

Noble Ape Presentation

Intel, July 13, 2010

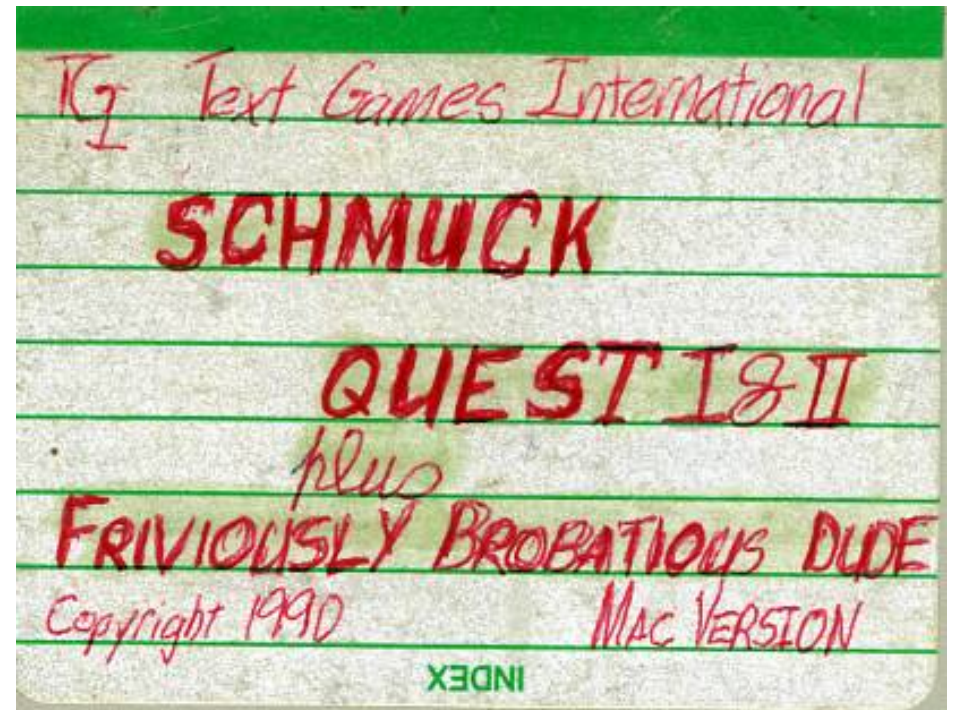
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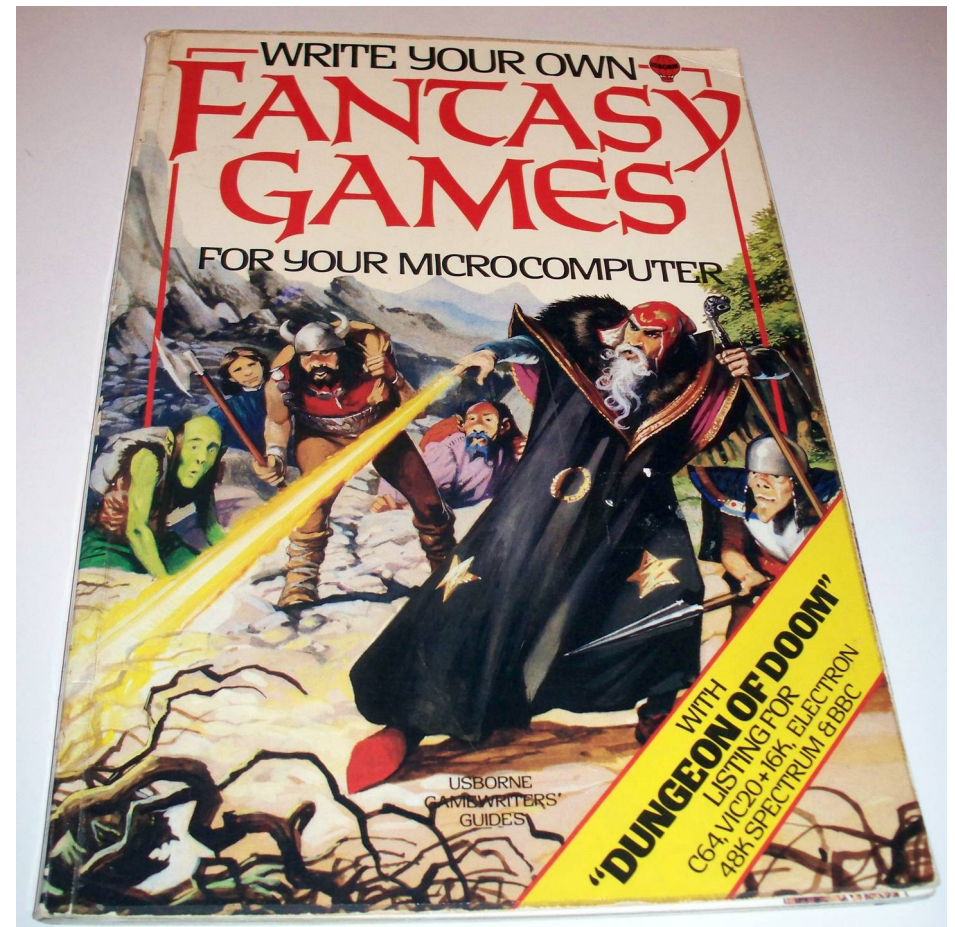
Early History

