ABSTRACT:

One ignored benefit of space travel is a potential elimination of obesity, a chronic problem for a growing majority in many parts of the world. In theory, when an individual is in a condition of zero gravity, weight is eliminated. Indeed, in space one could conceivably follow ad libitum feeding and never even gain an gram, and the only side effect would be the need to upgrade one's stretchy pants("exercise pants"). But because many diet schemes start as very good theories only to be found to be rather harmful, we tested our predictions with a longterm experiment in a colony of Guinea pigs (Cavia porcellus) maintained on the International Space Station. ndividuals were housed separately and given unlimited amounts of high-calorie food pellets. Fresh fruits and vegetables were not available in space so were not offered. Every 30 days, each Guinea pig was weighed. After 5 years, we found that individuals, on average, weighed nothing. In addition to weighing nothing, no weight appeared to be gained over the duration of the protocol. If space continues to be gravity-free, and we believe that assumption is sound, we believe that sending the overweight — and those at risk for overweight — to space would be a lasting cure.

Luckily, at the same time that fabrics became stretchy, the race to the moon between the United States and Russia yielded a useful fact: gravity in outer space is minimal to nonexistent. When gravity is zero, objects cease to have weight. Indeed, early astronauts and cosmonauts had to secure themselves to their ships with seat belts and sticky boots. The potential application to weight loss was noted immediately, but at the time travel to space was prohibitively expensive and thus the issue was not seriously pursued. Now, however, multiple companies are developing cheap extra-orbital travel options for normal consumers, and potential travelers are also creating news ways to pay for products and services that they cannot actually afford. Together, these factors open the possibility that moving to space could cure overweight syndrome quickly and permanently for a large number of humans.

We studied this potential by following weight gain in Guinea pigs, known on Earth as fond of ad libitum feeding. Guinea pigs were long envisioned to be the "Guinea pigs" of space research, too, so they seemed like the obvious choice. Studies on humans are of course desirable, but we feel this current study will be critical in acquiring the attention of granting agencies.



CONCLUSIONS: Federal IRBs.

ACKNOWLEDGEMENTS:

I am grateful for generous support from the National Research Foundation, Black Hole Diet Plans, and the High Fructose Sugar Association. Transport flights were funded by SPACE-EXES, the consortium of wives divorced from insanely wealthy space-flight startups. I am also grateful for comments on early drafts by Mañana Athletic Club, Corpus Christi, USA. Finally, sincere thanks to the Cuy Foundation for generously donating animal care after the conclusion of the study.

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PIGS IN SPACE: EFFECT OF ZERO GRAVITY AND LIBITUM FEEDING ON WEIGHT GAIN IN CAVIA PORCELLUS Colin B. Purrington 6673 College Avenue, Swarthmore, PA 19081 USA

INTRODUCTION:

The current obesity epidemic started in the early 1960s with the invention and proliferation of elastane and related stretchy fibers, which released wearers from the rigid constraints of clothes and permitted monthly weight gain without the need to buy new outfits. Indeed, exercise today for hundreds of million people involve only the act of wearing stretchy pants in public, presumably because the constrictive pressure forces fat molecules to adopt a more compact tertiary structure (Xavier 1965).

Our view that weight and weight gain would be zero in space was confirmed. Although we have not replicated this experiment on larger animals or primates, we are confident that our result would be mirrored in other model organisms. We are currently in the process of obtaining necessary human trial permissions, and should have our planned experiment initiated within 80 years, pending expedited review by local and



TERIALS AND METHODS:

One hundred male and one hundred female Guinea pigs (Cavia porcellus) were transported to the International Space Laboratory in 2010. Each pig was housed separately and deprived of exercise wheels and fresh fruits and vegetables for 48 months. Each month, pigs were individually weighed by ducttaping them to an electronic balance sensitive to 0.0001 grams. Back on Earth, an identical cohort was similarly maintained and weighed. Data was analyzed by statistics.

RESULTS:

Mean weight of pigs in space was 0.0000 +/- 0.0002 g. Some individuals weighed less than zero, some more, but these variations were due to reaction to the duct tape, we believe, which caused them to be alarmed push briefly against the force plate in the balance. Individuals on the Earth, the control cohort, gained about 240 g/month (p = 0.0002). Males and females gained a similar amount of weight on Earth (no main of effect of sex), and size at any point during the study was related to starting size (which was used as a covariate in the ANCOVA). Both Earth and space pigs developed substantial dewlaps (double chins) and were lethargic at the conclusion of the study.

