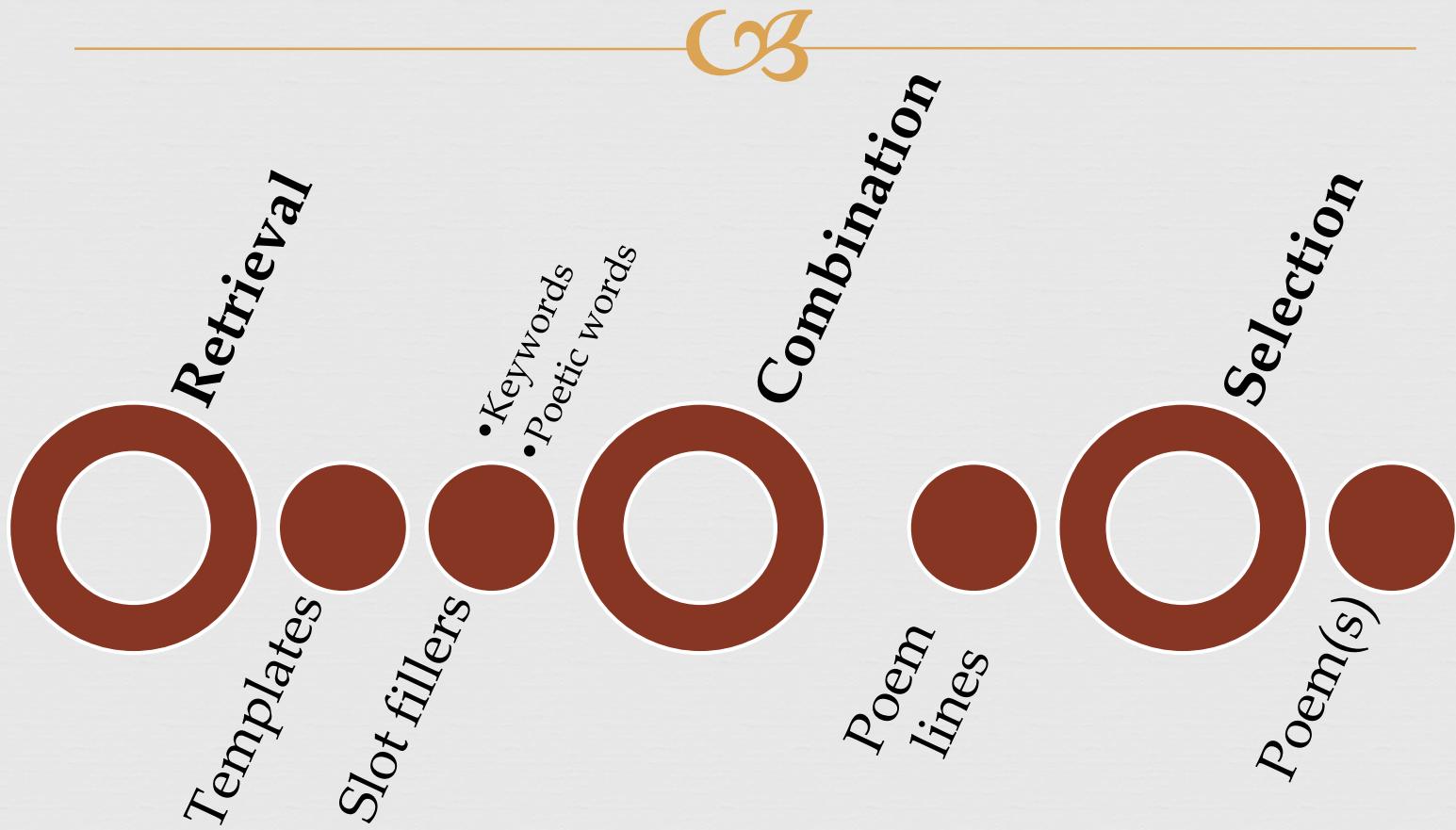
**WORD: POS, PRONOUNCE, SYLL.COUNT, FLAG**

**kalbu: nn, [k, aa, l, b, oo], 2, filler**

# Constraint Satisfaction Poetry Generation



# Overview



Adapting approach of Colton et al.(2012)

# Retrieval

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## Template

- <NN> dan <NN> bisa dibawa <VBI>: 6, 3
- <PR> <VBI> <PR> <VBI>: 0, 4

## Keywords

- sapi : nn, [s, aa, p, ee], 2
- korupsi : nn, [k, oh, r, oo, p, s, ee], 3
- menyogok : vbi, [m, eu, ny, oh, g, oh, k], 3

## Poetic words

- aku : pr, [aa, k, oo], 2
- kau : pr, [k, aa, oo], 2
- kalbu : nn, [k, aa, l, b, oo], 2
- pergi : vbi, [p, eu, r, g, ee], 2
- kembali : vbi, [k, eu, m, b, aa, l, ee], 3

