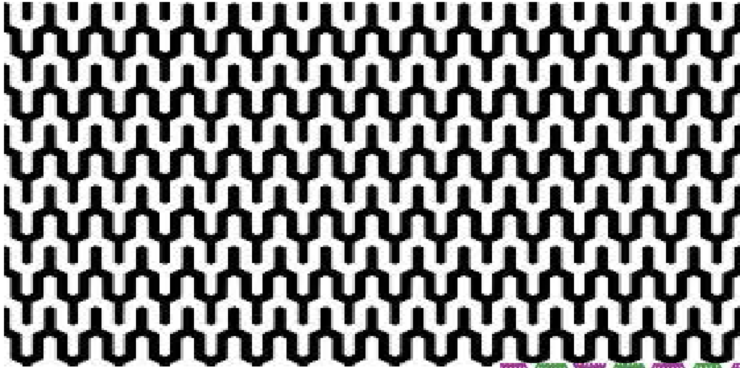
Science Camp #140703.5

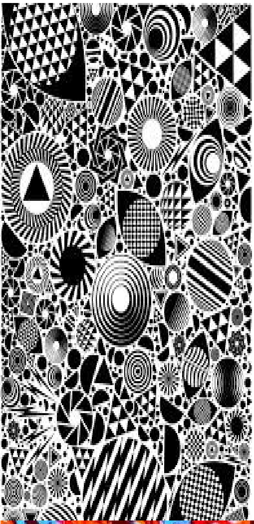
03-05 July 2014 @ the Nelson Condo, the Nelson Cabin on Cedar Mountain, and the surrounding area

Advisors
H. Roice Nelson, Jr., Andrea S. Nelson,
Benjamin B. Nelson, Paul F. Nelson, & Sara Ellen Sullivan

Attendees
Ethan E. Nelson, Grant M. Nelson, Colby C. Wright,
Taylor R. Wright, Ella D. Nelson, Halle N. Wright

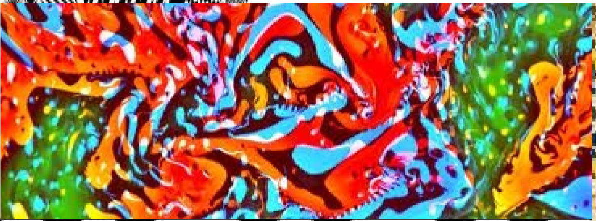
Patterns

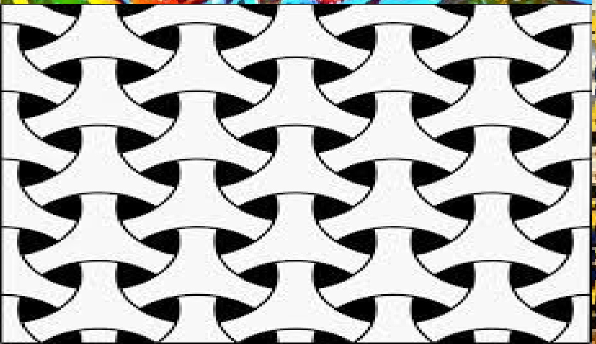


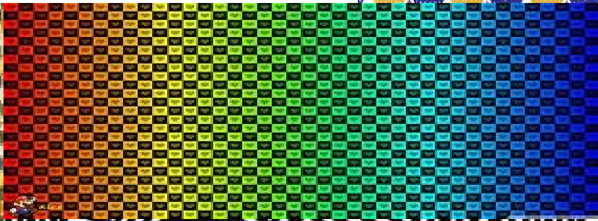


"Who serve unto the example and shadow of heavenly things, as Moses was admonished of God when he was about to make the tabernacle: for, See, saith he, that thou **make all things according to the pattern** shewed to thee in the mount."

