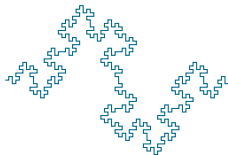


Lisp for the Win

Gábor Melis

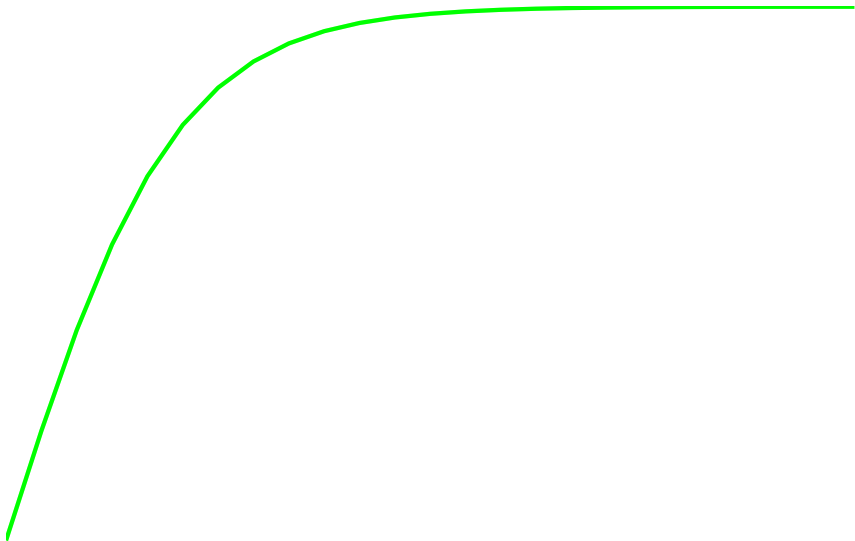
@GaborMelis | <http://quotenil.com> | mega@retes.hu

Franz Inc.

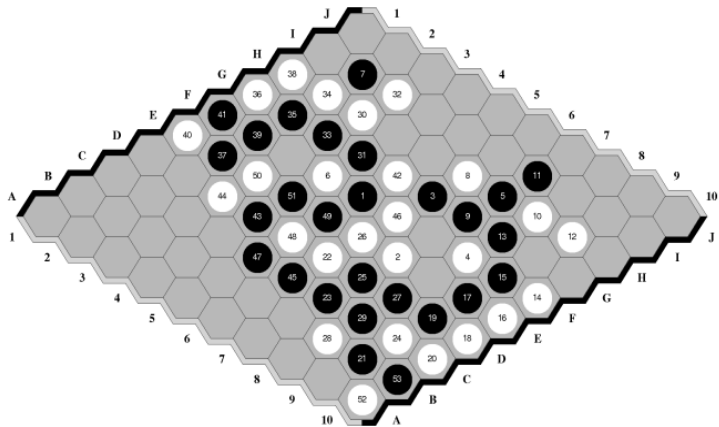


2014 May 6

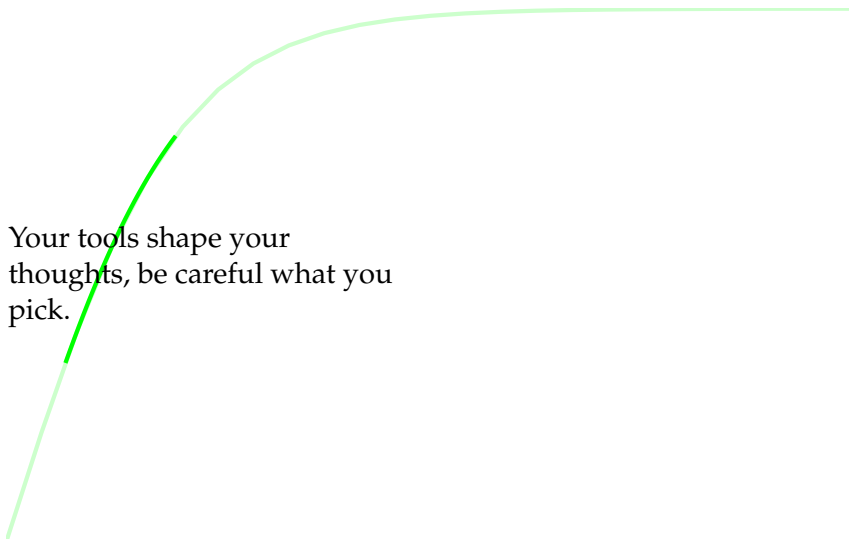
WHAT'S THIS?