# Combination



buku

*book*

/NN

<PR> mencintai <PR>

*love*

aku

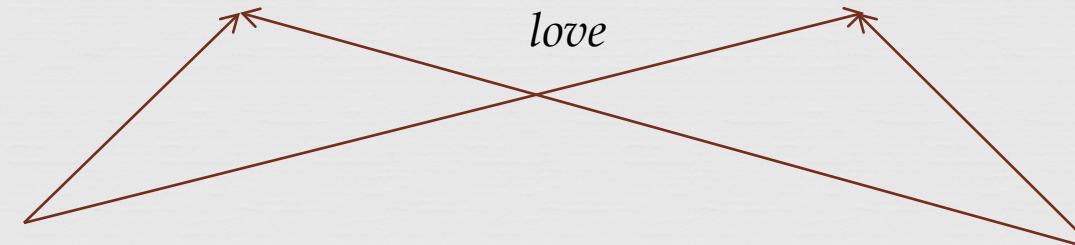
*I*

/PR

kamu

*you*

/PR



# Selection

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Previously generated sentences are collated into stanzas through a constraint logic programming approach (cf. Toivanen et al. 2013).

Constraints that will be used include:

- ❖ **Number of lines**
- ❖ **Rhyme**
- ❖ **Number of words**
- ❖ **Number of syllables**
- ❖ **The number of keywords relative to the number of slots**

# Selection

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Sample form:

- ❖ consists of 2 lines,
- ❖ where line 1 and 2 have the same rhyme,
- ❖ line 1 consists of 6 words with a total of 12 syllables,
- ❖ line 2 consists of 4 words with a total of 10 syllables, and
- ❖ 40% keywords used in all slot respectively.

```
poem([A, B]) :-  
    sentence(A, 12, KA, SA),  
    length(A, 6),  
    lastElem(A, LastA),  
  
    sentence(B, 10, KB, SB),  
    length(B, 4),  
    lastElem(B, LastB),  
  
    rhyme(LastA, LastB),  
    KTotal is KA + KB,  
    STotal is SA + SB,  
    KTotal * 100 / STotal >= 40.
```

(Assumption: 1 sentence per line.)

# Experiments & Evaluation



# Scenario 1: Turing test

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- ❧ 6 alternative structures
- ❧ Poetic slot fillers
- ❧ 4 poem snippets from human poets
- ❧ 4 poem snippets with all constraints applied
- ❧ 4 poem snippets with “loose” constraints (Selection not applied: no poetic features, e.g. syllable counts, rhymes).
- ❧ 180 respondents asked to guess: Man or Machine?

# Turing test sample poems



**Human authored (*Hilang* (Lost), by Sutardji Calzoum Bachri)**

batu kehilangan diam  
jam kehilangan waktu  
pisau kehilangan tikam  
mulut kehilangan lagu

*A stone loses silence  
A clock loses time  
A knife loses stab  
A mouth loses song*

**Full constraint**

tak ada lagi pilu dan rindu  
dari rindu ke mentari  
ada yang terdiam  
ada yang menunggu

*no more pain and yearning  
from yearning to the sun  
some lay silent  
some lay in waiting*

**Loose constraint**

cinta kau adalah sakit untuk kau  
aku melayang, aku melayang  
cinta kau adalah sakit untuk kau

*your love is pain for you  
I fly, I fly  
your love is pain for you*

# Turing Test Result



		Actual class		
		Loose Constraint	Full Constraint	Human
Guessed class	Human	35%	57%	74%
	Machine	65%	43%	26%

# Scenario 2: Detailed Analysis

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- ❖ 6 alternative structures
- ❖ 3 reference news articles
- ❖ 3 configurations:
  - ❖ 50% keywords - full constraint
  - ❖ 100% keywords - full constraint
  - ❖ Loose constraint
- ❖ Questionnaire on 4-point Likert scale (Strongly agree, Agree, Disagree, Strongly disagree)

# Ferguson Putuskan Pensiun sejak Natal

Penulis: Lariza Oky Adisty | Senin, 13 Mei 2013 | 05:25 WIB

Dibaca: 9228 Komentar: 2

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AFP/ANDREW YATES

Manajer Manchester United, Sir Alex Ferguson, berpose dengan trofi Premier League usai timnya mengalahkan Swansea City 2-1 di Stadion Old Trafford, Minggu (12/5/2013). Ini merupakan pertandingan terakhir Ferguson bersama MU di Old Trafford.

## MANCHESTER, KOMPAS.com —

Keputusan pelatih Manchester United, Sir Alex Ferguson, untuk pensiun sudah diambil sejak Natal tahun 2012. Dukacita sang istri akibat ditinggal saudara perempuannya menjadi salah satu alasan Fergie membuat keputusan tersebut.

