Noble Ape Presentation

Intel, July 13, 2010

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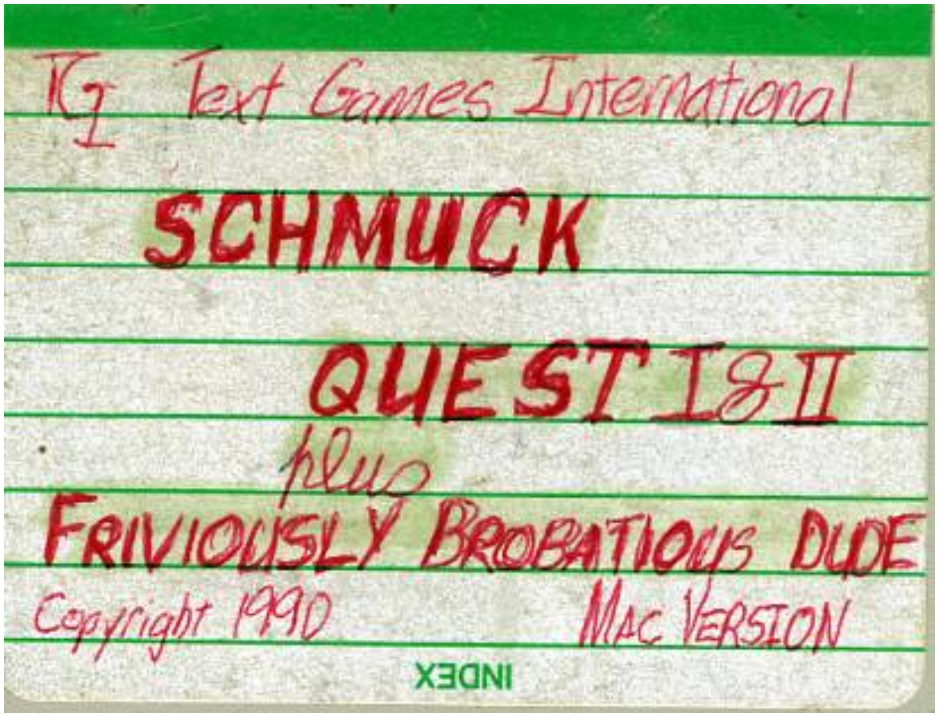
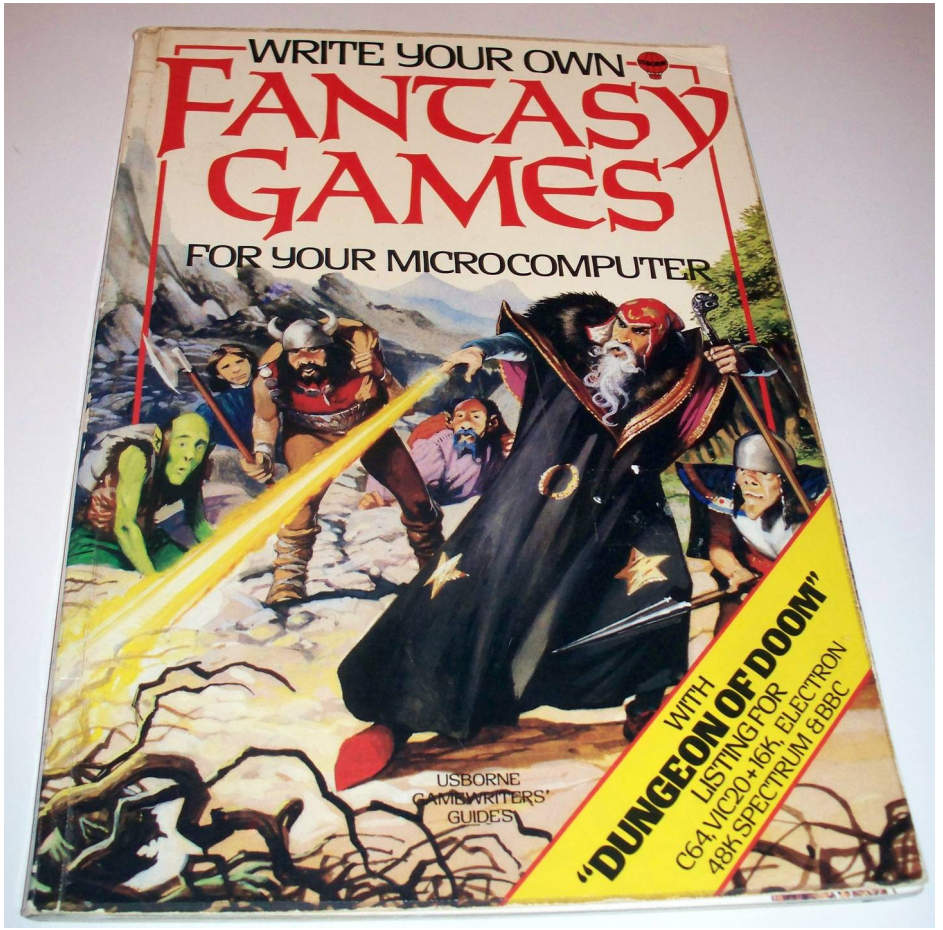
Early History