LITERATURE CITED:

NASA. 1982. Project STS-XX: Guinea Pigs. Leaked internal memo. Sekulić, S.R., D. D. Lukač, and N. M. Naumović. 2005. The Fetus Cannot Exercise Like An Astronaut: Gravity Loading Is Necessary For The Physiological Development During Second Half Of Pregnancy. Medical Hypotheses.

Xavier, M. 1965. Elastane Purchases Accelerate Weight Gain In Case-control Study. Journal of Obesity. 2:23-40.



Sculpting e-poetry in fractal space: Context Tree Jeremy Douglass, Ph.D.

Context Tree: an approach to fractal poetry



Context Free

Cross-platform

Graphical IDE

Conceptual

programming

Simple

Freely

available

Context Tree is both a series of eliterature artworks and an authoring framework for visualizing eliterature as clouds, streams, and fractal spaces made of words. The Context Tree framework is based on context free grammars as used in design, and explores how the "context free" paradigm affects authoring. As with the 'freedoms' of other digital paradigms, context 'freedom' is a two-edged sword: it constrains the author to a radical discontinuity of language while at the same time it opens up the radical possibilities of authoring fractal literature.

Context Tree is:

- a project exploring fractal poetry
- a series of animated fractal poems
- a software framework for fractal authoring

How it works

Code libraries built on top of the software Context Free.

Context Tree:

- renders the story into a word list with probabilities / Markov chain
- represents the words as fonts and spatial relationships
- provides standard ways for multiple texts to interact with different design grammars in the same visualization

Context Free:

- provides the underlying language for specifying designs and technology for rendering / animating them
- provides a public archive of community shared visual design experiments and font experiments that Context Tree adapts and synthesizes.

Literature

Baudrillard, Jean. The Ecstacy of Communication. 1987. Trans. Bernard Schutze, and Caroline Schutze. Foreign Agents Series, Semiotext(e), 1988.Borges, Jorge Luis. "The Library of Babel." Ficciones. Grove Press, 1969. Chomsky, Noam. "Three models for the description of language." Information Theory, IEEE Transactions 2.3: 113-124.

peters (x 0.5 + 120.2

Coyne, Chris. Context Free. (software)



Babel Spiral is an evocative visualization of a classic fiction. The Jorge Luis Borges story "The Library of Babel" (1941) provides source text on an infinite library.

> EXCERPT: "Those who judge it to be limited postulate that in remote places the corridors and stairways and hexagons can conceivably come to an end -- which is absurd. Those who imagine it to be without limit forget that the possible number of books does have such a limit. I venture to suggest this solution to the ancient problem: The Library is unlimited and cyclical."

In the poem / visualization Babel Spiral, the entire source text is rendered into a word-list with both probable frequency of occurrence and probable transitions between items (a Markov chain). Like Borges's library, the list can be wandered forever, moving from word to word.

Each entry in the word-list is mapped against a visual, spatial representation - which could be anything, but in this case is a collection of letter shapes that are in turn represented by simpler shapes, much like low-level font handling in software.

Finally, the word-list is mapped against a geometric design pattern in this case, a simple infinitely receding spiral. Each step along the spiral geometry renders a word-object from the word-list. Importantly, the same word-list can be mapped against many other (and more complex) geometries, and the same geometry be mapped against alternate or multiple word-lists.

Example grammar:

startshape spiralscene background { b -1 } include contexttree/ctt-fontmap-a.cfdg include st-markovchain.cfdg include st-words.cfdg rule ctt-object-bg 100000000000 { } rule stback {} rule spiralscene { spiralstart { s .0088 b 1 sat 1 x .5 r -3} rule spiralstart { stTHE { r -3 s .998 y -3 } }



Hofstadter, Douglas R. Gödel, Escher, Bach : An Eternal Golden Braid. Basic Books, 1979. Lentczner, Mark, and John Horigan. ContextFreeArt.org. 2006. Stribling, Jeremy, Daniel Aguayo, and Maxwell Krohn. "Scigen : An Automatic Cs Paper Generator." 2005. < http://pdos.csail.mit.edu/scigen/>.

LYHL NOWYONE YOOY



Example: Gamer Textually





Gamer Textually is a provocative visualization of noteable contemporary scholarship - a code artwork that generates visualizations and animations out of the text of the book Gamer Theory by McKenzie Wark, and was published online as part of the 2.0 release of Wark's book.

