

Aesthetics and Narrative: Programming What Cannot Be Programmed

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I.T.A.K.E.
Unconference

2017

Lambda Calculus

Lisp

Scheme

Clojure

Haskell

λ

REPL

λ

Symbolic Expressions

λ

Composable

$g(f(x))$

λ

Pure

λ

Reason About Code

 **Finance (Quantitative)**

 **Data (Quantitative)**

Quantitative Reasoning

Mathematically Provable

-  Correctness
-  Performance

Cogitating

-  Behavior
- `</>` Improvements

λ

Long History in Abstract Domains

 **Aesthetics**

 **Story**

Art



Process

 **Chaos and Surrender**

 **Decisiveness and Agency**

The Decisive Artist

**Know the Rules Before You Can
Break Them**

The Decisive Programmer
Know the Rules Before You Can
Write Them

We Don't Always Know the Rules

AARON

Development: 1968 - 21st Century

FORTRAN →

C →

Lisp (CLOS)

1983



1992





Composing a Small Number of Primitives

Process

AARON

Consider All Possibilities and Decide

Process

Artist

Manifest Intent and Respond

Intelligence?

Creative?

Autonomy

“ I want to make it clear that in trying to model cognitive behavior in a computer program [...] I was not a cognitive scientist doing research, I was an artist attempting to give form to what my own cognitive experience had told me. ”

Harold Cohen

Autonomy

Harold Cohen

(1 May 1928 – 27 April 2016)

Paintings by AARON

(1968 - ?)

Zork

Development: 1975 - 1982

FORTRAN (*Adventure*) →

MDL (PDP-10) →

ZIL (Z-Machine running *Zork I-III*)

West of House

Score: 0

Moves: 3

Copyright (c) 1981, 1982, 1983 Infocom, Inc. All rights reserved.

ZORK is a registered trademark of Infocom, Inc.

Revision 88 / Serial number 840726

West of House

You are standing in an open field west of a white house, with a boarded front door.

There is a small mailbox here.

>open mailbox

Opening the small mailbox reveals a leaflet.

>take leaflet

Taken.

>read leaflet

"WELCOME TO ZORK!"

ZORK is a game of adventure, danger, and low cunning. In it you will explore some of the most amazing territory ever seen by mortals. No computer should be without one!"

>

1975

Colossal Cave Adventure

Verb-Noun Commands

go west

1977

Zork

Prepositions and Conjunctions

Direct and Indirect Objects

fill the bottle with water

ZIL

```
<OBJECT LANTERN
  (LOC LIVING-ROOM)
  (SYNONYM LAMP LANTERN LIGHT)
  (ADJECTIVE BRASS)
  (DESC "brass lantern")
  (FLAGS TAKEBIT LIGHTBIT)
  (ACTION LANTERN-F)
  (FDESC "A battery-powered lantern is on the
         trophy case.")
  (LDESC "There is a brass lantern
         (battery-powered) here.")
  (SIZE 15)>
```



Parsing and Language

Small Number of Primitives

Autonomy

Narrative Guide

Natural Language

Making a Movie

Film Script:

A Technical Document

- Clarity and precision for interpretation:
 - Production breakdowns
 - Camera shooting scripts
 - Direction for actors and directors
 - Basis for novelizations

Autonomy

script ≠ film

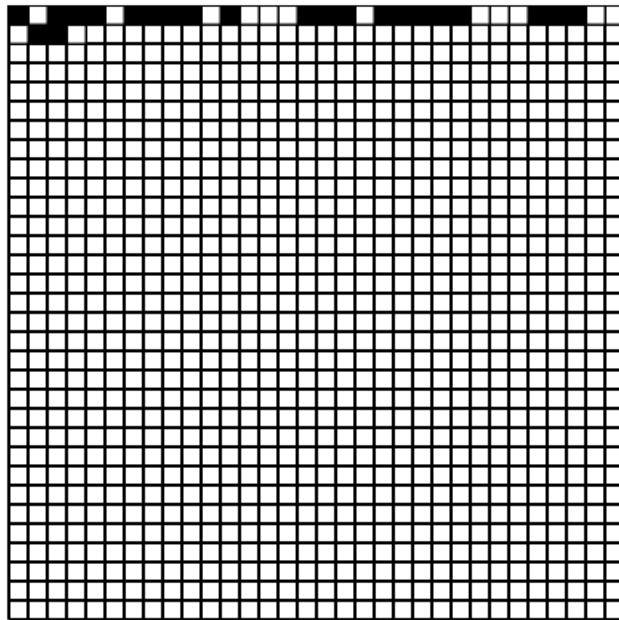
code ≠ execution

Quantitative Acts of Creativity

Every Icon (1997-present)

John F. Simon, Jr.

