Oyts – Build A Universe

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The obligatory intro joke

Universe [**yoo**-*nee*-vurs]
noun 1. A one-stanza hymn
(or herm for the PC)

Why Oyts?

- Everything has smaller parts

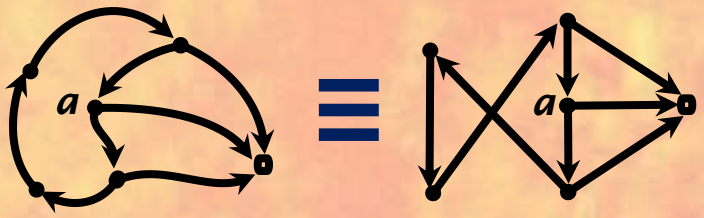
  Universe, galaxies, stars, planets, … people, organs, molecules, atoms, protons/neutrons, quarks, … ?

  - Let's jump ahead to the smallest
  - What is simplest object?
- Gravity & quantum theory at odds
  - Must coalesce space and its contents
- Hence: ***oyts*** & ***oyt spaces***

An *Oyt* Points to Oyts

An ***oyt*** is a shell holding 0, 1, or 2 one-way pointers to oyts

Two identical linked oyt groups



each has three 2-oyts, two 1-oyts, one 0-oyt

(3-, 4-, or more-oyts are less simple, but not more useful)

Oyts are Shapeless and Spaceless

- Imagine all oyts are in one "place"
- Travelers inside an oyt space *perceive* space by how many oyts they pass
- Dimensions arise from how many directions await the traveler

An *Oyt Space* has GRSs

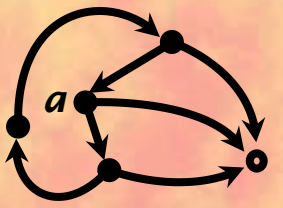
- A Graph Rewriting System (***GRS***) is a set of *rewrite rules*
- Each rule seeks a *pattern* & replaces its oyts with others
  - example rule: 

- An ***oyt space*** is a connected collection of oyts where each is associated with its own GRS

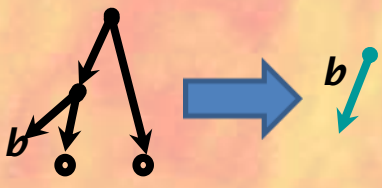
  (in many cases, the GRS has no rules)

Pointless example

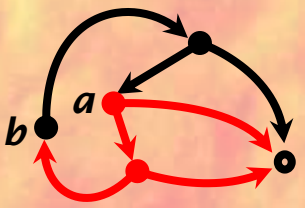
- Starting space:



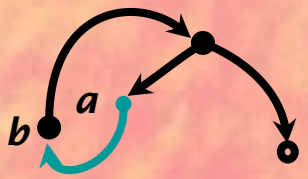
- A rule for oyt *a*:
  - (but oyts are colorless)



- Pattern matches



- Result



Rule Patterns

Oyts are all alike; so are pointers

- for simplicity

Pattern cannot test equality

Pattern can only test the size of an oyt

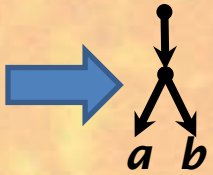
0-oyt, 1-oyt, or 2-oyt

The pattern must be strictly a tree

- no loops, no shared subtrees

(otherwise match test is impossible)

Rule Replacements



The replacement is arbitrary

- It replaces the contents of the associated oyt and may associate a new GRS with it
- The replacement associates a new GRS with each inserted oyt
- Pre-existing pointers to replaced oyts will still point where they did

Simplest Example

- Make a string of oyts
  - Rule set (1 rule) 
  - the new 0-oyt has same rule
  - the root (now a 1-oyt) is given no rules
- Start with one 0-oyt
- Apply rule four times getting 
- Nothing stops this oyt space
  - infinite size
  - but still occupies no physical space

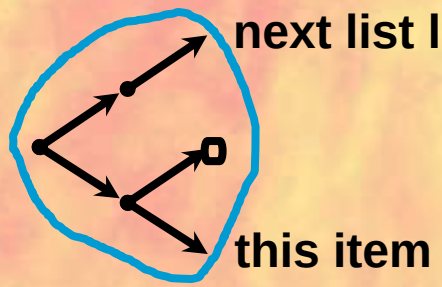
Why "oyts"