Hebrews 8:5







Safety

- Never go anyplace alone, including during the July 4th Parade!
- Exception is if one of you is hurt, then:
  - One of you stay and help the person hurt.
  - The other one run and get help.
- If you get lost stay put, we will find you.
- If you hear a rattlesnake do not move quickly, just slowly move away from the sound.
- Do not run with a knife open. Use knife safety.
- If you cut yourself, apply pressure to the wound to stop bleeding, and send for help.
- Never point an arrow in a cocked bow or a gun at any person.
- Drink lots and lots and lots of water.
- Do not go swimming unless an adult is with you.
- Do not start branches on fire and swing them around where others can be hurt.
- Use common sense, and think before you act.

Schedule Monday - Thursday

- Monday - Tuesday:
  - Colby, Taylor, Halle, Grandpa, and Grandma drive to Utah.
  - Visit the South Rim of The Grand Canyon.
- Wednesday:
  - Meet Paul, Grant, and Ella in Cedar City, unload the U-Haul, decide on meals, and go fishing.
  - Review and print and get bound the books for Science Camp.
- Thursday:
  - Breakfast @ the Condo.
  - 8:00 Dust Devil Ranch service and ridding horses
  - 10:00 Pete Larson at InfoWest and in the field showing a repeater.
  - 12:00 Lunch sandwiches while we visit last year's Geocache up Fiddler's Canyon.
  - 2:00 Showers and get ready for reports and Shakespeare.
  - 3:30 set up for presentations and Aunt Sara Ellyn arrives.
  - 4:00n Song, Patterns, technology breakthroughs, 2013 School Science Presentations.
  - Dinner at Aunt Sara's with Audrey and her kids.
  - 6:30 Theater Preview, Greenshow, Shakespeare's *Comedy of Errors* in the Old West.

Schedule Friday - Sunday

- Friday:
  - 7:00 Neighborhood Pancake Breakfast, provided by LDS Hillcrest Ward.
  - 9:30 4th of July Parade and lunch at the City Park.
  - Visit Cemetery and Veterans Monument.
  - To the Nelson Cabin in the afternoon.
  - “Be-a-man camp-out”:
    - Prepare tin foil dinner, and hike to the top of the hill to the east of the cabin.
    - Select a campsite, set up hammocks, collect wood, cook dinner.
    - Tell stories. Watch the sunrise over Cedar Breaks.
  - “Girl’s Night Out / In”:
    - Fish, explore, and prepare dinner.
    - Drive back to the “C” and watch fireworks from Cedar Mountain.
    - Back to the cabin, s’mores, stories and watch the sunrise across the valley.
- Saturday:
  - 10:00 back together.
  - Discussion about patterns and computers and programming.
  - Rocket Launches, hot lava, water races, etc.
    - Those that want to stay at the cabin Saturday night are welcome to.
- Sunday:
  - Roice and Andrea and Wrights to church at 11:00.

Job Chart

	Wednesday	Thursday	Friday Evening	Saturday Morning	Saturday Afternoon
Ethan	Arrive Late Review Notes	Prepare Breakfast	Prepare & Clean-Up after Dinner	Lunch Clean Up	Clean Cabin
Grant	Review Notes	Breakfast Dishes	Prepare & Clean-Up after Dinner	Prepare Lunch	Clean Cabin
Colby	Review Notes	Set up lunch sandwiches	Prepare & Clean-Up after Dinner	Prepare Lunch	Clean Cabin
Taylor	Review Notes	Clean up lunch garbage	Prepare & Clean-Up after Dinner	Prepare & Clean Up Breakfast	Clean Cabin
Ella	Review Notes	Dinner Dishes at Aunt Sara’s	Prepare & Clean-Up after Dinner	Prepare & Clean Up Breakfast	Clean Cabin
Halle	Review Notes	Dinner Dishes at Aunt Sara’s	Prepare & Clean-Up after Dinner	Prepare & Clean Up Breakfast	Clean Cabin

Notes

Why are Patterns important?

- To show relationships.
- To show trends.
- To provide context.
- To teach.