- '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

Dungeons and characters

To play a fantasy game, you first need a dungeon and a character who is armed and ready to enter it.

What is a dungeon?

A dungeon is where your fantasy game takes place. It is usually called a dungeon, but it doesn't actually have to be a dungeon at all. *Dungeon of Doom* is set beneath the ruins of the Castle of Grekkan, but you could venture to another planet where aliens are plotting the destruction of Earth, or into a cave where prehistoric creatures have survived. Even a city like London or New York could be the location for an exciting game.

To be really convincing, your dungeon should be filled with creatures and things that you might expect to find there. In a cave you might find a magic sword and evil trolls, but in Space, Martians with laser guns would be more likely.

Make your treasure appropriate, too. A Space adventurer could be searching for the Martians' plans to destroy the Earth, or a Knight of Old might be seeking buried gold.

Dungeon levels

Once you have collected the treasure from your dungeon and escaped alive, you can have further adventures in your fantasy world by inventing more dungeons, which should get progressively more difficult. Your character must gain experience in the easier dungeons, though, before he can try his luck in the more dangerous ones.

Here is a picture of some dungeons. There are three levels. The top one is the first one you enter and is the easiest to survive in. They get more dangerous as you go down but there are greater treasures, too. When you play your dungeons it is up to you to grade them so that courage and experience are properly rewarded.

Gold coins

Dragon

Inventing a character

A character is the hero who enters your dungeon. Like everything else, he should fit logically into the setting. A Knight of Old wouldn't get far on an alien planet.

Every character in a fantasy game has

attributes, such as strength, agility, aura (magical ability) and so on. These are decided before the game starts. In *Dungeon of Doom* the computer gives you a score beside each attribute which shows how much of that quality your character has. You also get a few modification points with

Barbarian

Knight

Scholar



Very strong and fierce. Loves to fight. Low intelligence. No magic ability.



Also strong, but more intelligent. Does not always rush into a fight. No magic.



Less strong, but still a good fighter. High intelligence. Some magic ability.



which you can change your scores if you want more intelligence, or less strength, for example.

The attribute scores determine your character-type. If you use your modification points to change them, then your character-type may change, too. (Making a character

for *Dungeon of Doom* is fully explained on pages 18-19.)

These pictures show some possible character-types and their attributes for a typical dungeon setting. It's your job to make the best use of your character's skills.



Not strong, avoids physical combat. Very intelligent. Uses powerful magic.

Thief



Fairly strong and intelligent. Avoids combat. Prefers to use cunning where possible. No magic.

Dwarf



Tough and violent, despite being small. Has some lesser magic abilities, like seeing in the dark.