- Decimal arithmetic has 10 digits
- Binary arithmetic has 2 digits: 0 & 1
  - named "bits" for **BI**nary digi**TS**
- Unary arithmetic has 1 digit, say 1
  - 4 is 1111
  - Addition is easy; concatenate
- Zero-ary arithmetic has no digits

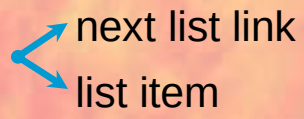
O-ar***Y*** digi***TS***

Distinguishing Oyts - List Links

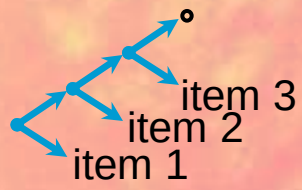
- List link needs
  - pointer to list item (as oyts)
  - pointer to next link
- 1-oyt vs 2-oyt
  - the pointer to a 1-oyt leads to next link
  - the pointer to a 2-oyt leads to
    - a 0-oyt
    - the list item value



- Diagram with blue arrows

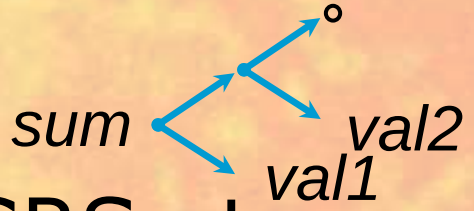


- Can now do lists



Example: Addition

- *Sum* is a list of two unary integers



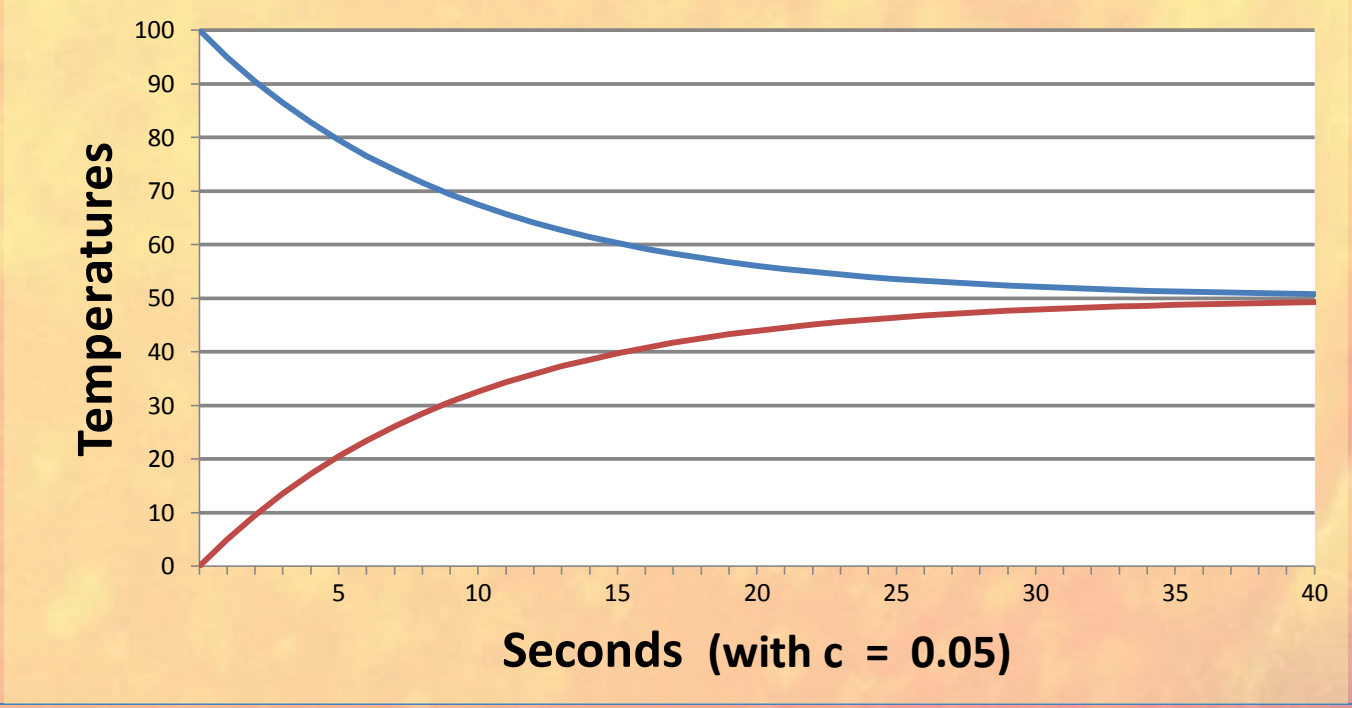
- Initial GRS at *sum* removes first of *val2* and replaces GRS for *sum*
- New GRS at *sum* prepends a 1-oyt to *val1* and restores GRS at *sum*
- Initial GRS also looks for an empty *val2*; if found, remove *sum*'s GRS
- Similarly for subtract and multiply

