

# MT Extravaganza

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Ling 567

March 7, 2012

# Overview

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- Background
- Overview results
- Interactive exploration
- Course evals

# Languages

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| iso | Language name          | Language family | Grammar authors     |
|-----|------------------------|-----------------|---------------------|
| eng | English                | Indo-European   |                     |
| hbs | Bosnian-Serbo-Croatian |                 |                     |
|     | macro language         | Indo-European   | Pozen & Huynh       |
| inh | Ingush                 | North Caucasian | Schneider & Labarre |
| ita | Italian                | Indo-European   |                     |
| jup | Hup                    | Nadahup         | Bodding-Long        |
| kat | Georgian               | Karvelian       | Smith               |
| sci | Sri Lanka Malay        | Creole          | Tan                 |

# Grammar coverage

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- Basic word order
- Case
- Agreement
- Personal pronouns
- Tense/aspect
- Sentential negation
- Argument optionality
- Matrix yes-no questions
- Coordination
- Modification (adjective, adverb)
- Non-verbal predicates
- Clausal complements
- Information structure

# Set up

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- Transfer-based MT: Grammars parse and generate, mapping surface strings to semantic representations in MRS
- Quasi lexical interlingua (English lemmatas as PRED values)
- ‘semi’ (Semantic Interface) maps variable properties (PNG, TAM, COG-ST, INFO-STR) from grammar internal space to interlingual space. Lossy mapping, provides defaults.
- One ‘accommodation’ transfer grammar per language, instantiating shared transfer rules.

# Two runs

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- First run: Grammars as submitted, with transfer grammars built from acm.tdl files as submitted (ita/ and eng/ versions merged).
- Second run: Various attempts at improvement:
  - transfer rules for all other grammars to take inh forms as input
  - inh: removed various rules to try to make generation faster
  - eng/ita: added trigger rules (oops)
  - eng: fixed CASE bug on clausal-complement-verb

# Input sentences

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- |     |                                             |     |                                       |
|-----|---------------------------------------------|-----|---------------------------------------|
| 1.  | Dogs sleep                                  | 12. | Dogs chase cars and cats chase dogs   |
| 2.  | Dogs chase cars                             | 13. | Cats chase dogs and sleep             |
| 3.  | I chase you                                 | 14. | Do cats chase dogs?                   |
| 4.  | These dogs sleep                            | 15. | Hungry dogs eat                       |
| 5.  | Dogs eat                                    | 16. | Dogs eat quickly                      |
| 6.  | I can eat glass                             | 17. | The dogs are hungry                   |
| 7.  | It doesn't hurt me                          | 18. | The dogs are in the park              |
| 8.  | The dogs chase cars                         | 19. | The dogs are the cats                 |
| 9.  | I think that you know that dogs chase cars  | 20. | <del>The dogs-FP chase the cats</del> |
| 10. | I ask whether you know that dogs chase cars | 21. | <del>The dogs chase-FP the cats</del> |
| 11. | Cats and dogs chase cars                    | 22. | <del>The dogs chase the cats-FP</del> |

| Items with end to end success (run 1) |     |     |     |     |     |     |     |
|---------------------------------------|-----|-----|-----|-----|-----|-----|-----|
|                                       | eng | ita | hbs | inh | jup | kat | sci |
| eng                                   | —   | 14  | 16  | 8   | 14  | 15  | 14  |
| ita                                   | 10  | —   | 13  | 7   | 13  | 11  | 9   |
| hbs                                   | 8   | 13  | —   | 7   | 1   | 16  | 13  |
| inh                                   | 6   | 9   | 8   | —   | 1   | 8   | 8   |
| jup                                   | 11  | 11  | 12  | 4   | —   | 11  | 10  |
| kat                                   | 8   | 12  | 15  | 7   | 13  | —   | 12  |
| sci                                   | 3   | 12  | 14  | 4   | 11  | 11  | —   |

| Items with end to end success (run 2) |     |     |     |     |     |     |     |
|---------------------------------------|-----|-----|-----|-----|-----|-----|-----|
|                                       | eng | ita | hbs | inh | jup | kat | sci |
| eng                                   | —   | 14  | 16  | 13  | 14  | 15  | 14  |
| ita                                   | 14  | —   | 13  | 8   | 12  | 11  | 9   |
| hbs                                   | 16  | 13  | —   | 12  | 1   | 16  | 13  |
| inh                                   | 12  | 9   | 11  | —   | 1   | 12  | 12  |
| jup                                   | 10  | 11  | 12  | 10  | —   | 11  | 10  |
| kat                                   | 14  | 12  | 15  | 11  | 13  | —   | 12  |
| sci                                   | 11  | 12  | 14  | 7   | 11  | 11  | —   |