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

20 HCOLOR=3: HONE

40 HCOLOR=2



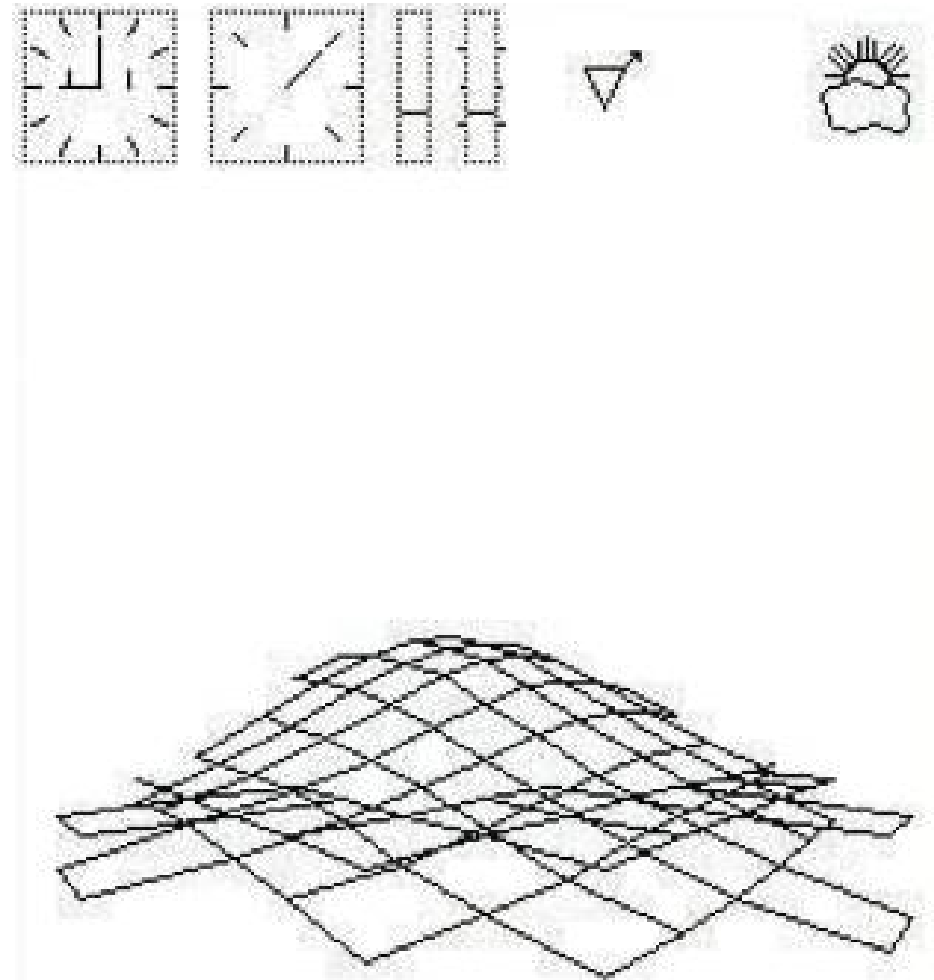
There are lots of print and colour commands at the start of this listing, so use the general conversion charts opposite with great care.

Noble Ape

Designed to Bring
Together All Prior
Developed Software

Originally Created in
Malaysia

Documented in “the
Original Manuals”