The Context Tree code 'reads' Wark's work into visualization poetry by randomly assembling context free grammar modules for the title, the table of contents, and the full source text of Wark's "v1.1" online manuscript. It also samples the cover logo art created by Tim Jones from the "v2.0" Harvard Press print edition (2007). The code further imagines beyond Wark's literal text, supposing myriad other combinatoric possibilities implied by Wark's use of 'leetspeak', or letter-number substition.

Gamer Textually was created around one central question: How might a computer read Wark's Gamer Theory? The answer takes the form of procedures or unit operations such as alphabetizing, ordering, coloring words by frequency of occurrence, etc. etc. However unlike a tag cloud or a histogram, which represents the statistical

facts of a text, each Gamer

represents one play session

through the text - a series of

possible words structures,

the same.

sensitive to initial conditions,

always different and yet always

chance encounters with various

Textually visualization





Acknowledgments

Thanks to: Chris Coyne for creating Context Free; Mark Lentczner and John Horigan for the graphical clients; the contextfreeart.org community for publicly sharing their code and inspiration (individual credits such as adapted fonts in source code); Tassie Gniady for being (in addition to an artist) an early adopter and beta tester; Rita Raley for her support; and Susan Schreibman for organizing the session and its format. Thanks to Wikimedia Commons and its respective contributors for their images of the Mandelbrot set and a fractal fern.









Example: PepysViz



PepysViz is a visualization artwork by Tassie Gniady that engages an extant archive - the accumulated early modern ballads as cataloged by Samuel Pepys. The Context Tree framework was used to complete the project.



The names of Pepys categories are visually scattered around the Space in a square-format fractal according the proportional frequency of their usage by Pepys. Blocks of words are randomly replaced by blocks representing actual woodcut ballad illustractions rendered in rough pixels although these pixels can themselves be substituted for shapes, letters, or further sub-blocks of words.



Further thoughts

Context Tree is a project with its own context: a tradition of poetic experiments that have emphasized unit and form over sequence and series, including Concrete Poetry, Dada, Vorticism, and even the "flowerishes" of Kenneth Burke. Text-based computer visualization artworks such as "Making the Visible Invisible" and "Word News" have emphasized the role of the artist as architect in structuring the presentation of an external source of textual information. Related works like "TextArc" and "txtKit" have emphasized their role as providers of readings in relation to prior texts. Context Tree explores text visualization as an original authoring metaphor, engaging the consequences of context free authoring: writing as exhaustive logic, as arbitrary sequence, as discrete inscriptions, etc.

In one sense the logics of text and context free design are antithetical: one is fundamentally sequential, the other fundamentally anti-sequential. Context Tree is one attempt to synthesize this dialectic into new possibilities.

Further information

Please email jeremydouglass@gmail.com.

More information on this and related projects can be obtained at http://jeremydouglass.com.

A PDF version of the poster is available at: http://jeremydouglass.com/cv/contexttree-poster.pdf

Gene Flow in Lions

Introduction

 One of the greatest dangers to small populations is related to gene flow

 Deleterious alleles can crop up and spread throughout a small population, pushing the population towards extinction

 It may be possible, as conservationists, to use gene flow in small populations to our advantage, by introducing beneficial genes into a small population, perhaps by translocating animals with desired traits

 In either case, it is essential to know how fast the new gene, whether beneficial or detrimental, will affect the population

 Because of their unusual social structure and endangered species status, lions present an interesting and informative model of gene flow in small populations

Objectives

 Determine what kinds of detrimental genes are likely to threaten a small population.

 Predict the speed with which a beneficial gene will spread throughout the population

Methods

 I developed a stochastic model that followed the fate of ten lion prides, month by month, over a period of 60 years

- I modeled nine different effects of genetics on survival:
- Gene Effect 1 Control
 - · Initial population random, about 68% heterozygous
- · Effect on survival none
- · Gene Effect 2 Harmful recessive gene
 - · Initial population RR with one Rr adult female
 - Effect on survival \ 10%
- Gene Effect 3 Beneficial recessive gene
- Initial population RR with one rr adult female
 Effect on survival # 10%
- Gene Effect 4 Harmful dominant gene
- Initial population rr with one Rr adult female
- Effect on survival ¥ 10%
- · Gene Effect 5 Beneficial dominant gene
- Initial population rr with one RR adult female
 Effect 10%
- Gene Effect 6 Very harmful recessive gene
 Initial population RR with one Rr adult female
 - Effect on survival \$ 50%
- Gene Effect 7 Very beneficial recessive gene
 - Initial population RR with one rr adult female
 Effect on survival # 50%
- · Gene Effect 8 Very harmful dominant gene
- Initial population rr with one Rr adult female
- Effect on survival
 50%
- Gene Effect 9 Very beneficial dominant gene
 - Initial population rr with one RR adult female
 - Effect on survival # 50%