| Items with exact match output (run 1) |     |     |     |     |     |     |     |
|---------------------------------------|-----|-----|-----|-----|-----|-----|-----|
|                                       | eng | ita | hbs | inh | jup | kat | sci |
| eng                                   | —   | 11  | 2   | 5   | 8   | 7   | 7   |
| ita                                   | 4   | —   | 2   | 3   | 6   | 6   | 5   |
| hbs                                   | 6   | 7   | —   | 3   | 0   | 6   | 6   |
| inh                                   | 1   | 3   | 2   | —   | 0   | 1   | 2   |
| jup                                   | 6   | 3   | 2   | 2   | —   | 4   | 6   |
| kat                                   | 5   | 7   | 1   | 2   | 6   | —   | 6   |
| sci                                   | 1   | 2   | 1   | 0   | 6   | 3   | —   |

| Items with exact match output (run 2) |     |     |     |     |     |     |     |
|---------------------------------------|-----|-----|-----|-----|-----|-----|-----|
|                                       | eng | ita | hbs | inh | jup | kat | sci |
| eng                                   | —   | 11  | 2   | 5   | 8   | 7   | 7   |
| ita                                   | 9   | —   | 2   | 3   | 5   | 6   | 5   |
| hbs                                   | 10  | 7   | —   | 3   | 0   | 6   | 6   |
| inh                                   | 7   | 3   | 2   | —   | 0   | 3   | 5   |
| jup                                   | 10  | 3   | 2   | 6   | —   | 4   | 6   |
| kat                                   | 9   | 7   | 1   | 2   | 6   | —   | 6   |
| sci                                   | 5   | 2   | 1   | 1   | 6   | 3   | —   |

| Average number of outputs per item, if any (run 1) |       |       |       |      |       |       |       |
|----------------------------------------------------|-------|-------|-------|------|-------|-------|-------|
|                                                    | eng   | ita   | hbs   | inh  | jup   | kat   | sci   |
| eng                                                | —     | 4.14  | 32.31 | 4.25 | 9.71  | 7.87  | 16.36 |
| ita                                                | 27.1  | —     | 10.54 | 3.71 | 10.23 | 7.45  | 5.78  |
| hbs                                                | 30.38 | 42.38 | —     | 5.86 | 10.0  | 12.63 | 13.69 |
| inh                                                | 39.67 | 13.22 | 31.25 | —    | 10.0  | 16.75 | 11.25 |
| jup                                                | 29.09 | 52.45 | 15.17 | 3.25 | —     | 6.36  | 18.6  |
| kat                                                | 39.63 | 13.58 | 36.47 | 4.14 | 9.77  | —     | 8.83  |
| sci                                                | 26.67 | 75.08 | 83.21 | 82.0 | 9.64  | 14.36 | —     |

| Average number of outputs per item, if any (run 2) |       |       |       |       |       |       |       |
|----------------------------------------------------|-------|-------|-------|-------|-------|-------|-------|
|                                                    | eng   | ita   | hbs   | inh   | jup   | kat   | sci   |
| eng                                                | —     | 4.14  | 32.31 | 11.54 | 9.71  | 7.87  | 16.36 |
| ita                                                | 7.5   | —     | 10.54 | 5.25  | 10.92 | 7.45  | 5.78  |
| hbs                                                | 35.63 | 42.38 | —     | 13.08 | 10.0  | 12.63 | 13.69 |
| inh                                                | 12.75 | 13.22 | 24.91 | —     | 10.0  | 16.33 | 20.5  |
| jup                                                | 3.2   | 87.36 | 15.17 | 21.4  | —     | 6.36  | 18.6  |
| kat                                                | 6.57  | 13.58 | 36.47 | 6.64  | 9.77  | —     | 8.83  |
| sci                                                | 16.82 | 75.08 | 83.21 | 56.29 | 9.64  | 14.36 | —     |

| Max number of outputs per item (run 1) |     |     |     |     |     |     |     |
|----------------------------------------|-----|-----|-----|-----|-----|-----|-----|
|                                        | eng | ita | hbs | inh | jup | kat | sci |
| eng                                    | —   | 30  | 178 | 8   | 72  | 36  | 72  |
| ita                                    | 64  | —   | 72  | 8   | 72  | 36  | 16  |
| hbs                                    | 64  | 198 | —   | 16  | 10  | 108 | 72  |
| inh                                    | 64  | 42  | 118 | —   | 10  | 36  | 48  |
| jup                                    | 96  | 216 | 92  | 4   | —   | 14  | 100 |
| kat                                    | 64  | 54  | 192 | 8   | 72  | —   | 40  |
| sci                                    | 32  | 252 | 855 | 224 | 72  | 48  | —   |