Designer Defines Scaffold

- A ***scaffold*** is an oyt space definition
  - what kinds of connections will exist
  - what GRS at each kind of node
- Can simulate space as points
- In one design, each point is a list
- List elements – in order
  - pointers to adjacent points in space
  - pointers to values at the point
    - examples: temperature & wind velocity

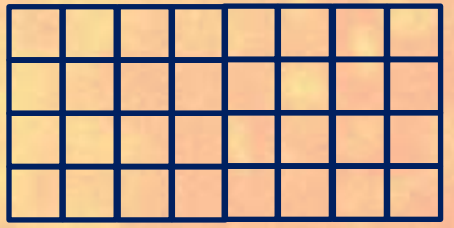
GRS for temperatures

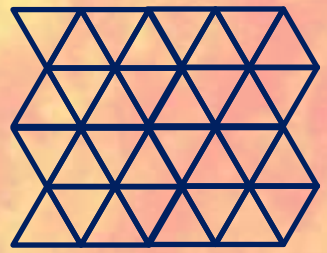
- Suppose a hot and a cold object
- GRS adjusts their temperatures by a constant times the difference
- Exponential, as per Newton



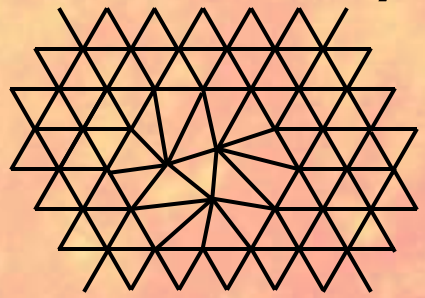
Points in simulated space

- Now space as squares or triangles





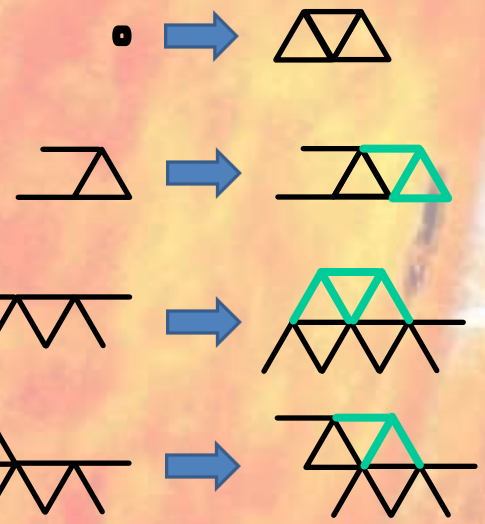
- Or cubes or tetrahedra
- Gravity: space-time is warped
- Warped space is easy with oyts

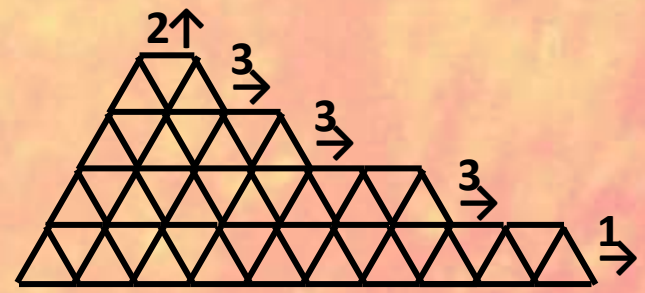


- Warped time is a future development

We can create space

- Rules to create a triangled space
  - 0: starter 0-oyt ⇒ trapezoid
  - 1: a bottom right triangle adds two triangles
  - 2: flattop adds layer
  - 3: cliff adds two triangles