Time in M

Results

 Recessive genes had little effect, no matter how beneficial or detrimental

Time in Mr

 Harmful dominant genes quickly eradicated themselves, and had little effect on the resulting population size

 Introductions of beneficial dominant genes resulted in small, quick increases in the prevalence of the beneficial allele, followed by a slower decrease

 Gene effect 9, the very beneficial dominant gene, was the only effect I modeled that had any real positive effect on the final population size.

Discussion

 If we are to attempt to use relocation as a way to 'beef up' the genetics of small populations of lions, we must try to make sure the gene we wish to introduce is a dominant one. Also, relocating just one animal is unlikely to be enough to spread the gene in a reasonable amount of time. My model could easily be modified to simulate the introduction of multiple animals.

 Spontaneous mutations are unlikely to be a problem in lion populations; recessive genes do not have a large enough effect to be dangerous, at least in the relatively short term of 60 years, and dominant genes eradicate themselves quickly.

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Can Suburban Greenways Provide High Quality Bird Habitat?

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Birds of Conservation Concern in Decline

- Many bird species of conservation concern including neotropical migrants, insectivores, and forest-interior specialists - decline with increasing human development
- Greenways might mitigate this effect
- Habitat patch size, vegetation composition & structure, and landscape context are key factors
- Standards are lacking for designing and managing suburban greenways as high quality habitat

Objective: Greenways for the Birds

- Determine how development-sensitive forest birds are affected by forested corridor width
 - adjacent development intensity
 - vegetation composition & structure
- Develop recommendations for greenway designers and planners

Study Design & Independent Variables

- Sampled 34 300m corridors in Raleigh & Cary, NC, USA
- Sampled range of
 - Forested corridor widths (20 - 1.200m)
 - Adjacent density (low density residential office/commercial)
- Additional measures
 - Vegetation composition & structure in corridor
 - Land cover in 300m x 300m adjacent to corridor (context)
- Measured richness & abundance of
 - Breeding birds
 - Neotropical migrant birds during stopovers
 - Mammal nest predators

Breeding Birds of Concern More Common in Wider Greenways with Less Managed Area Surrounded by More Forest Canopy





Some insectivores



Significant Predictors for Breeder Abundance

- Greenway: (-) Managed Area (+)Shrub Cover
- Adjacent Landscape: (+) Canopy Cover (-) Building Density (-) Bare Earth

Spring Neotropical Migrant Stopovers More Common in Wider Greenways with More, Taller Hardwood Trees

- 200m x 25m transects along one side of greenway path
- Revisited sites for two spring seasons and one fall season
- Width not significant, but trend consistent with other findings



Forested Corridor Width

Significant Predictors for Spring Migrant Abundance

Greenway: (+) % Hardwoods (+) Canopy Height

Adjacent Landscape: (-) Bare Earth

Nest Predators Less Common in Wider Greenways with Narrower Paths

- Five baited scent stations along each greenway segment
- Observed for 5 nights each

Predator Abundance Decreased with Corridor Width





Greenways for Development-Sensitive Forest Birds Might Conflict with Intense Recreational Use

People & Managers Prefer ...



Good for walking, running, cycling, strollers, wheelchairs Easier to maintain, especially with higher intensity use

Forest Birds Prefer ...



- Narrow path avoids splitting forested corridor
- Discourages heavy human use
- Fewer nest predators

Potential Solution: Wide Corridor, Trail Near Edge

- Make corridors at least 50m wide; wider is better
- Don't split forested corridor
 - Keep trails as narrow as possible
 - Avoid wide grassy areas along trails within forested corridor
 - Locate trails near the edge of forested corridors

2005 August 7



Will Manatees Still Exist in 2100? Effect of Cold Winters and Watercraft Accidents

. Introduction

In Florida, the populations of West Indian Manatees, listed as endangered species in 1967, appear to be growing in recent years. At the same time, the total number of manatee deaths is increasing rapidly. Therefore, it has became more important to evaluate the long-term viability of the populations. I hypothesized that cold stress due to cold winters and accidents with watercrafts cause additional mortality, and examined the population trends during the next 100 years.