| Max number of outputs per item (run 2) |     |     |     |     |     |     |     |
|----------------------------------------|-----|-----|-----|-----|-----|-----|-----|
|                                        | eng | ita | hbs | inh | jup | kat | sci |
| eng                                    | —   | 30  | 178 | 72  | 72  | 36  | 72  |
| ita                                    | 26  | —   | 72  | 16  | 72  | 36  | 16  |
| hbs                                    | 256 | 198 | —   | 72  | 10  | 108 | 72  |
| inh                                    | 48  | 42  | 118 | —   | 10  | 42  | 144 |
| jup                                    | 12  | 600 | 92  | 180 | —   | 14  | 100 |
| kat                                    | 16  | 54  | 192 | 16  | 72  | —   | 40  |
| sci                                    | 72  | 252 | 855 | 224 | 72  | 48  | —   |

| Successful source languages per item (run 1) |   |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |
|----------------------------------------------|---|---|---|---|---|---|---|---|---|----|----|----|----|----|----|----|----|----|----|
|                                              | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 |
| eng                                          | 5 | 3 | 5 | 4 | 6 | 3 | 3 | 3 | 0 | 0  | 0  | 0  | 0  | 3  | 2  | 4  | 3  | 2  | 0  |
| ita                                          | 5 | 6 | 6 | 4 | 6 | 5 | 5 | 6 | 4 | 2  | 4  | 3  | 2  | 6  | 6  | 0  | 0  | 0  | 1  |
| hbs                                          | 5 | 6 | 6 | 5 | 5 | 5 | 5 | 6 | 1 | 1  | 4  | 3  | 4  | 5  | 5  | 4  | 2  | 4  | 2  |
| inh                                          | 5 | 6 | 5 | 3 | 5 | 1 | 0 | 5 | 0 | 0  | 0  | 1  | 0  | 3  | 0  | 0  | 1  | 0  | 2  |
| jup                                          | 3 | 4 | 4 | 3 | 4 | 0 | 4 | 4 | 0 | 1  | 4  | 3  | 2  | 4  | 4  | 3  | 3  | 0  | 3  |
| kat                                          | 5 | 6 | 6 | 6 | 5 | 0 | 4 | 6 | 0 | 0  | 4  | 3  | 2  | 6  | 5  | 4  | 4  | 2  | 4  |
| sci                                          | 6 | 6 | 4 | 4 | 5 | 3 | 2 | 6 | 0 | 0  | 4  | 5  | 2  | 6  | 5  | 4  | 0  | 0  | 4  |

| Successful target languages per item (run 1) |   |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |
|----------------------------------------------|---|---|---|---|---|---|---|---|---|----|----|----|----|----|----|----|----|----|----|
|                                              | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 |
| eng                                          | 6 | 6 | 6 | 6 | 6 | 3 | 5 | 6 | 1 | 1  | 5  | 5  | 0  | 6  | 5  | 4  | 3  | 2  | 5  |
| ita                                          | 6 | 6 | 5 | 6 | 6 | 2 | 3 | 6 | 0 | 1  | 4  | 4  | 3  | 6  | 5  | 0  | 0  | 0  | 0  |
| hbs                                          | 5 | 4 | 4 | 1 | 5 | 3 | 4 | 4 | 1 | 0  | 3  | 4  | 3  | 3  | 3  | 3  | 4  | 2  | 2  |
| inh                                          | 5 | 4 | 5 | 5 | 2 | 0 | 0 | 4 | 0 | 0  | 0  | 1  | 1  | 3  | 1  | 2  | 3  | 1  | 3  |
| jup                                          | 6 | 6 | 5 | 6 | 5 | 5 | 3 | 5 | 1 | 0  | 0  | 0  | 0  | 5  | 5  | 4  | 3  | 0  | 0  |
| kat                                          | 6 | 6 | 6 | 0 | 6 | 2 | 4 | 6 | 0 | 0  | 4  | 4  | 4  | 6  | 4  | 3  | 0  | 2  | 4  |
| sci                                          | 0 | 5 | 5 | 5 | 6 | 2 | 4 | 5 | 2 | 2  | 4  | 0  | 1  | 4  | 4  | 3  | 0  | 1  | 2  |