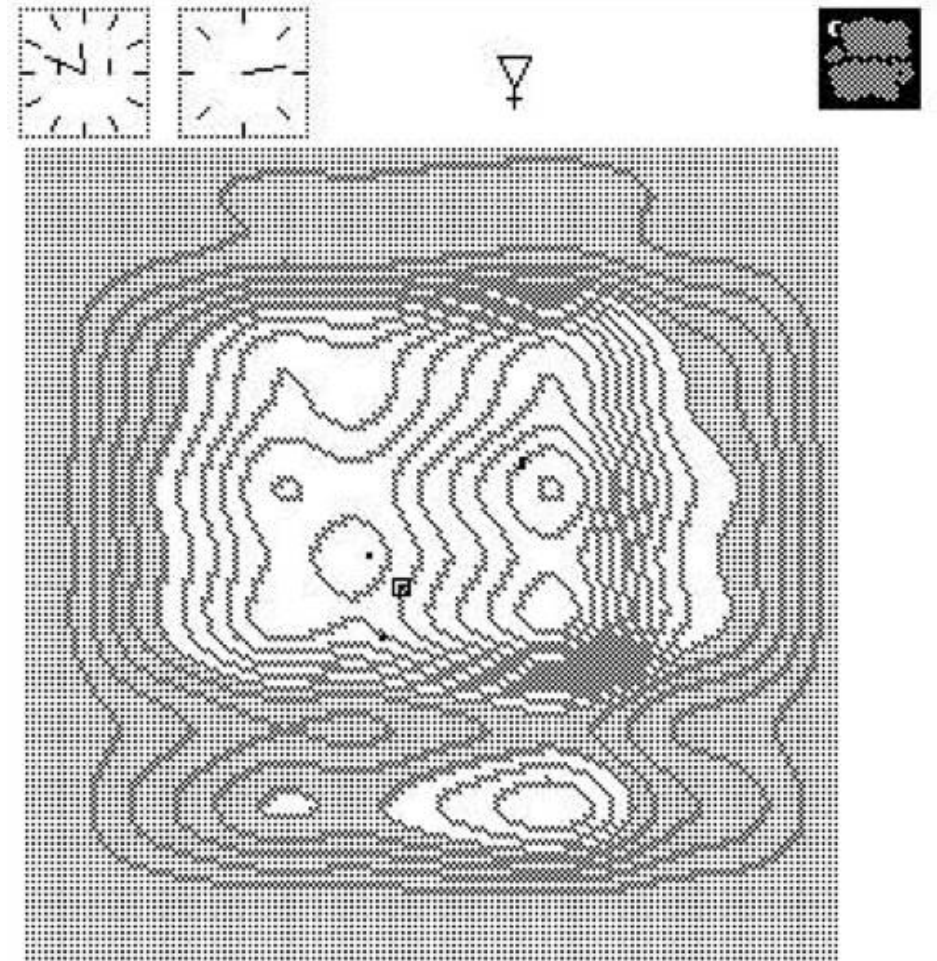
Noble Ape: Simulations

Landscape

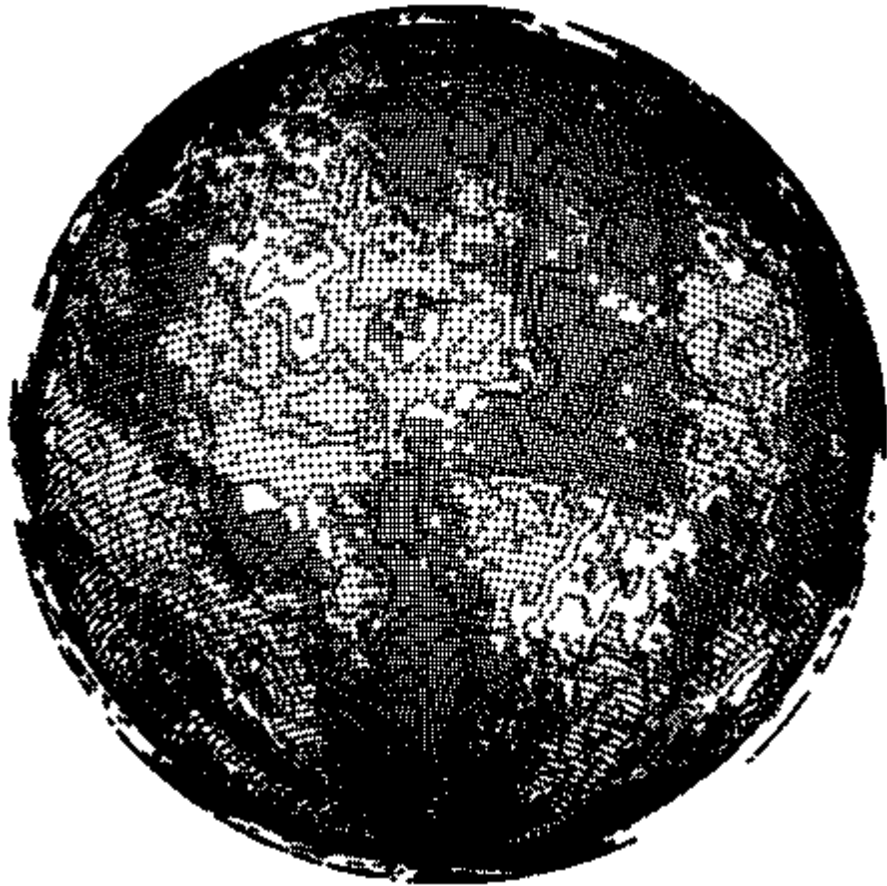
Weather