- '84: Fantasy Games
- '89-95: Landscape Visualization
- '90-93: Schmuck Quest Series
- '92-93: Anti-Viral Software
- '93-95: Compilers
- '93-96: Agar / Petri Dish Sims
- '96: Noble Ape

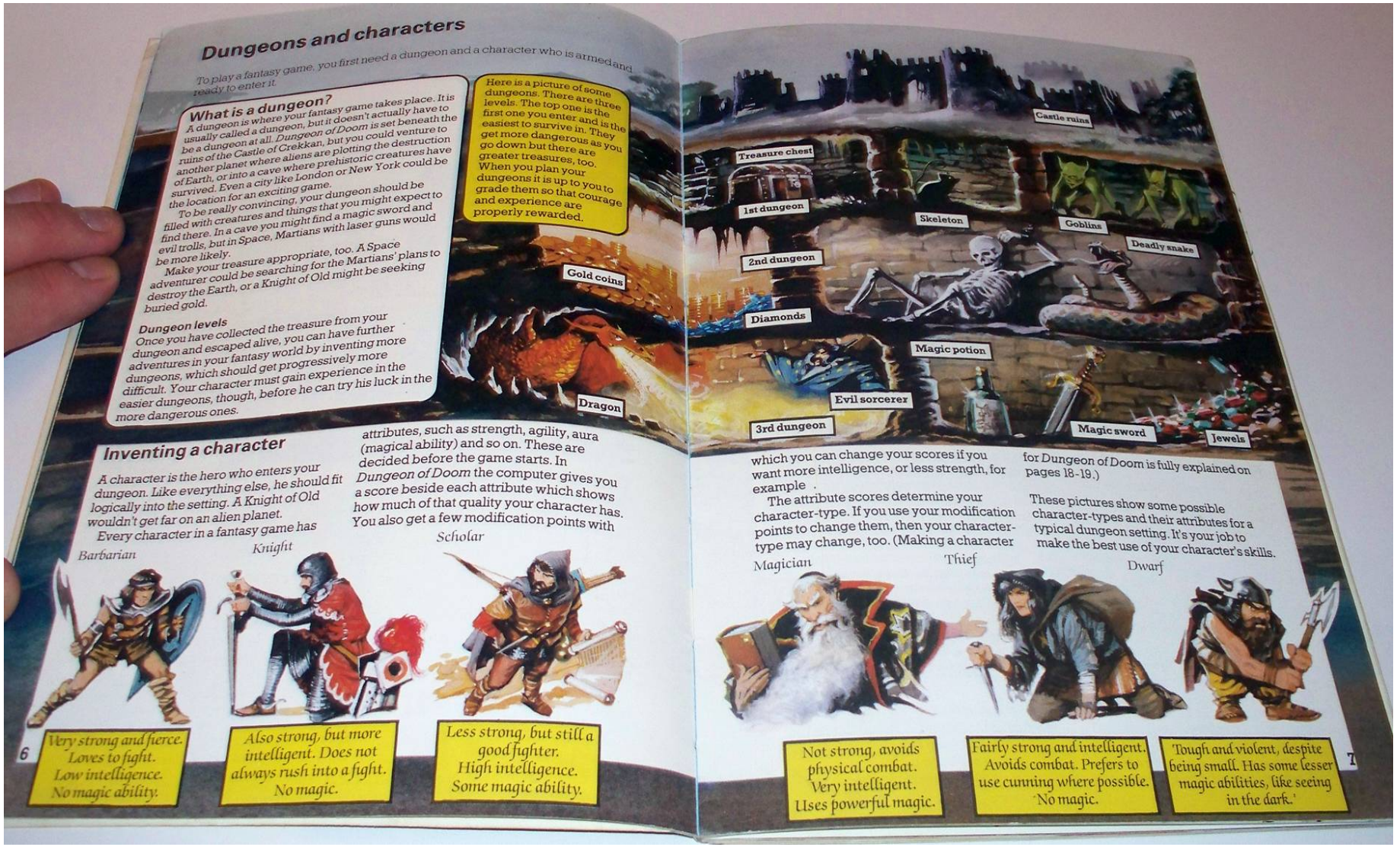


Fantasy Games

- Narrative
- Sustainability
- Game Dynamics
- Simulated World
- Early Graphics



Fantasy Games



Fantasy Games

The Dungeon Generator

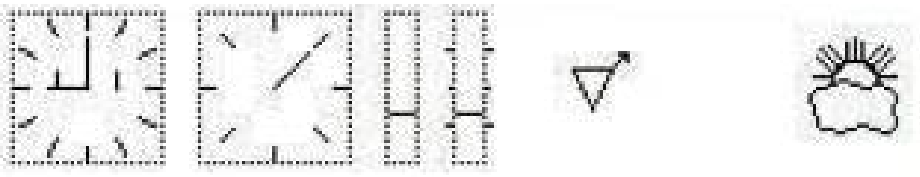
See special note for Vic users page 35.

```
 10 GOSUB 610
 20 paper 3:CLS
 30 LET BG=2:LET FG=1:LET T=0:LET L=3:LET LW=W-3:GOSUB 280
 40 paper 2:ink 0
 50 PRINT tab(1,1);"LEVEL GENERATOR";
 60 PRINT tab(1,2);"THIS IS LEVEL:";LE;
 70 PRINT tab(1,3);"PRESS H FOR HELP"
 80 LET BG=3:LET FG=2:LET T=5:LET L=15:LET LW=15:GOSUB 280