SETTING OUT

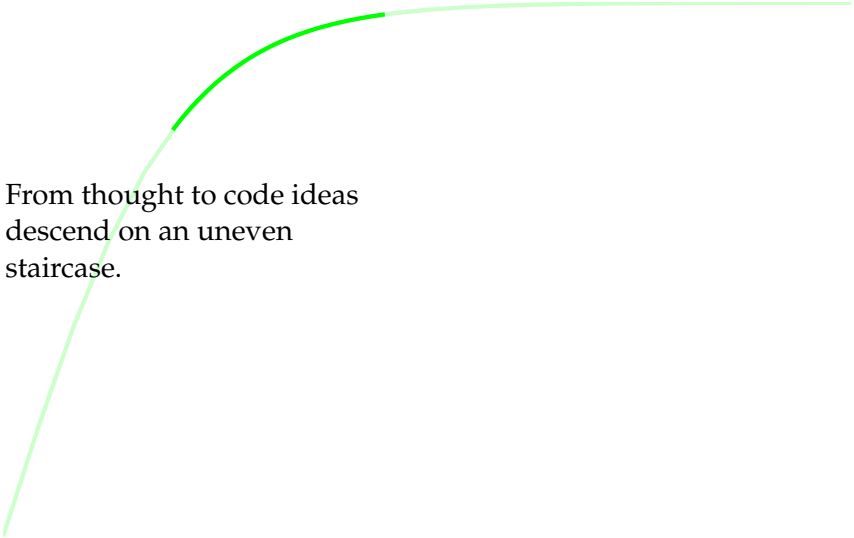


THE QUICK CLIMB



Your tools shape your thoughts, be careful what you pick.

THE SWEET SPOT



From thought to code ideas
descend on an uneven
staircase.

HIGHLANDS

Lisp, the ultimate prototyping language.

```
(defmacro defsection (name docstring)
  `(defun ,name () ,docstring))
```

HIGHLANDS

(defsection @pax-basics

*"Now let's examine the most important pieces in detail. See the DEFSECTION macro, *DISCARD-DOCUMENTATION-P*, and the DOCUMENT function.")*

HIGHLANDS

```
(defsection @pax-basics
  "Now let's examine the most important pieces
  in detail."
  defsection
  *discard-documentation-p*
  document)
```


HIGHLANDS

```
(defsection @pax-basics
  "Now let's examine the most important pieces
  in detail."
  (defsection macro)
  (*discard-documentation-p* variable)
  (document function))
```

HIGHLANDS

The versatile `M-` works in docstrings and code:

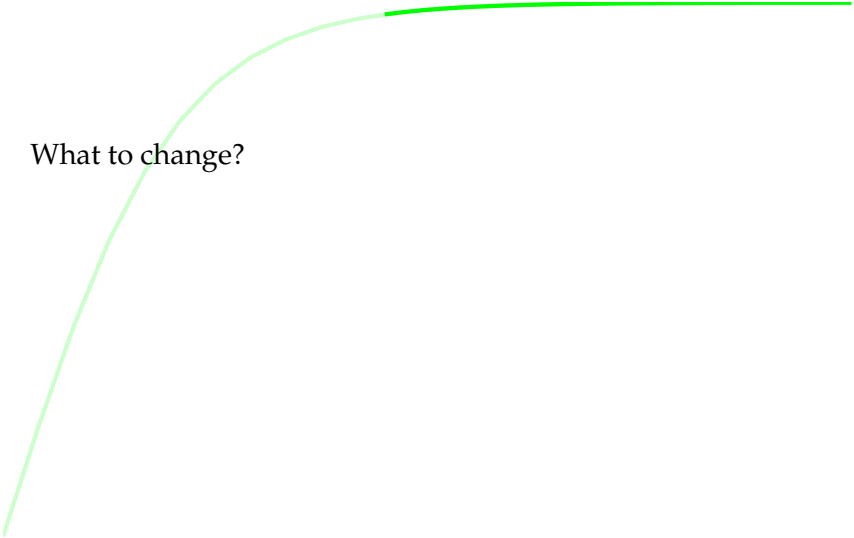
```
"See generic-function FOO."  
"See [FOO][generic-function]."  
(generic-function foo)  
(foo generic-function)  
(foo (method () (t string t)))  
(foo compiler-macro)
```

HIGHLANDS

PAX highlights:

- ▶ DEFSECTION: A place for the narrative
- ▶ DEFSECTION: Export in logical groups
- ▶ Automatic linking and markup of code in generated documentation
- ▶ SLIME's `M-.` goes where the link does
- ▶ Extensible

STUCK ON THE FLAT



What to change?