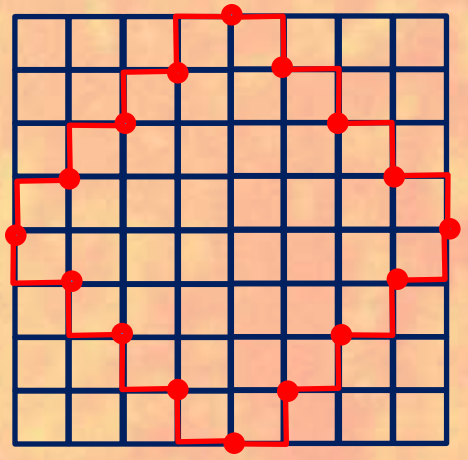




- Could define inflation

The π Problem

- π is circumference over diameter, c/d
- Both are altered by point space



- r = 4, d = 8, c = 32, π = 4, OOPS
- Getting π right is an open question

Local Action

- To forbid worm holes the scaffold design should not allow distant links
- Each GRS rule applies only locally
- All GRSs operate independently and asynchronously

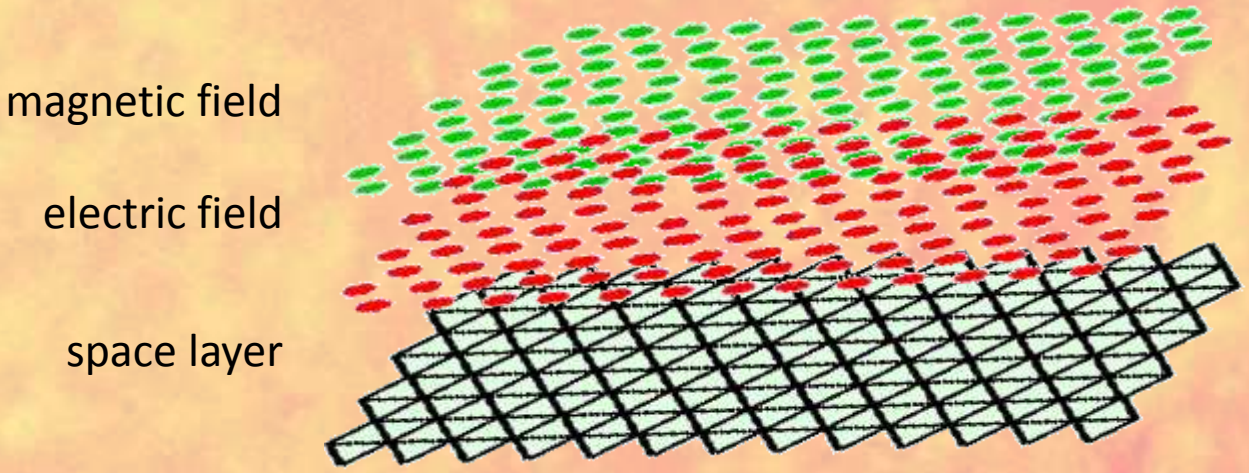
Segue to Our Universe

- That's it for defining oyts
  - Confusing perhaps, but no controversy (There is also a description of GRS operation in terms of h-oyts)

- Now let's speculate on how a Designer might have defined an oyts scaffold for our universe