Shortly a developer asked me, what are the most know-worthy patterns - in context of Java EE. My answer was:

Facade: it decouples independent classes, and more important, decreases (makes the interface more coarse grained) the granularity. Session Facade from Java EE is a sample.
Adapter: makes incompatible things compatible. Especially important in server programming, in case you have to talk to legacy backend systems like SAP, CICS or IMS. Business Delegate in J2EE 1.4 (catches RemoteExceptions and throws something else), DAOs or JCA Connectors are adapters.

Decorator: Enhances an interface (in our case the Facade), with additional aspects (it is actually the beginning of AOP :-)). In Java EE we have the Servlet Filter, Interceptors or implicit decoration with transactions, state or security. In Java SE the whole java.io package is a decorator.

Interface (actually not a standard pattern): is needed for encapsulation, decoupling the clients from the interface realization, and so is the beginning of service orientation or SOA.

Factory/Builder: encapsulates the creation of differnt implementations for a Java-Interface. Can be a part of a framework (see Spring or Java EE 5), or of project architecture.
Command: provides a simple and stable interface (often one method with name like execute, go, run, actionPerformed etc). The implementation provides the behavior, having the only the interface, it is not possible to see what happens :-). Command is the foundation of JMS, the whole SOA (stands for Same Old Architecture :-)) and also the event handling of frameworks like swing (ActionListener), or Struts (Actions).

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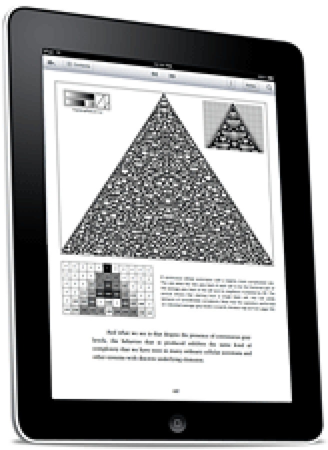

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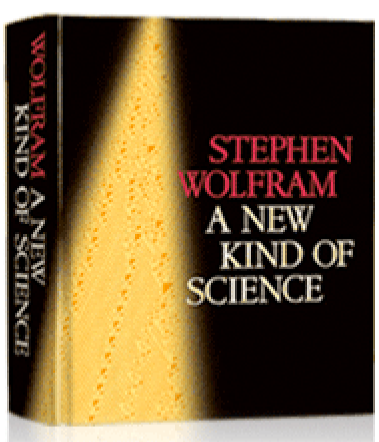

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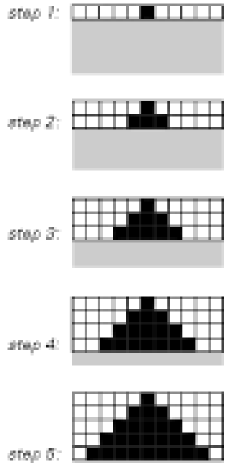
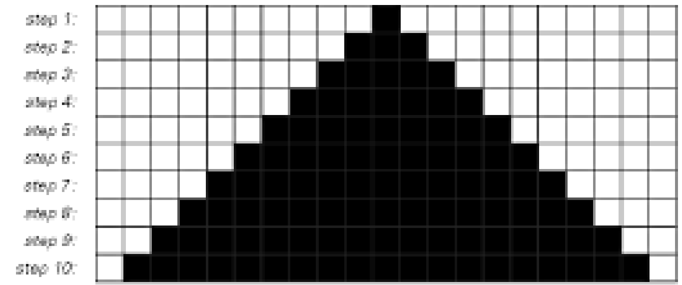
Cellular Automata

An important feature of cellular automata is that their behavior can readily be presented in a visual way. And so the picture below shows what one cellular automaton does over the course of ten steps.

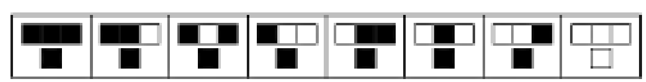


A visual representation of the behavior of a cellular automaton, with each row of cells corresponding to one step. At the first step the cell in the center is black and all other cells are white. Then on each successive step, a particular cell is made black whenever it or either of its neighbors were black on the step before. As the picture shows, this leads to a simple expanding pattern uniformly filled with black.