2. Objectives

- Simulate manatee population trends during the next 100 years under the assumptions that there is additional mortality due to
 - cold stress only (temperature effect)
 - accidents with watercrafts only (boat effect).
 - both cold stress and accidents (combined effect)
- Investigate the relationship between the mean number of deaths due to watercraft accidents in each year and the probability of extinction within the next 100 years

3. Methods

- Model type: modified age based matrix model of female manatees
- Initial population size = 1600
- Mean boat collision deaths / year = 68 individuals
- Draw minimum temperature and the number of boat collision deaths in each year randomly from normal distribution
- Simulated 100 times for each model.



Jun Yoshizaki, Biomathematics Program, North Carolina State University, Raleigh, NC 27695 Email: jyoshiz@unity.ncsu.edu

4. Results: Graphs of Population Trends

Model 1: No effect (natural mortality only)



Model 2: Temperature effect

Even 100 years of consecutive cold winters do not cause the manatee population to decline

Model 3: Boat effect

A mean of 68 boat collision deaths / year causes slower population growth, but the population size still increases

Model 4: Combined effect

Assuming randomly occurring cold winters and a mean of 68 boat collision deaths / year, population growth became even slower, but the population size still increases

BUT.....

If the mean number of boat collision deaths / year becomes 72, there is a chance that the population will become extinct

Without additional mortality, the manatee population keeps growing





 Increase in the mean boat collision deaths (even by a small number) could be a serious problem. For a mean >= 78, the extinction probability became 1. The records show that the deaths due to accidents increased rapidly during last 5 years, therefore understanding the current situation of boat collision deaths is important to maintain manatee populations.



So, what is the relationship between mean boat collision deaths and extinction risk?

of simulations with extinction event



5. Discussion

Extinction Risk =

 Cold winters did not cause the manatee population to decline. This result can be expected because there are thermal refuges during winter (e.g. power plant warm-water discharges) therefore, the mortality due to cold winters was very low. Developing a model that includes the effect of winter refuge loss could be interesting in future studies.

 Current average boat collision deaths (i.e. 68 deaths / year) slowed population growth however, did not cause the manatee population to decline.

 Population growth became even slower when the effects were combined (i.e. randomly occurring cold winters and mean boat collision deaths / year = 68) however, the population was still growing.



Conflict Minerals: Should Businesses Avoid or Develop?

Supply Chain Management, McCombs School of Business

Abstract

- Conflict minerals are those that are sourced under armed forces
- Militia sell the minerals to smelters to be used
- In countries like the Democratic Republic of Congo (DRC), roughly 5 million civilians and workers have died working in these mines
- Armed militia in the DRC generate \$180 million annually from exporting conflict minerals to smelters
- Profits are used to continue their supply of weapons

Research Objective

- Analyze the effects companies have on countries that source conflict minerals
- Determine the extent to which companies are held responsible for the treatment of workers in these mines
- Make recommendations for how businesses can create a more transparent supply chain

Background/Introduction

- In 2010, the US passed the Dodd-Frank Act
- This act required that companies list and audit all of their suppliers
- Businesses were prohibited from sourcing from countries that sold conflict minerals
- 2014 is the first year that companies are required to provide their first audit showing improvements in their supply chain towards less use of these minerals



Carrier a share cardier comprises compliance by the first supplier Garling Scientific Cardier Internation Acade Control Cardier Cardie



Benefits of Dodd-Frank Act

- Serves as guiding point for companies to have their plan of action against conflict minerals
- Forces companies to disclose what their suppliers use
- Eliminates a major source of income in countries, like DRC, that rely on profits from conflict minerals
- Creates more transparency in businesses

Negatives of Dodd-Frank Act

- Focus of economy should be on reforming financial and capital markets, not human rights
- Adds another layer of bureaucracy to business
- Shifts the balance in the supply and demand of companies
 - Estimated initial compliance costs of \$3 to \$4 billion USD, and another \$200 million annually thereafter

Methods for Verifying Conflict-Free

- Auditing: required of each supplier within a company's supply chain
- Supply certification: third-party auditors evaluate suppliers under standards that the company has already set out
- Bag and tag labeling: minerals are bagged and tagged "conflict free" immediately upon extraction
- Analytical fingerprinting: a method determined by a group of German scientists in which the region in which the minerals were extracted from can be determined

Recommendation

- Source majority of minerals from places that are not in conflicted regions
- Find political support from international amnesty to bring reform to the business process in these regions

Status January Westmanish

BATTELL CARACT