 90 LET X=1:LET Y=1
100 LET I$=inkey$
110 IF I$="H" THEN GOSUB 360
120 IF I$="A" AND Y>1 THEN LET Y=Y-1
130 IF I$="Z" AND Y<15 THEN LET Y=Y+1
140 IF I$="N" AND X>1 THEN LET X=X-1
150 IF I$="M" AND X<15 THEN LET X=X+1
160 IF I$>"/" AND I$<":" THEN GOSUB 230
170 paper 3:ink 0
180 PRINT tab(X,Y+5);CHR$(OS);
190 PRINT tab(X,Y+5);CHR$(R(X,Y));
200 IF I$="S" AND IX>0 THEN GOSUB 450:GOTO 20
210 IF I$<>"F" THEN GOTO 100
220 STOP
```

There are lots of print and colour commands at the start of this listing, so use the general conversion charts opposite with great care.

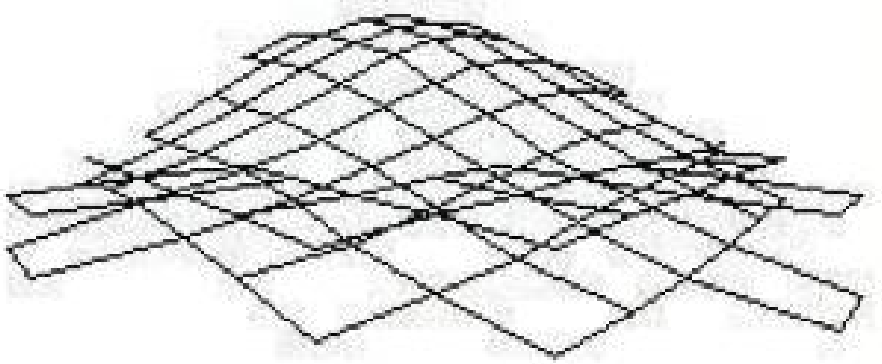
Noble Ape

Designed to Bring Together All Prior Developed Software



Originally Created in Malaysia

Documented in “the Original Manuals”