The cellular automaton consists of a line of cells, each colored either black or white. At every step there is then a definite rule that determines the color of a given cell from the color of that cell and its immediate left and right neighbors on the step before.

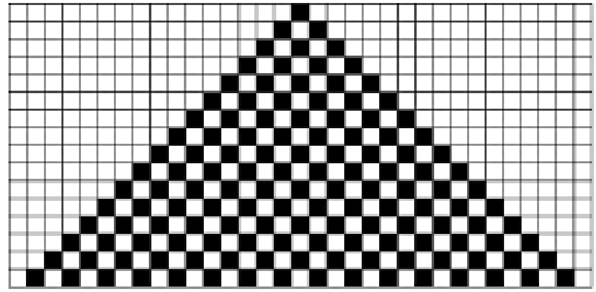
For the particular cellular automaton shown here the rule specifies—as in the picture below—that a cell should be black in all cases where it or either of its neighbors were black on the step before.

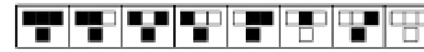


A representation of the rule for the cellular automaton shown above. The top row in each box gives one of the possible combinations of colors for a cell and its immediate neighbors. The bottom row then specifies what color the center cell should be on the next step in each of these cases. In the numbering scheme described in Chapter 3, this is cellular automaton rule 254.

And the picture at the top of the page shows that starting with a single black cell in the center this rule then leads to a simple growing pattern uniformly filled with black. But modifying the rule just slightly one can immediately get a different pattern.

Patterns quickly become complex

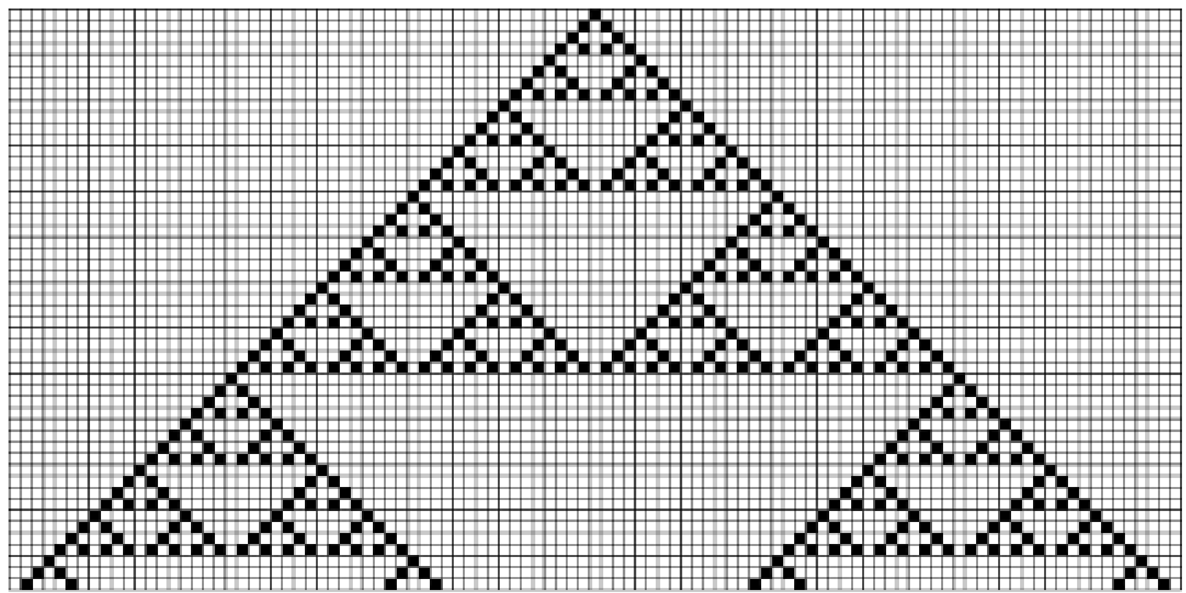


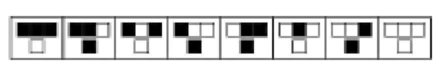


A cellular automaton with a slightly different rule. The rule makes a particular cell black if either of its neighbors was black on the step before, and makes the cell white if both its neighbors were white. Starting from a single black cell, this rule leads to a checkerboard pattern. In the numbering scheme of Chapter 3, this is cellular automaton rule 250.