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

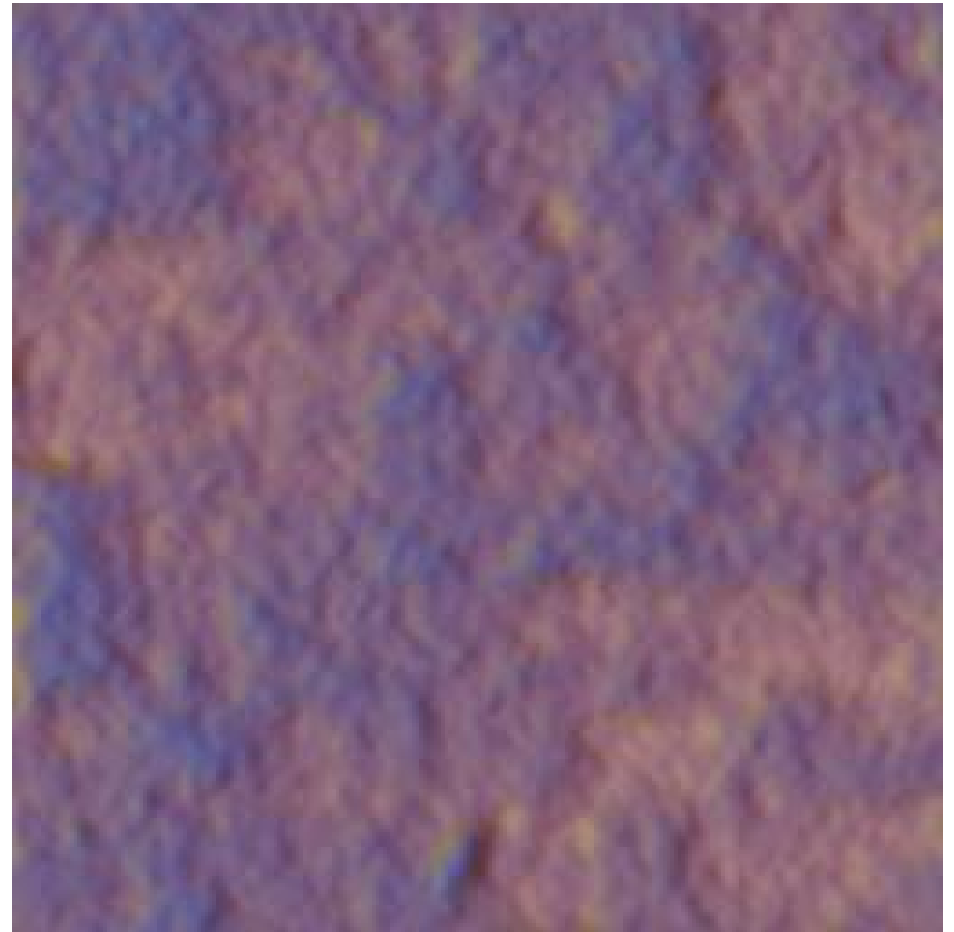
Noble Ape size + wind = windchill
(Move to vegetation for shelter)