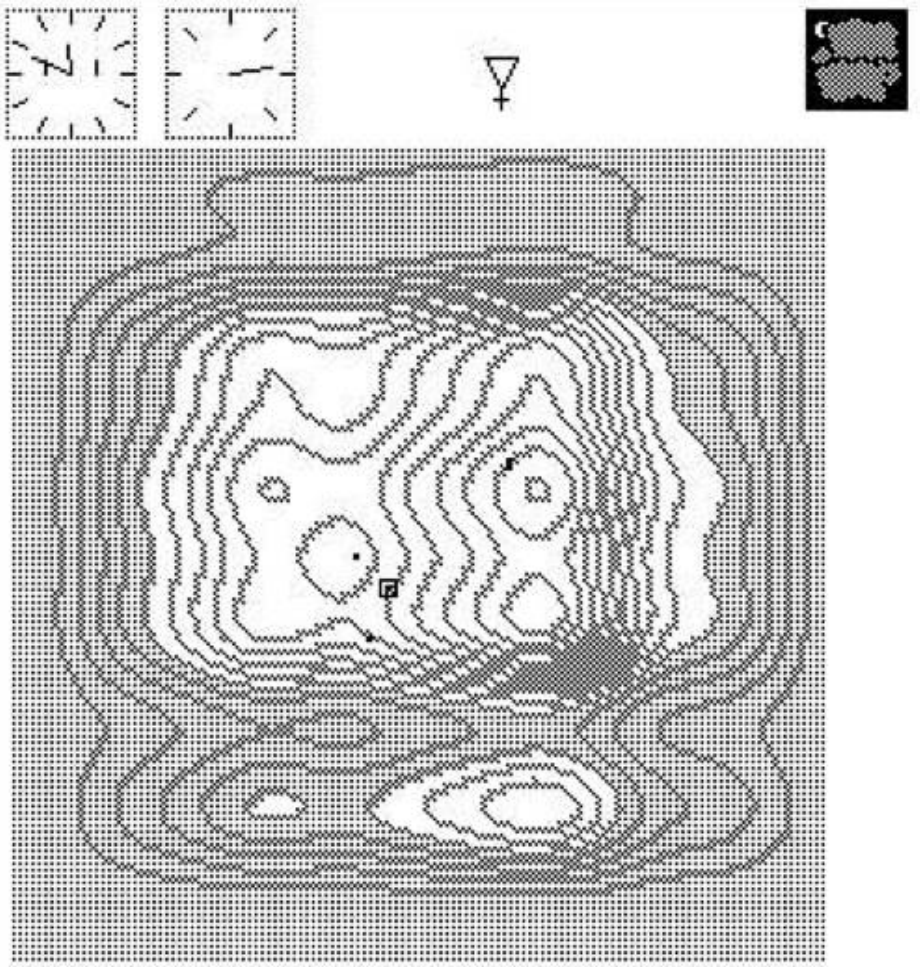
Noble Ape: Simulations

Landscape

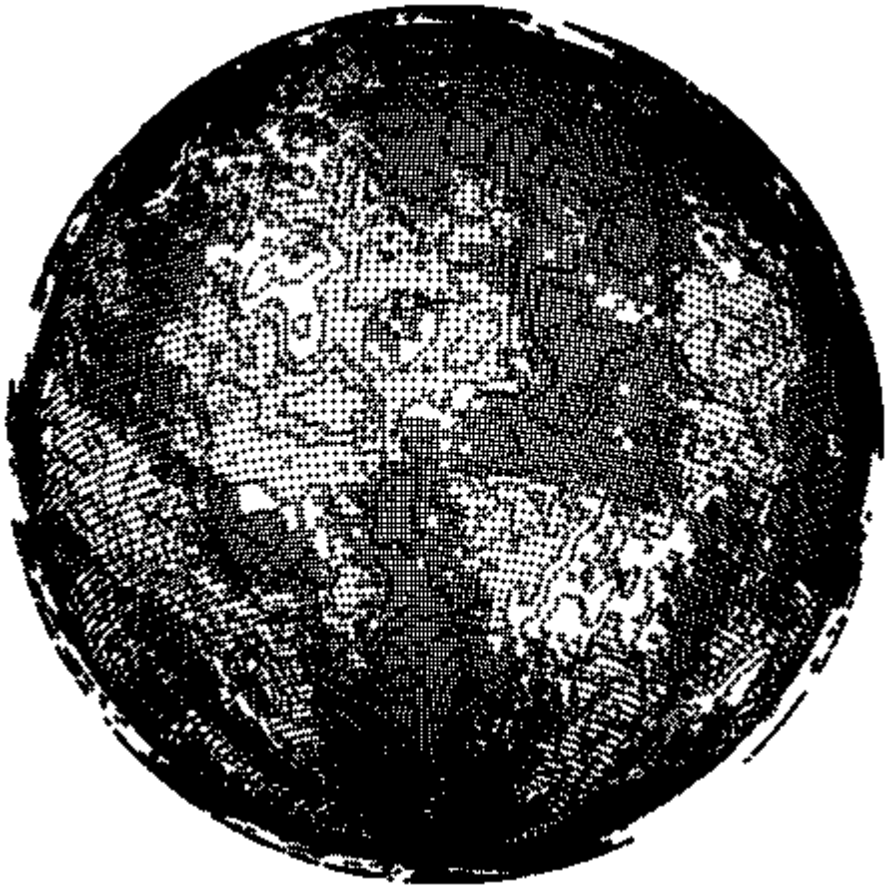
Weather

Cognitive

Biological



Landscape Simulation



2D binary division on random values

45 degree rotation for every other level

Rounding over the entire land

Future: Larger and potentially distributed landscapes

Both Landscape and Weather come from Planet Noble Ape (circa 2000)