This pattern is however again fairly simple. And we might assume that at least with the type of cellular automata that we are considering, any rule we might choose would always give a pattern that is quite simple. But now we are in for our first surprise.

The picture below shows the pattern produced by a cellular automaton of the same type as before, but with a slightly different rule.





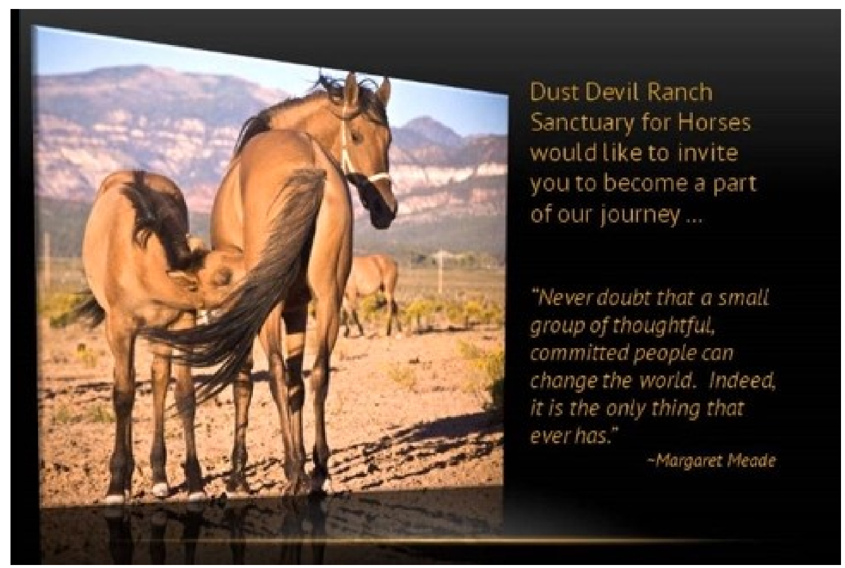
A cellular automaton that produces an intricate nested pattern. The rule in this case is that a cell should be black whenever one or the other, but not both, of its neighbors were black on the step before. Even though the rule is very simple, the picture shows that the overall pattern obtained over the course of 50 steps starting from a single black cell is not so simple. The particular rule used here can be described by the formula $a_i' = Mod[a_{i-1} + a_{i+1}, 2]$. In the numbering scheme of Chapter 3, it is cellular automaton rule 90.