STUCK ON THE FLAT

What to change?

1. The code (Hex: RL -> electric circuit)

STUCK ON THE FLAT

What to change?

1. The code (Hex: RL -> electric circuit)
2. The tools (Tron: C++ -> Lisp)

STUCK ON THE FLAT



What to change?

1. The code (Hex: RL -> electric circuit)
2. The tools (Tron: C++ -> Lisp)
3. The methodology (Planet Wars: notes, PAX)

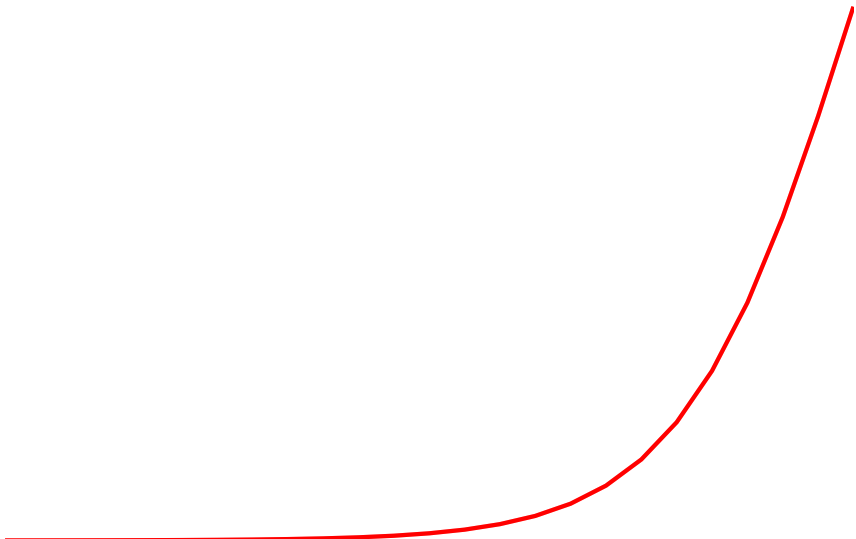
STUCK ON THE FLAT



What to change?

1. The code (Hex: RL -> electric circuit)
2. The tools (Tron: C++ -> Lisp)
3. The methodology (Planet Wars: notes, PAX)
4. You (Sleep, exercise)

WHAT'S THIS?



WHAT'S THIS?



WHAT'S THIS?



A LONG WAY FROM HOME

*Boltzmann
Machines*

SVD

SVM

FOCUS ON THE CARROT

CPU

BLAS

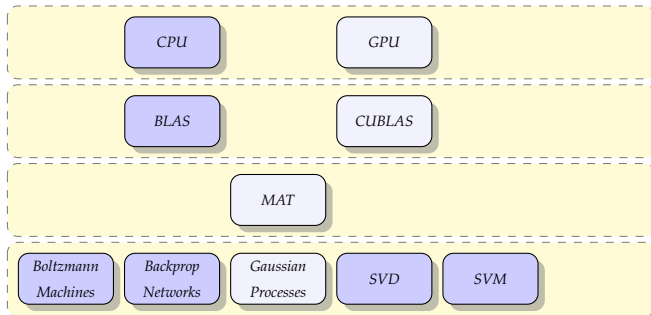
Boltzmann
Machines

Backprop
Networks

SVD

SVM

ARE WE THERE YET?