Weather Overview

Pressurized water vapor in air

Higher pressure cloud formation and even higher pressure rainfall

Done at half the resolution of the landscape currently
    (could change in the future)

Based on processing time to calculate the weather

Weather simulation represented in two integer arrays combined

Weather Initialization

First array contains an average of land values

Second array is used to populate vectorized differentials of the landscape

```
Diff(x, y)  = halfLand( x + 1, y )
            - halfLand( x - 1, y )
            + halfLand( x, y + 1 )
            - halfLand( x, y - 1 )
```

The second array (differential) is maintained and should be considered like a slip scalar

The first array is zeroed

Each Weather Cycle

The first array is the only array that changes through this process

```
Sum = Diff( x, y ) - pressure( x + 1, y )
    + pressure( x - 1, y )
    - pressure( x, y + 1 )
    + pressure( x, y - 1 )

pressure( x, y )
 += (Sum / Width) - (TotalPressure / Area)

NewTotalPressure += Sum
```

New additions: Wind and Basic Tides
(thanks to Bob Mottram)

Future Weather

At the resolution of the landscape

Much larger

Noble Ape size + wind = windchill
(Move to vegetation for shelter)

New weather phenomena
(snow and cyclones etc)

Adding tides and water currents based on weather

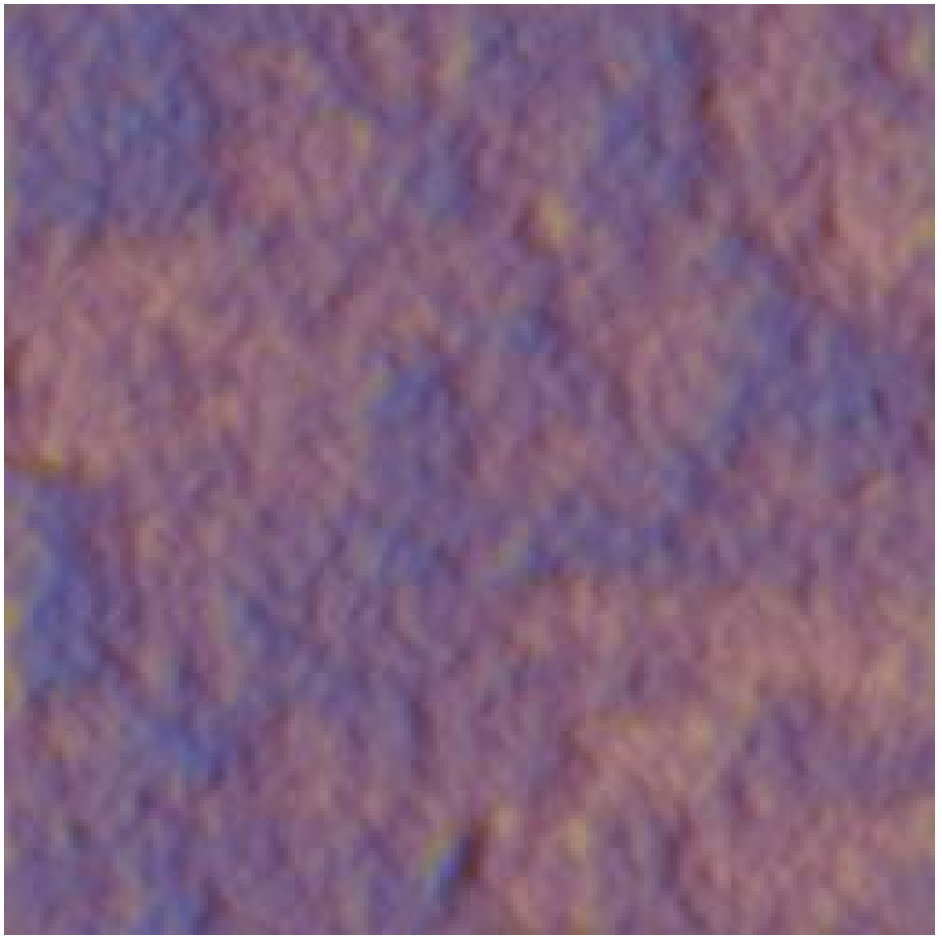
Biological Simulation

- Based on Quantum Mechanics
- Operators

  Area, Height, Water,

  Moving Sun, Total Sun,

  Salt (thanks to Bob Mottram)
- Biological elements are a combination of the operators