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

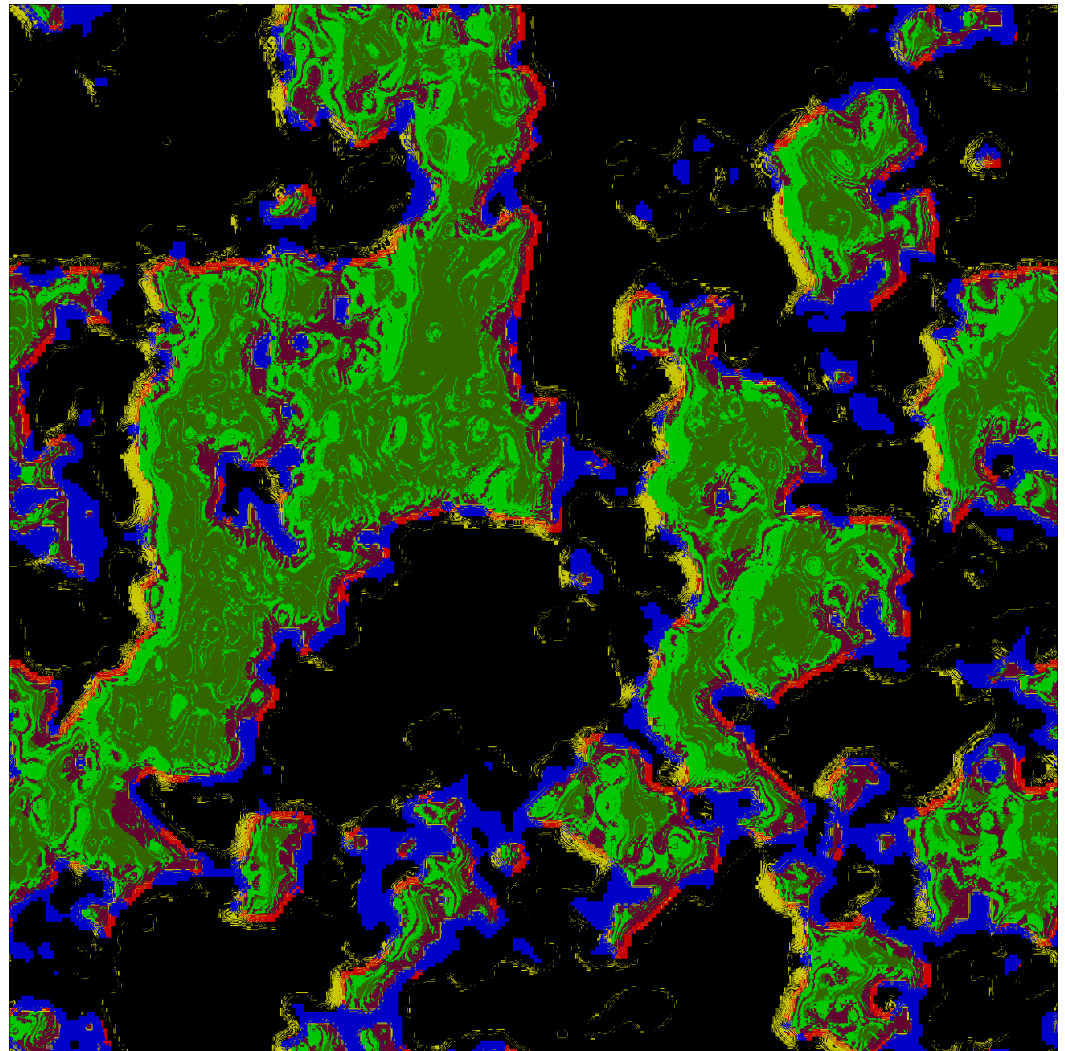
Light green = grass

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 (dl/dt)

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

Similar to neural networks but not a neural network

Tuning in March 2001

Awake

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

Asleep

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

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

Robotician



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

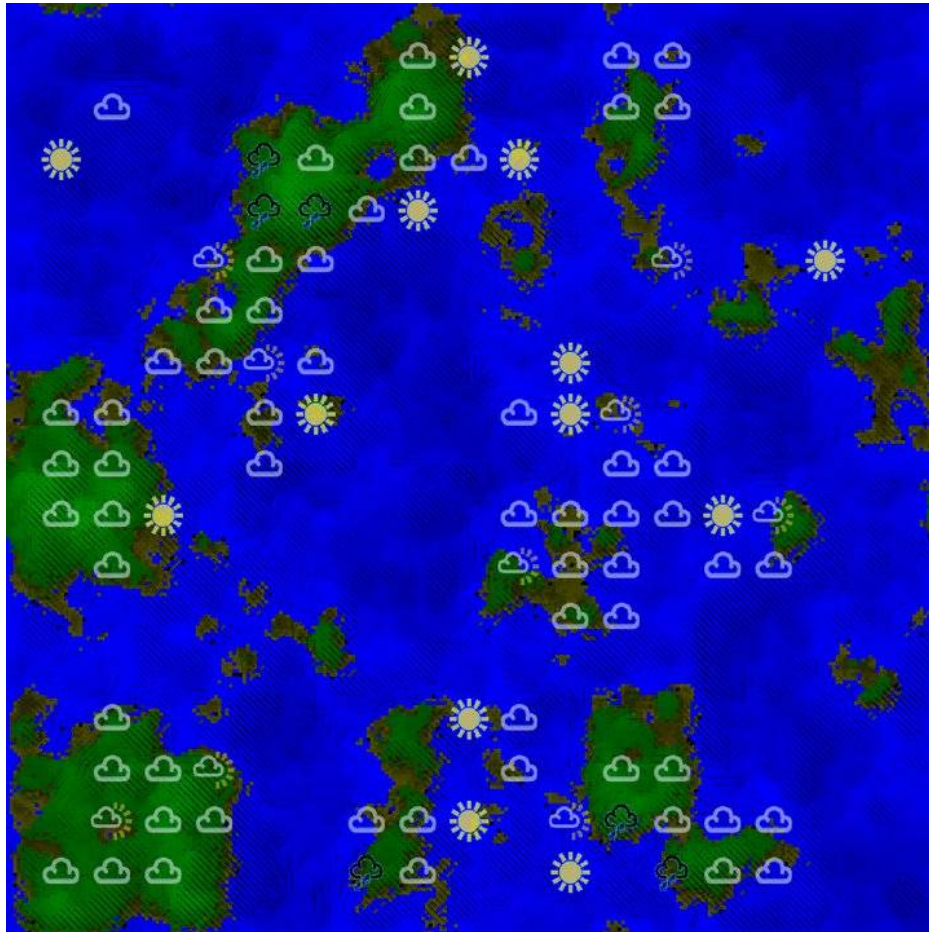
Mother carries the child or child follows
the mother

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 Specific 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