AH, IT'S THE TRAINING WHEELS

```
(make-mat ' (2 3)
           :initial-contents ' ((1 2 3) (4 5 6)))
```

=>

```
#<MAT 2x3 AB #2A ((1.0d0 2.0d0 3.0d0)
                  (4.0d0 5.0d0 6.0d0))>
```

AH, IT'S THE TRAINING WHEELS

```
(scal! 2 *)
```

```
=>
```

```
#<MAT 2x3 AB #2A ((2.0d0 4.0d0 6.0d0)
                  (8.0d0 10.0d0 12.0d0))>
```


AH, IT'S THE TRAINING WHEELS

```
(with-cuda ()  
  (print (scal! -1 *)))
```

```
#<MAT 2x3 abC #2A((-2.0d0 -4.0d0 -6.0d0)  
                (-8.0d0 -10.0d0 -12.0d0))>
```

```
=>
```

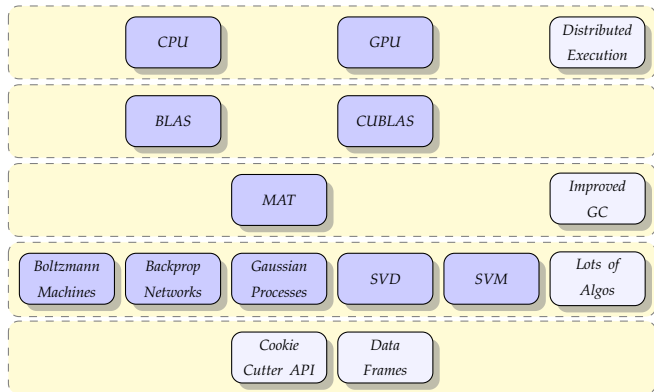
```
#<MAT 2x3 AB #2A((-2.0d0 -4.0d0 -6.0d0)  
                (-8.0d0 -10.0d0 -12.0d0))>
```

AH, IT'S THE TRAINING WHEELS

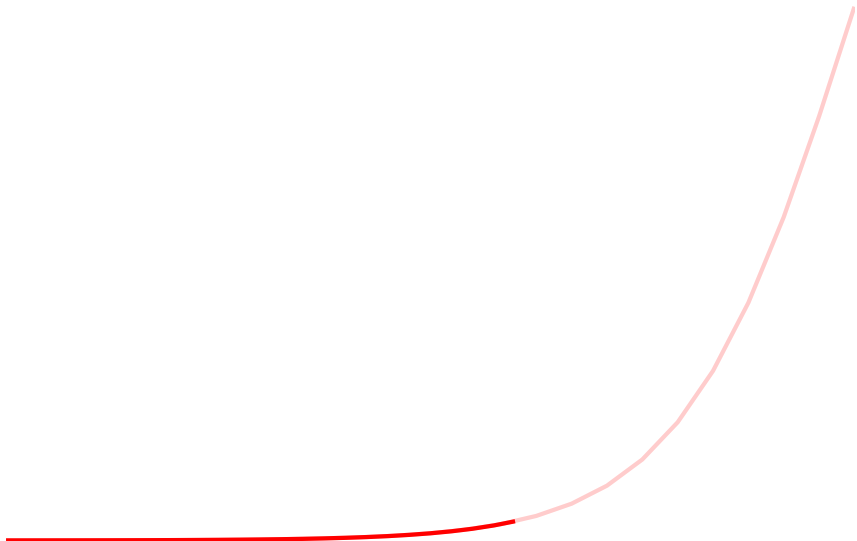
MAT features:

- ▶ API similar to normal lisp arrays
- ▶ Automatic synchronization of lisp, foreign and cuda memory
- ▶ BLAS, CUBLAS, CURAND support
- ▶ Foreign arrays: pinning, static or dynamic allocation
- ▶ Extensible with new facet types
- ▶ Implemented on top of the CUBE library