Biological Simulation Future

More “species”

Fractal resolution

Dark green = trees

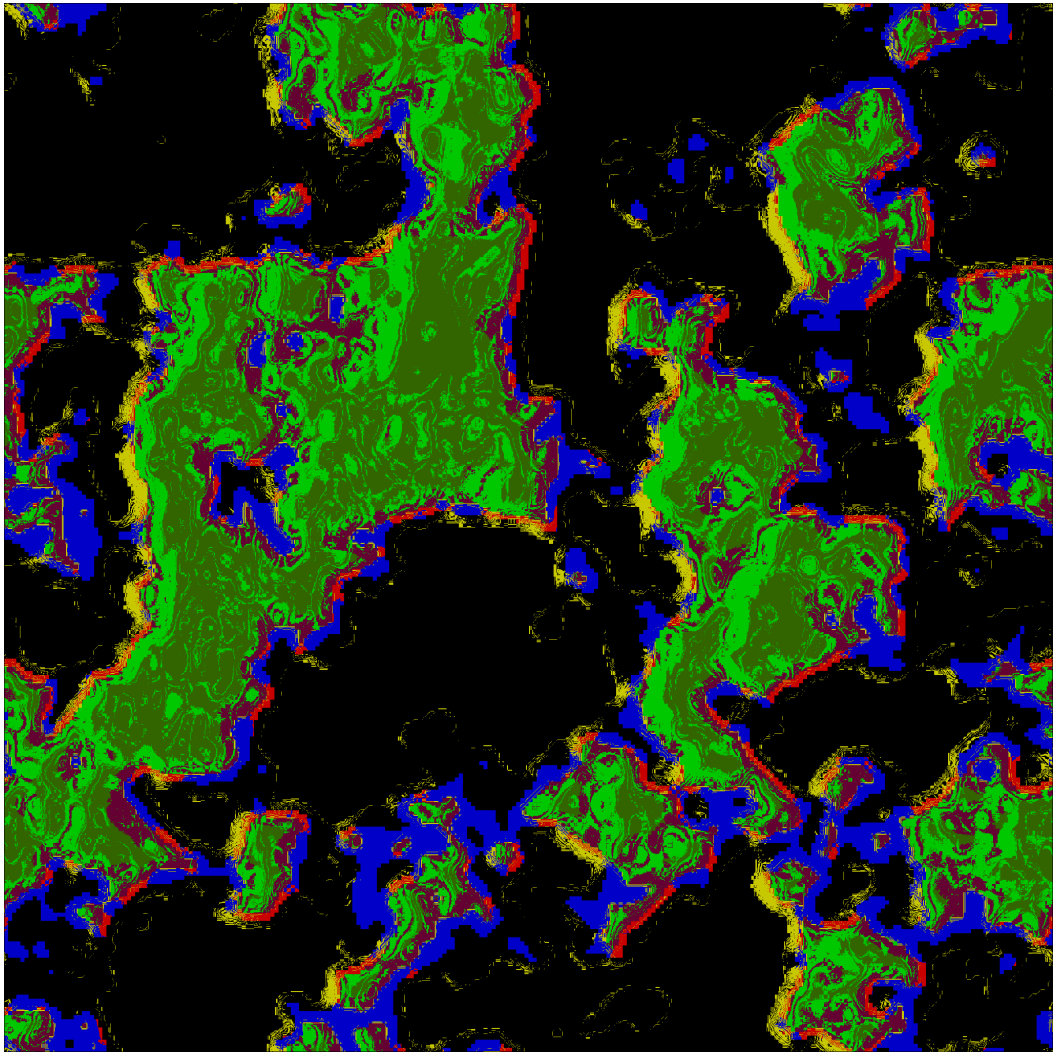
Light green = grass

Purple = bushes

Yellow = beach

Red = rockpool

Blue = seaweed



Cognitive Simulation Overview

Originally 2d

Now 32 x 32 x 32 cells

Based on Agar/Petri-dish simulation

Bacterial growth could also be used for information transfer

Two competing ideas – space deltas (desire) and time deltas (fear)