Keputusan pelatih yang akrab disapa Fergie itu memang sangat mengejutkan banyak pihak. Namun, itu sudah ia pikirkan secara matang, cuma ia menyembunyikan rencananya tersebut dengan rapat.

"Saya sudah memutuskan pensiun sejak Natal. Semua hal berubah saat saudara perempuan Cathy, istri saya, meninggal. Cathy kehilangan sahabatnya dan saya ingin memberi waktu lebih banyak untuknya. Saya juga ingin berhenti dengan menjadi pemenang liga," jelas Ferguson pada BBC Sport.

Fergie pun mengungkapkan sulitnya menyimpan hal ini dari semua pihak, bahkan kepada anak-anaknya yang baru diberi tahu tiga bulan setelah ia membuat keputusan tersebut. "Sulit

## TERKAIT

- [Ferguson: Agak Frustrasi, Rooney Minta Dijual](#)
- [Fergie: Kini Saya Tak Lagi Menderita bersama MU](#)
- [Ferdinand: Ferguson Layak Dapatkan Kemenangan Ini](#)
- [Kado Spesial Ferdinand untuk Fergie di "Teater Mimpi"](#)

## Example reference news article

<http://bola.kompas.com/read/2013/05/13/05253483/Ferguson.Putuskan.Pensiun.sejak.Natal>

# Example poem



fergie pergi  
ferguson pensiun, ferguson berhenti  
adakah masa padaku atau juri  
fergie berhenti

fergie pensiun sendirian  
dengan penuh merah dalam perjuangan  
tak ada lagi akrab dan perjalanan  
fergie pensiun sendirian  
dengan penuh biru dalam kesedihan  
tak ada lagi akrab dan pertandingan

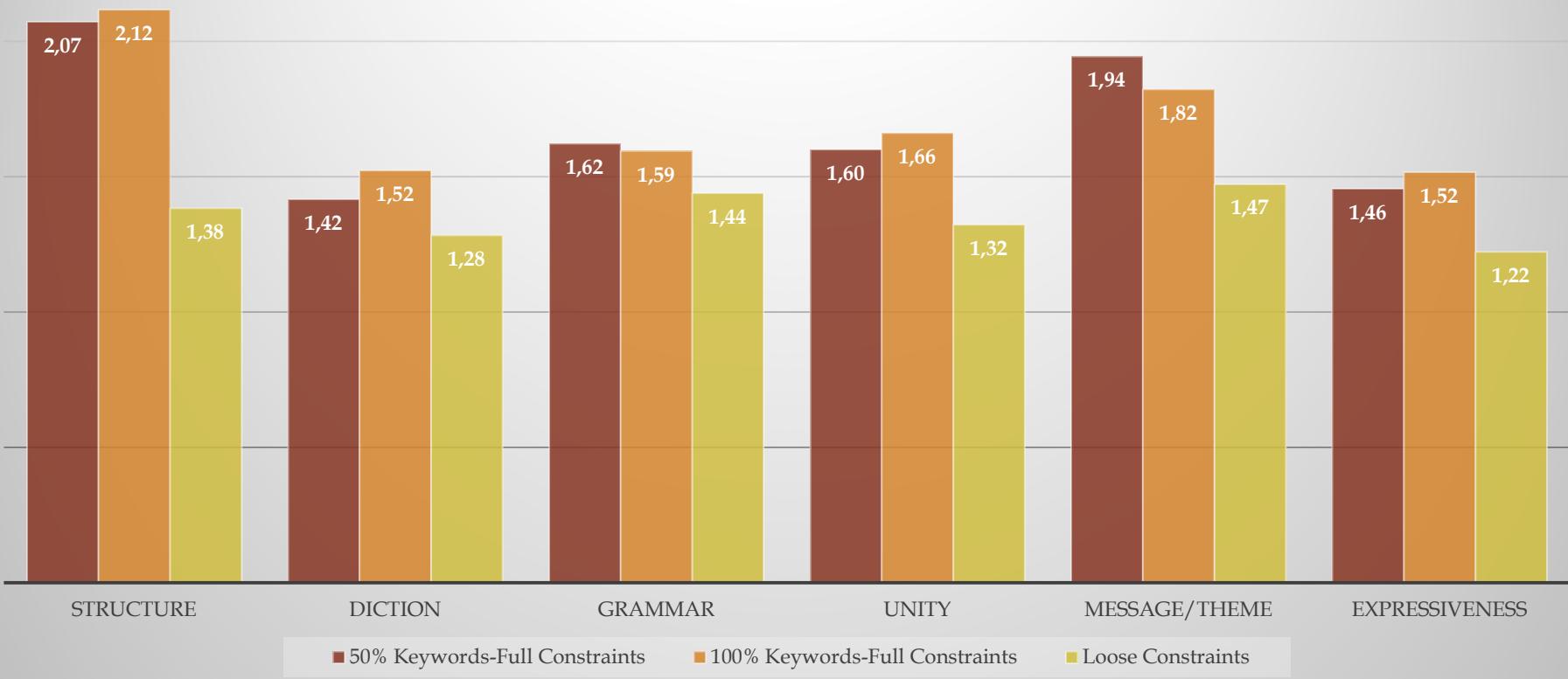
ferguson, ini hanyalah kompetisi  
usia dan keputusan bisa dibawa pensiun  
fergie, ini hanyalah tradisi  
emain dan manajemen bisa dibawa pensiun