Every Icon



Given:

An icon described by a 32 X 32 grid.

Allowed:

Any element of the grid to be colored black or white.

Shown:

Every icon.

Owner:

John F Simon Jr

Edition Number:

Artist's Proof

Starting Date:

January 14, 1997, 9:00:00 pm

Super Mario Bros. (1985)

Shigeru Miyamoto



Qualitative Reasoning

? Unknown Quantities

💡 Exploration of the *Idea*

Borderless



Kinect



Overtone

Abstract Domain



Transducers

→ **Input**

- personEntered
- personUpdated
- personWillLeave

→ **Input**

- 0: pid;
- 1: oid;
- 2: age;
- 3: centroid.x;
- 4: centroid.y;
- 5: velocity.x;
- 6: velocity.y;
- 7: depth;
- 8: boundingRect.x;

→ **Input**

- 9: boundingRect.y;
- 10: boundingRect.width;
- 11: boundingRect.height;
- 12: highest.x
- 13: highest.y
- 14: haarRect.x;
- 15: haarRect.y;
- 16: haarRect.width;

Output →

- vca (loudness)
- reverb (timbre)
- vco (pitch)
- attack (timbre)
- sustain (timbre)
- release (timbre)
- gate (loudness)
- silence (loudness)

A/V Flow

→

Input: Kinect Vision

Δ

Internally: Clojure: Operate on Primitives

→

Output: Overtone Sound

Δ Operations

`osc/person-enter` ∈

`@person-sound{id-1 "vowel-1" id-2 "vowel-2" ...}`

`(osc/person-updated '(id age))`

∃ `@person-sound{id ...}`

× `(vowel (map #(* age %) [amp verb osc]))`

Complexity

```
(definst drone-ae-sus
  "I make the 'ae' vowel sound at a given frequency.
  I start/stop with the gate set to 1 or 0."
  [freq    100
   gate    (synth-defaults ::gate)
   amp     (synth-defaults ::vca)
   verb    (synth-defaults ::reverb)
   kr-mul  (synth-defaults ::vco)]

  (let [kr-mul      (:value kr-mul)
        eq-freq    [270 2290 3010]
        hpf-rlpf   [600 8000 0.6]
        q          0.1
        synth-unit (synth-unit-layered freq
                                         eq-freq q kr-mul)]

    (synth-filter-chain synth-unit amp verb gate hpf-rlpf))
```

Art

Qualitative Reasoning

- Know the rules before you can break them

Art

Qualitative Reasoning

- Know the rules before you can break them
- Constraints breed creativity

clojure.spec

**Integrated System For
Specification and Testing**

spec

Aesthetic Constraints

```
(s/def ::vca (s/and number?  
                #((control-range 0.4 1) %)))
```

```
(s/def ::reverb (s/and integer?  
                #((control-range 0 1000) %)))
```

```
(s/def ::vco (s/and integer?  
                #((control-range 0 25) %)))
```