Cognitive Simulation

Changes over time (dI/dt)

Changes over space (dI/ds = dI/dx + dI/dy + dI/dz)

Similar to neural networks but not a neural network

Tuning in March 2001

Awake

$$I(t+1) = (0\ I(t) + 171\ dI/ds + 146\ dI/dt) / 1024$$

Asleep

$$I(t+1) = (501\ I(t) + 86\ dI/ds + 73\ dI/dt) / 1024$$

Cognitive Simulation Future

Currently very under-utilized

Expand for Noble Apes and other species

Time/chemical effects on the numerical constants

Structure of the Simulation

```
platform (Win, Cocoa or GTK)

gui                or              cle.c

universe                           universe

noble                              noble
```

Noble directory

For Noble Warfare and Noble Ape

Memory Handling

File Handling

ApeScript Parser and Interpreter

Universe directory

Land, biology and weather simulation

Noble Ape movement

Cognitive simulation

Simulation core

GUI directory

Link with the platform (mouse, keyboard etc)

Drawing

Platform directory

Small-scale After-hours Open Source

Most things don’t happen quickly but they do happen

Long-term project planning

Continuous Bug Fixing

Ongoing Platform Maintenance

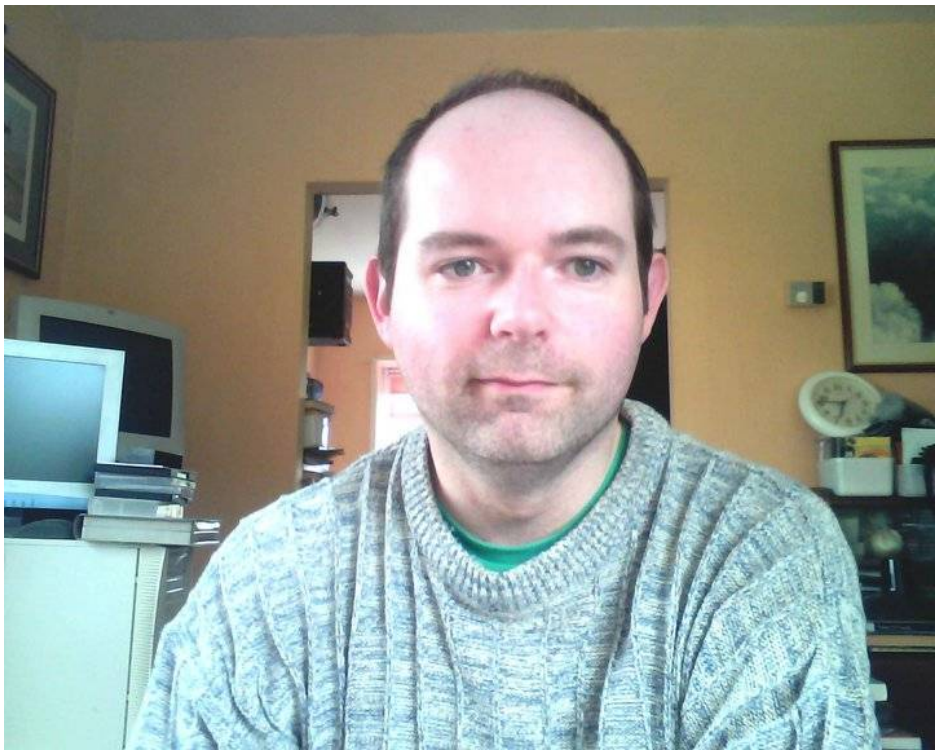
Constant Dialogue rather than a Walled Garden

Occasional Amazing Contributions

If You Haven't Seen Noble Ape in the Past Month,

It's Not the Same Simulation...

Bob Mottram



Roboticist

Well known in the professional and hobbyist robotics communities

Based in North Yorkshire, UK

Bob Mottram's Changes

New naming convention:
First name + Double Barreled Surname

Grooming / Parasites
(random/growth/transmission)

Honor: Ascribed social status
(grooming + fighting)

Physical Disputes between males of different families

Bob Mottram's Changes

Preference for particular appearance (avoid similar names)

Gestation Periods (short currently)