THE FUTURE OF LISP SCIENTIFIC COMPUTING

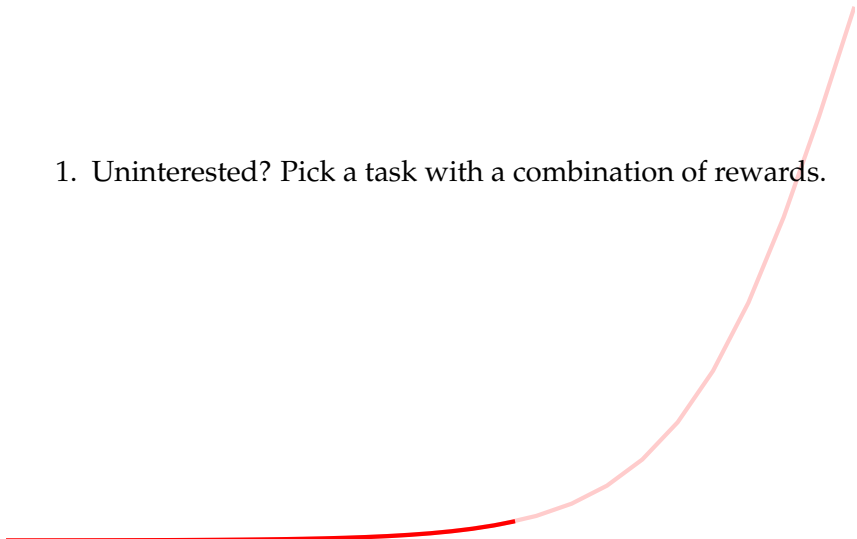


STUCK ON THE FLAT



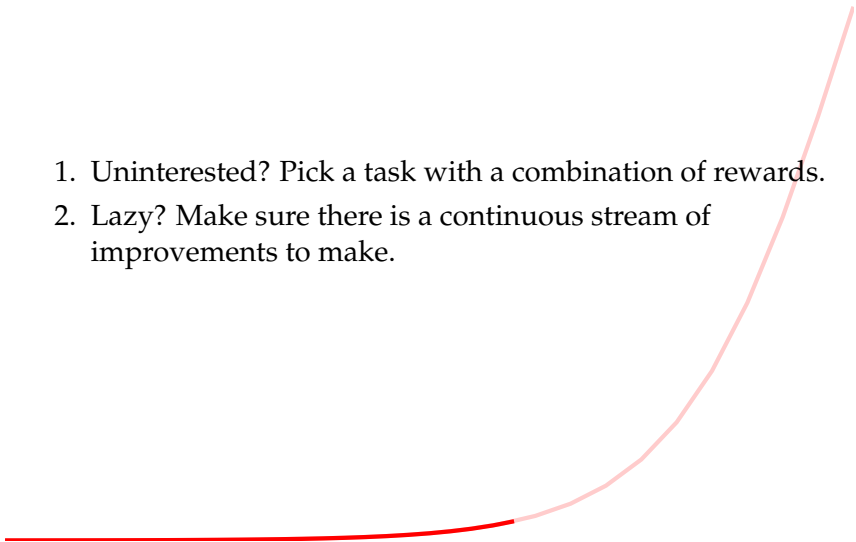
STUCK ON THE FLAT

1. Uninterested? Pick a task with a combination of rewards.



STUCK ON THE FLAT

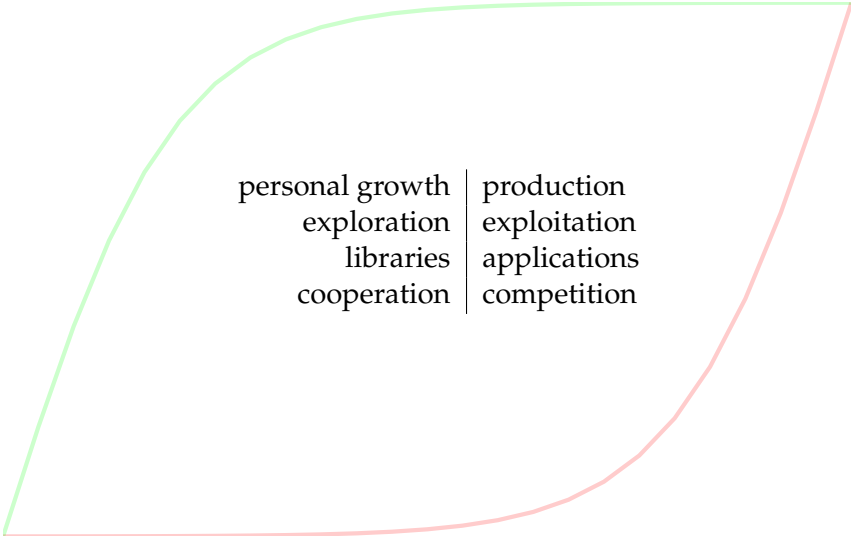
1. Uninterested? Pick a task with a combination of rewards.
2. Lazy? Make sure there is a continuous stream of improvements to make.



STUCK ON THE FLAT

1. Uninterested? Pick a task with a combination of rewards.
2. Lazy? Make sure there is a continuous stream of improvements to make.
3. Too few? Make it easy for users and other developers to join.

WRAPUP



personal growth	production
exploration	exploitation
libraries	applications
cooperation	competition

WRAPUP

<https://github.com/melisgl/mgl-pax>
<https://github.com/melisgl/mgl-mat>