*fergie is gone  
ferguson retired, ferguson stopped  
is there time with me or jury  
fergie stopped*

*fergie retired alone  
with full red in struggle  
no more friendship and trips  
fergie retired alone  
with full blue in sadness  
no more friendship and matches*

*ferguson, this is just a competition  
age and decisions can be brought in retirement  
fergie, this is just a tradition  
players and management can be brought in retirement*

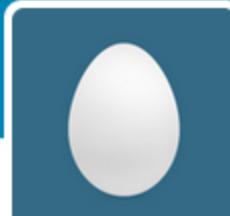
# Experiment Results



*Pemuisi*  
Up-to-date Poem Feed



Profile summary X



TWEETS 2 FOLLOWING 3 FOLLOWERS 3 Following

**Pemuisi**  
@Pemuisi FOLLOWS YOU

  Followed by Fam Rashel P Scala and Andry Luthfi.

 **Pemuisi** @Pemuisi - Feb 20  
Puisi terinspirasi: Dugaan korupsi Rp77 miliar dana pendidikan NTT mulai terkuak [bit.ly/1gJhmtj](http://bit.ly/1gJhmtj)  
[Details](#)

 **Pemuisi** @Pemuisi - Nov 6  
PT Liga Rampungkan Hadiah Juara [bit.ly/19BBM4H](http://bit.ly/19BBM4H)  
[Details](#)

[Go to full profile](#)

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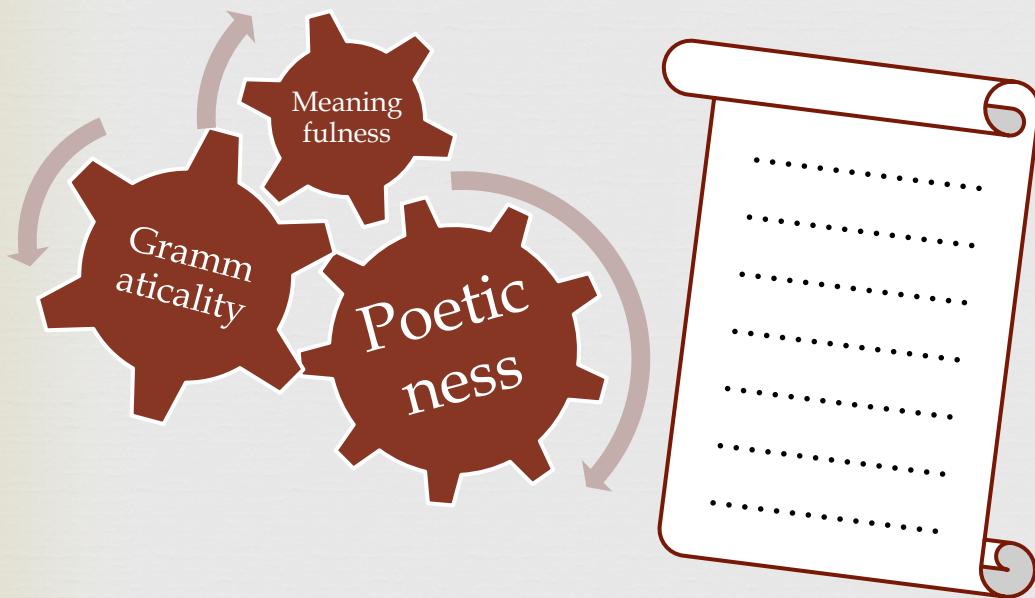
Web app: <http://budaya.cs.ui.ac.id/pemuisi>  
Twitterbot! @pemuisi (in development)

# Summary



# Summary

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- Knowledge-poor system (lack of Indonesian resources)
- Topical poetry generator
- Evaluation indicates that people can detect the effects of applying constraints (or not).
- Next up: faithfulness (predicate argument structure) and deep syntactic generation (grammar-based)



Don't make me cry you  
stupid language  
generator !!

<http://dfki.de/service/NLG>

Thank you for your attention!