Weaving was a first Pattern

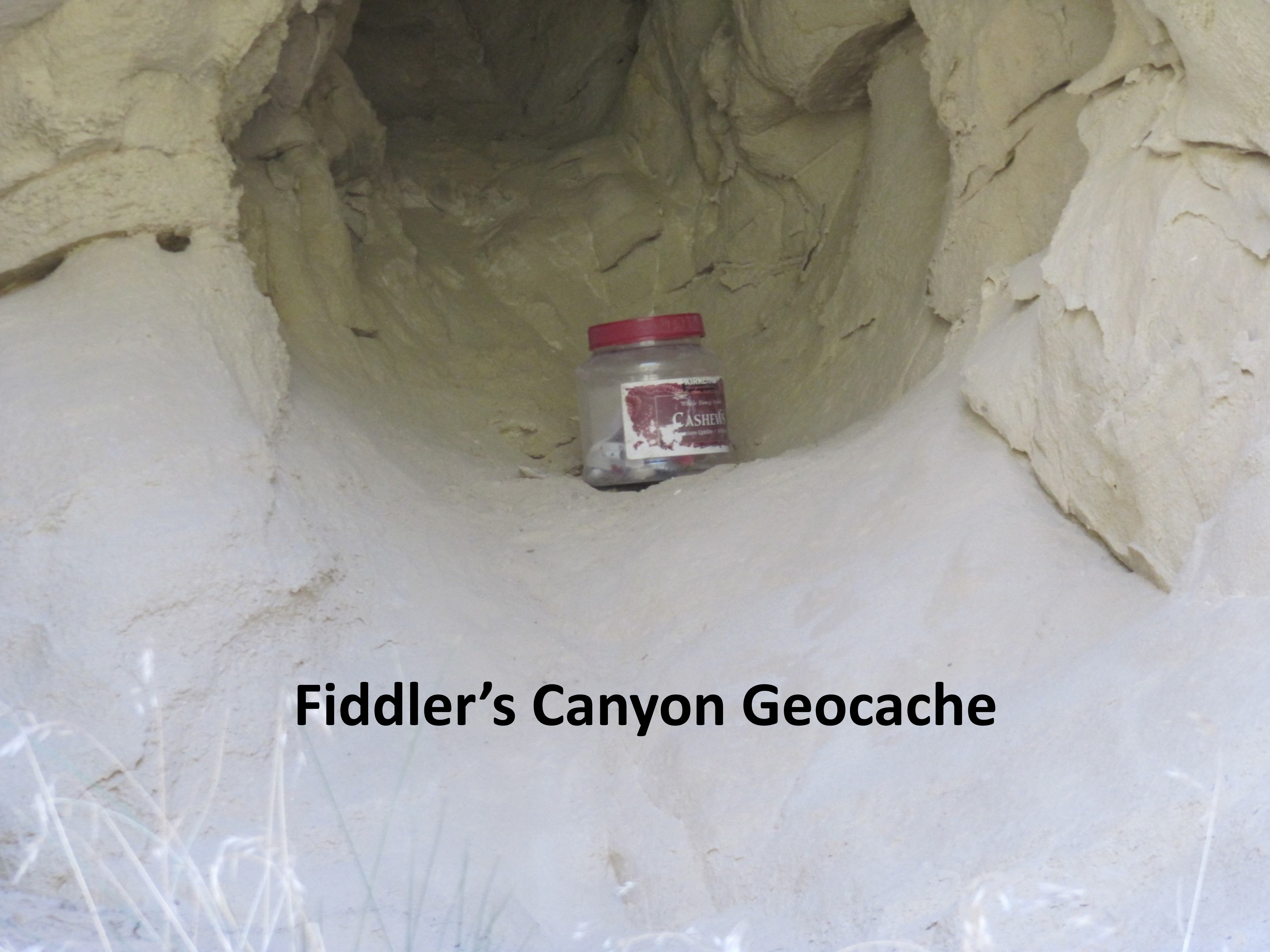
Weaving code: learning computer programming through pattern and craft
February 17, 2014
A new collaborative project, “Weaving code:learning computer programming through pattern and craft.”
There is national policy drive [Britian] to teach computer programming in schools. However, there is a disconnect between programming, and socially-situated learning through play. Our research will bridge this gap, recognising the needs of people, particularly of children, to engage with the social and tangible in order to understand the abstract. Our core aim is to bring pattern making in weaving, together with pattern making in live coding of music, in a pedagogic context. This will ground abstract thinking in social activities, as a springboard for learning. We will reconnect computer programming with its origins in craft, drawing from the inspiration which Babbage and Lovelace took from the Jacquard loom, as well as the development of formal mathematics in Greek antiquity using loom metaphors.

