LKB-FOS Update

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Outline

One LKB-FOS release since last year's summit, on 28 June

- Bug fixes
- Improvements: smoother interface, some core code cleaned and modernised
- New experimental feature: parser local ambiguity packing under generalisation

To-do list

Bug Fixes

Fixed bugs and missing functionality in DELPH-IN YY input mode

- allow a token to have multiple inflections
- apply pre-processor inflections to generic lexical entries
- correctly interpret the inflection 'null'

Students on Ling 567 reported a bug that prevented generation of sentences containing multiple occurrences of semantically empty lexical items

- prompted discussion on DELPH-IN Discourse about breadth-first search and outputting strings from an incomplete generation forest

In [incr tsdb()], attempting to treebank sometimes led to error `The value NIL is not of type NUMBER`

Improvements

Smoother interface

- more consistent and informative diagnostic and progress textual messages; corrected documentation strings for some LKB parameters
- graphical interface a bit more polished
  - faster and artefact-free window display and scrolling
  - able to use mouse to move cursor and select text in dialog boxes
- better support for high DPI displays – add `(setq mcclim-truetype::*dpi* 96)` to your `~/.lkbrc`

Some core code cleaned and modernised, especially in core unification functions, type unification, agenda handling

Examples:

1. agenda implemented as a priority queue
   - algorithm reference books present queue updates as a sequence of element swaps – but can be done better
   - priorities of new elements coerced to single floats $\rightarrow$ much faster type checking and execution of priority comparisons

2. Low-level DAG slot access guarded by a 'generation' counter
   - encourage compiler to emit machine code that checks the counter using branchless conditionals

Code clean-up gives a 10% improvement in parse time

Local Ambiguity Packing

The parser can now pack local ambiguity under feature structure generalisation; enable it with `(setq *generalising-p* t)`

```
procedure dag-subsumes-p(dag1 , dag2) ≡
  (forwardp , backwardp) ←                                  {establish context for non-local exit}
    catch with tag 'fail' dag-subsumes-p0(dag1 , dag2 , true , true);
  invalidate-temporary-pointers();                          {reset temporary 'copy' pointers}
  return (forwardp , backwardp);
end

procedure dag-subsumes-p0(dag1 , dag2 , forwardp , backwardp) ≡
  if (dag1.copy is empty) then dag1.copy ← dag2;            {check reentrancies}
  else if(dag1.copy ≠ dag2) then forwardp ← false; fi
  if (dag2.copy is empty) then dag2.copy ← dag1;
  else if (dag2.copy ≠ dag1) then backwardp ← false; fi
  if (forwardp = false and backwardp = false) then
    throw (false , false) with tag 'fail';                  {reentrancy check failed}
  fi
  if (not supertype-or-equal-p(dag1.type , dag2.type)) then forwardp ← false; fi     {check types}
  if (not supertype-or-equal-p(dag2.type , dag1.type)) then backwardp ← false; fi
  if (forwardp = false and backwardp = false) then
    throw (false , false) with tag 'fail';                  {no subtype relations}
  fi
  for each arc in intersect(dag1.arcs , dag2.arcs) do       {check shared arcs recursively}
    (forwardp , backwardp) ←
      dag-subsumes-p0(destination of arc for dag1 , destination of arc for dag2 , forwardp , backwardp);
  od
  return (forwardp , backwardp);                            {signal result to caller}
end
```

re-entrancies

types

follow arcs

from Oepen & Carroll (2000)

Still experimental; only tested thoroughly on the ERG and partially on the SRG

Practical results

Parsing Rondane with stable 2023 version of ERG, no PoS tagging, computing top-ranked parse, resource limits giving ~25 timeouts

Mac Intel *	*mm:ss*	*Mac M1* †	*mm:ss*
LKB-FOS	10:17	LKB-FOS native	7:26
ACE	13:54		

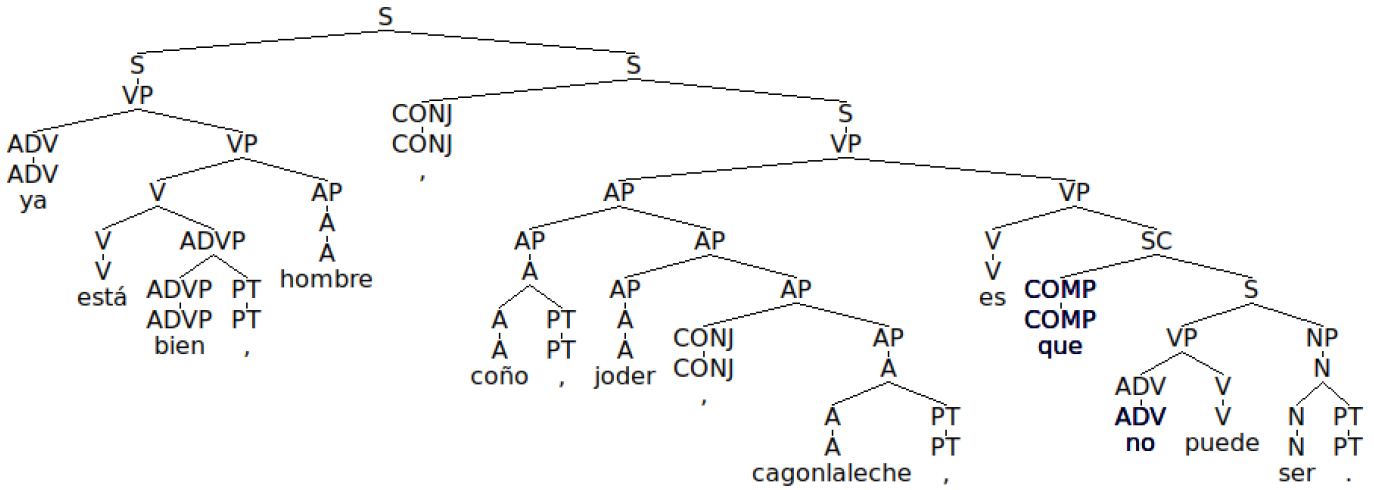
* iMac i7 3.8GHz

† MacBook Pro M1

Parsing with SRG version of February 2024

First 20 items of ‘an12’ test suite parse in 7.7 sec (LKB-FOS), 72 sec (ACE)

On item 21, ACE fails to terminate, even with a timeout; LKB-FOS parses it successfully in 29 sec



Summary

Development has continued over the past year

- bug fixes
- improvements
- new features

Still a long to-do list, including

- change post-generation chart mapping to act on ‘full‘ FS, not ‘edge‘ FS
- remove passive chart parser
- add ‘grandparent’ features in selective unpacking
- unified grammar configuration file format
- part of speech tagger
- Microsoft Windows version