| Successful source languages per item (run 2) |   |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |
|----------------------------------------------|---|---|---|---|---|---|---|---|---|----|----|----|----|----|----|----|----|----|----|
|                                              | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 |
| eng                                          | 5 | 6 | 6 | 4 | 6 | 4 | 4 | 6 | 1 | 0  | 4  | 3  | 3  | 6  | 6  | 5  | 2  | 2  | 4  |
| ita                                          | 5 | 6 | 6 | 4 | 6 | 5 | 5 | 6 | 4 | 2  | 4  | 3  | 2  | 6  | 6  | 0  | 0  | 0  | 1  |
| hbs                                          | 5 | 6 | 6 | 5 | 6 | 5 | 6 | 5 | 1 | 1  | 4  | 4  | 4  | 6  | 6  | 3  | 3  | 3  | 2  |
| inh                                          | 5 | 6 | 6 | 4 | 6 | 0 | 3 | 6 | 0 | 0  | 0  | 1  | 1  | 6  | 5  | 4  | 3  | 2  | 3  |
| jup                                          | 3 | 4 | 4 | 3 | 3 | 1 | 4 | 3 | 1 | 1  | 4  | 3  | 2  | 4  | 3  | 3  | 3  | 0  | 3  |
| kat                                          | 5 | 6 | 6 | 6 | 6 | 0 | 5 | 6 | 0 | 0  | 4  | 3  | 2  | 6  | 6  | 5  | 4  | 2  | 4  |
| sci                                          | 6 | 6 | 4 | 4 | 6 | 3 | 3 | 6 | 0 | 0  | 4  | 5  | 2  | 6  | 6  | 5  | 0  | 0  | 4  |

| Successful target languages per item (run 2) |   |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |
|----------------------------------------------|---|---|---|---|---|---|---|---|---|----|----|----|----|----|----|----|----|----|----|
|                                              | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 |
| eng                                          | 6 | 6 | 6 | 6 | 6 | 3 | 6 | 6 | 1 | 1  | 5  | 5  | 0  | 6  | 6  | 5  | 4  | 3  | 5  |
| ita                                          | 6 | 6 | 5 | 6 | 5 | 3 | 3 | 5 | 2 | 1  | 5  | 5  | 4  | 6  | 5  | 0  | 0  | 0  | 0  |
| hbs                                          | 5 | 5 | 4 | 1 | 5 | 3 | 5 | 5 | 1 | 0  | 4  | 5  | 5  | 5  | 5  | 4  | 4  | 2  | 3  |
| inh                                          | 5 | 5 | 5 | 5 | 5 | 0 | 4 | 4 | 0 | 0  | 0  | 2  | 1  | 5  | 5  | 3  | 4  | 0  | 4  |
| jup                                          | 6 | 6 | 6 | 6 | 6 | 4 | 3 | 6 | 1 | 0  | 0  | 0  | 0  | 6  | 6  | 5  | 3  | 0  | 0  |
| kat                                          | 6 | 6 | 6 | 0 | 6 | 2 | 5 | 6 | 0 | 0  | 5  | 5  | 5  | 6  | 6  | 5  | 0  | 3  | 5  |
| sci                                          | 0 | 6 | 6 | 6 | 6 | 3 | 4 | 6 | 2 | 2  | 5  | 0  | 1  | 6  | 5  | 3  | 0  | 1  | 4  |

# Input sentences

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- |     |                                             |     |                                       |
|-----|---------------------------------------------|-----|---------------------------------------|
| 1.  | Dogs sleep                                  | 12. | Dogs chase cars and cats chase dogs   |
| 2.  | Dogs chase cars                             | 13. | Cats chase dogs and sleep             |
| 3.  | I chase you                                 | 14. | Do cats chase dogs?                   |
| 4.  | These dogs sleep                            | 15. | Hungry dogs eat                       |
| 5.  | Dogs eat                                    | 16. | Dogs eat quickly                      |
| 6.  | I can eat glass                             | 17. | The dogs are hungry                   |
| 7.  | It doesn't hurt me                          | 18. | The dogs are in the park              |
| 8.  | The dogs chase cars                         | 19. | The dogs are the cats                 |
| 9.  | I think that you know that dogs chase cars  | 20. | <del>The dogs-FP chase the cats</del> |
| 10. | I ask whether you know that dogs chase cars | 21. | <del>The dogs chase-FP the cats</del> |
| 11. | Cats and dogs chase cars                    | 22. | <del>The dogs chase the cats-FP</del> |

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