Parenting

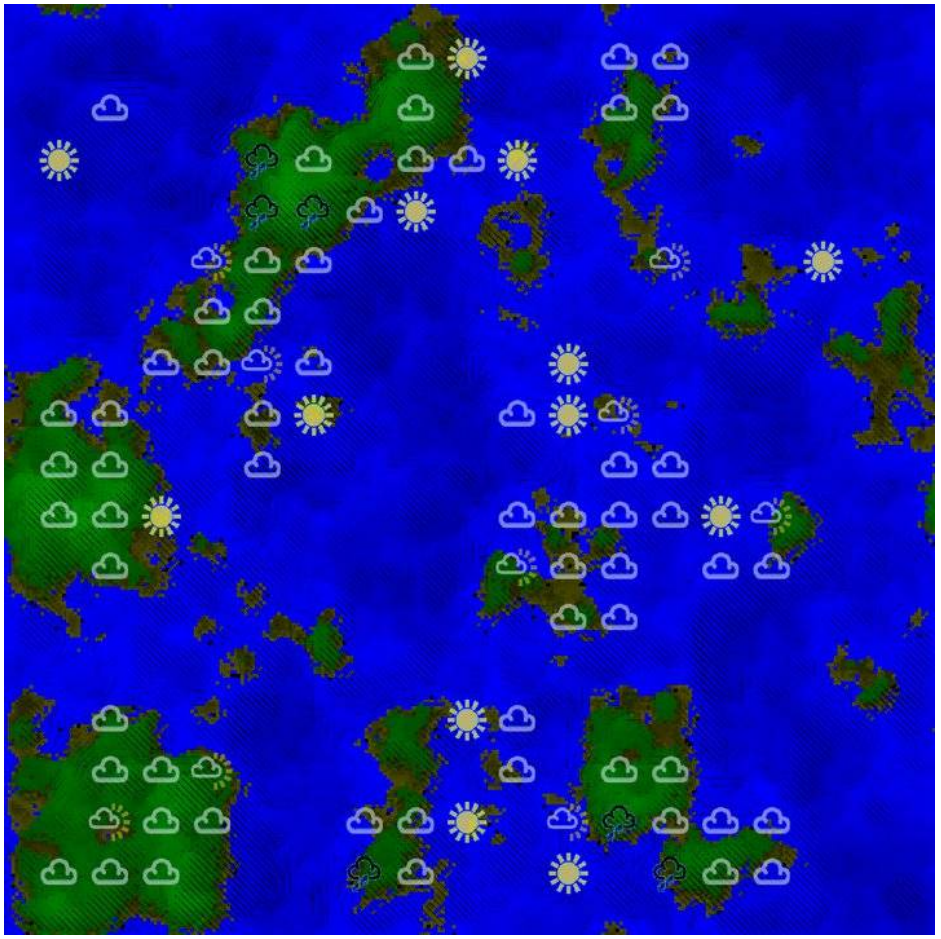
Mother carries the child or child follows the mother

Bob Mottram's Changes

Noble Ape genome (combined factors for);

Rate of Growth, Status Preference, Pigmentation, Pigmentation Preference, Grooming, Aggression, Speed, Stagger, Hill Climb, Energy from Vegetables, Energy from Fruits, Energy from Meats, Latent Energy Use

Bob Mottram's Changes



Noble Ape Web Server

Twitter reporting

```
Culver Davis-Howard is
in discussion

Eliza Hill-Mason is
the most honorable
female

#nobleape
```

Noble Ape Web Server Future

Interface to SecondLife(-like) client

Improved Web Browser Interface

Additive game content

ApeBook?

Experimental Social Graph

Form Long Lasting Friendships, Disputes and Pair Bonding

Social Behavior More Sophisticated

Jealousy and Tribalism emerging from Grooming or Squabbling

Goal Oriented Actions

Moving towards Friends and away from Enemies

Seeking out Specif c Mates

Like Facebook, but for Noble Apes

Future Development

Narrative Engine
(Early implementation from Bob Mottram)

Noble Warfare

Objective ApeScript?

Narrative Engine

If the Noble Apes Could Speak English, What Kinds of Things Would They Say?

Debugging

External Observers

Noble Warfare

Lack of a good open source Real Time Tactical Engine

Long history linking the artificial life community into games

Develop historical engines for various periods

Objective ApeScript

Multiple productive uses

Development feedback

Formally translate syntax to more OOP-centric format

Lua or Python?

Idea

What's the difference between a novel and a movie?

No one says to an author,
"If only this was a movie!"

Movies – Commercial Game Development

Novels – Artificial Life Simulations

Many thanks for your efforts

WWDC 2003

Simulation looks different

New directions to come!

Questions?

Tom Barbalet

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Talk at SRI, 7pm, July 14
333 Ravenswood Ave, Menlo Park