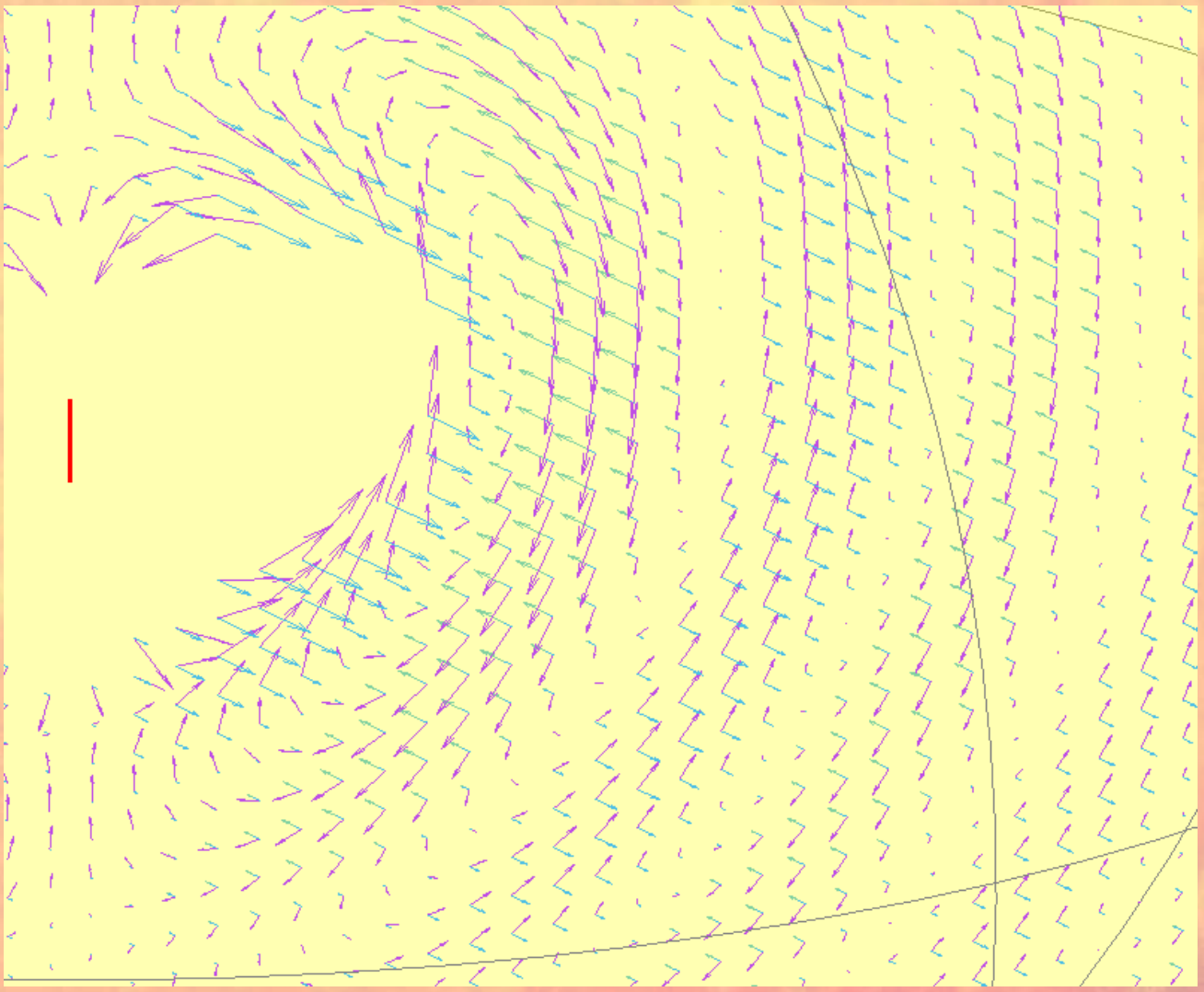
Light is Waves

- Electrical and magnetic vectors at each point in space (E & M)



- GRS continuously transforms the vectors based on neighbors

E & M Fields Drive Each Other



Photons are Waves/Electrons

- Electron-ness, and nucleon-ness are also layers of vectors
- Photon is transfer from E/M to electron
  - some energy (amplitude) from E/M moves to electron vector, or vice versa
  - depends exactly on how the vectors interact (somewhat random)

Mass & Gravity

- Mass is “time” required to move an “object”
- Most mass is in nucleons; bigger objects have more nucleons
- Changing the nucleon-ness field involves also adjusting the space scaffold
  - More adjustment means more effort
  - Harder to move = more mass
  - Changing space warps it: GRAVITY

Objects Move by GRSs

- Objects emerge from the fields
- Many oyts to sing a herm