Autonomy

~~testable~~ experiment-able with `spec`

Autonomy

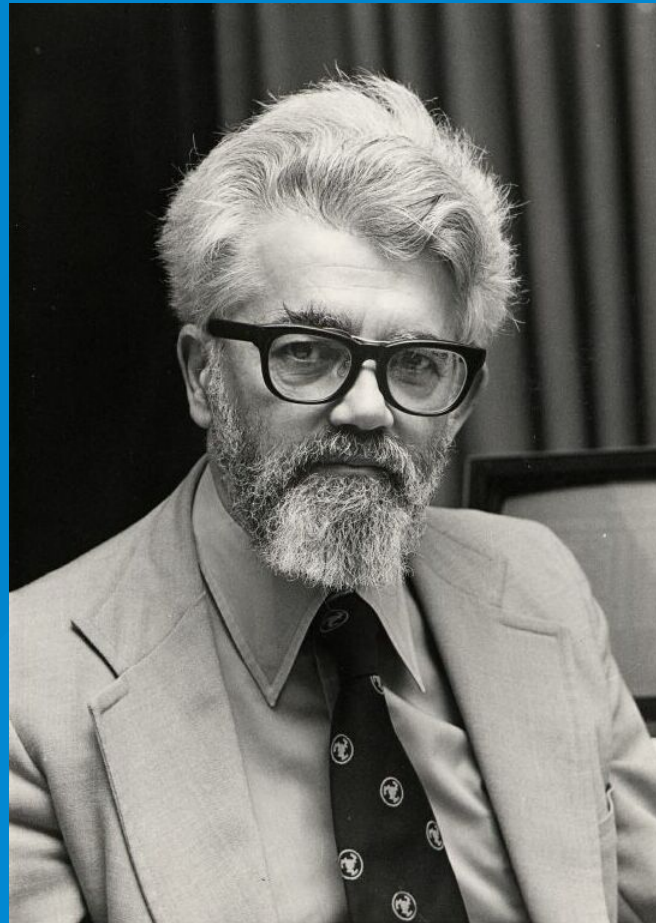
Unexpected Paths

Unexpected Results

Expressive Tool

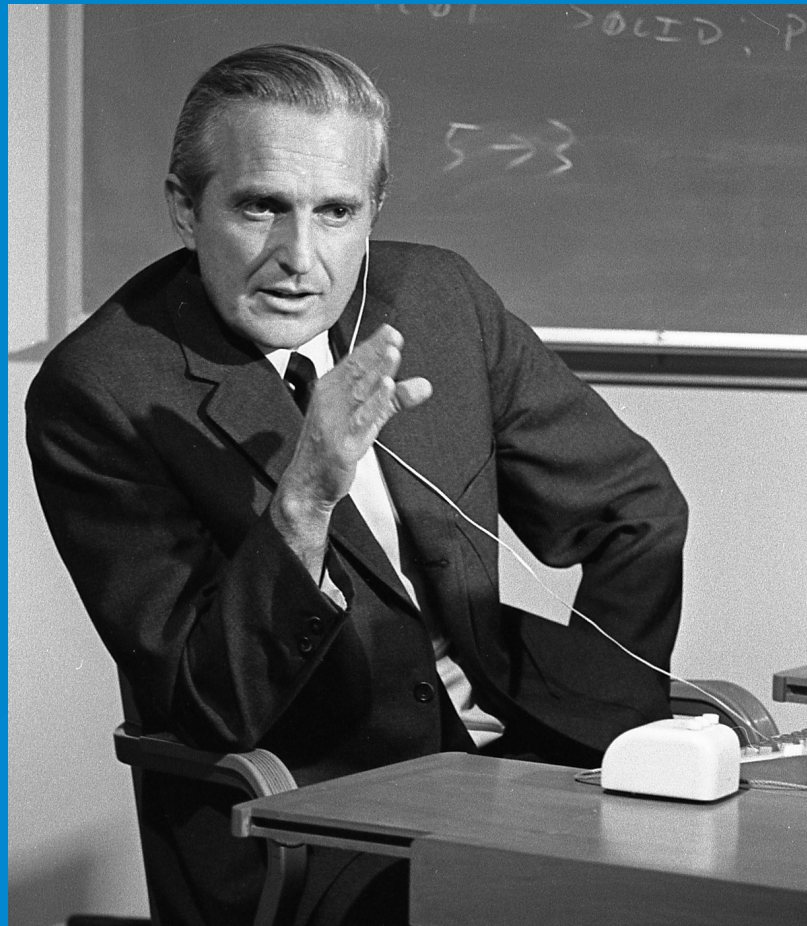
Autonomy

Artificial Intelligence (Computers)



Autonomy

Augmented Intelligence (Humanities)



Autonomy
&
Authorship

Aesthetics and Narrative:

Programming What ~~Cannot~~ Can Be Programmed

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