Notes

Dust Devil Ranch, Cedar City, Utah

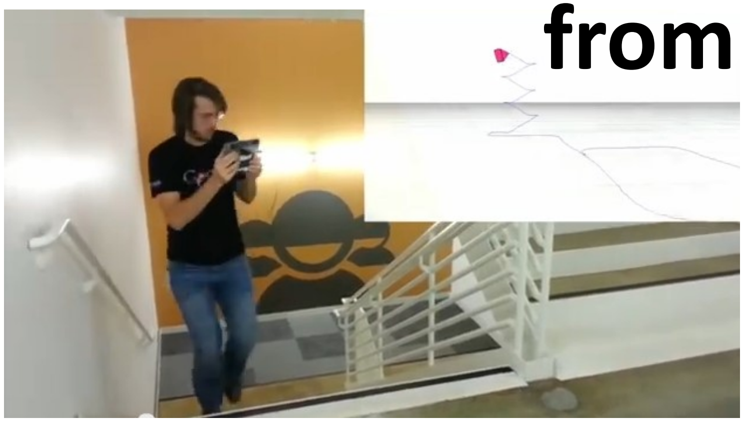


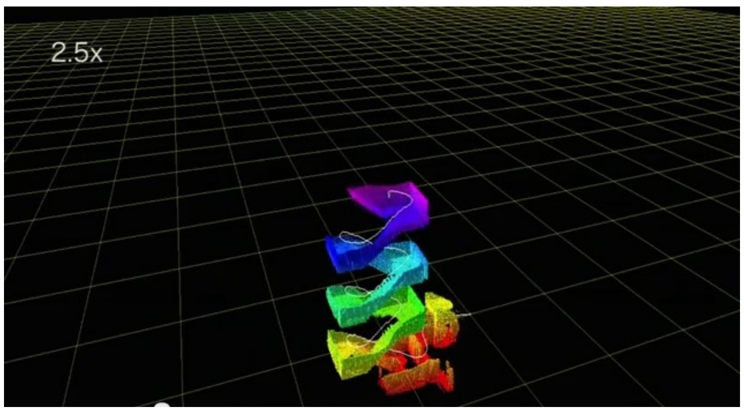
Pete Larsen: InfoWest

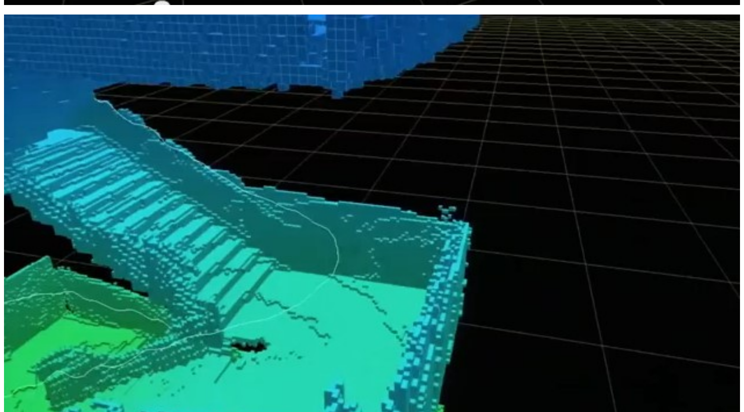

Fiddler’s Canyon Geocache

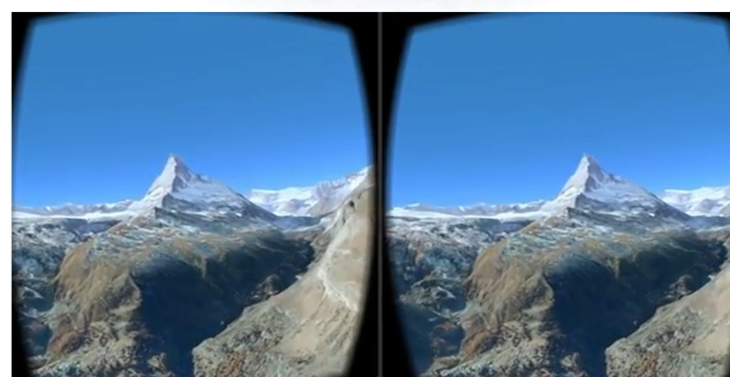
Notes

Tango & Cardboard VR from Google IO



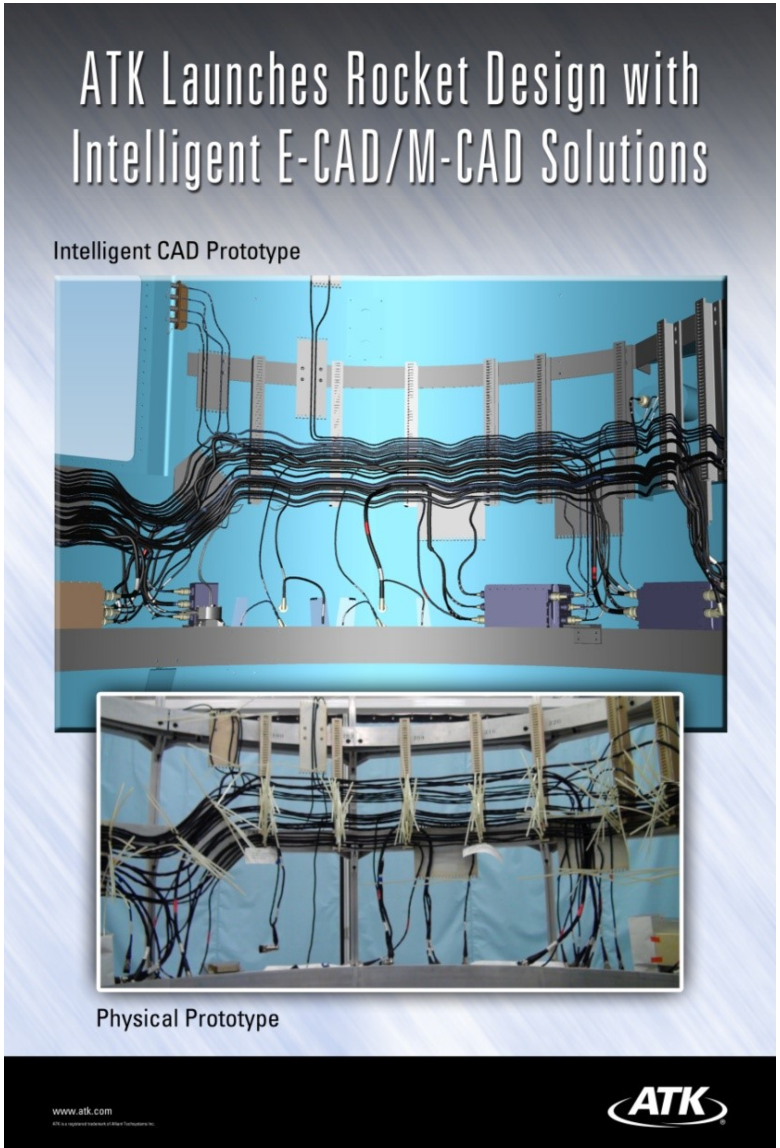






Paul's Report

Patterns are Everywhere



Ethan's Report

Ethan Nelson
Mrs. Tracy
Period 8
10/23/13

Problem Statement

- Which type of internal structure withstands weight the best?

Variables

- Independent Variable: Internal Structure type I will use trusses, columns, and load bearing walls as the three variables
- Dependent Variable: The amount of weight each structure can hold.
- Control Variable: Basic structure, type of weight, and material type.

Background Knowledge

- Buildings are man made structures built for shelter. Buildings are supported by things called structural elements. These are the parts of a building that keep it standing. Three examples of structural elements are load bearing walls, columns, and trusses. Trusses are structural elements that can keep the ceiling from sagging and extreme weight. Load bearing walls are inter-walls running through the whole building and support all other walls. Columns are a structural element that do the same thing as load bearing walls but also support the floors.

Hypothesis

- Load bearing walls will hold the most weight because it interlocks with other walls while columns and trusses sit separate. In addition, load bearing walls transfer weight to the foundation.

Ethan Materials & Procedure

Materials
Foam core
Cutting knife
foot long ruler
glue
weight

Procedure

1. Take foam core, matte board, a cutting knife, and a ruler to make a structure that will have a specific internal structure. Be sure to make each building the same design. Not doing this will affect the outcome of the data.
2. Repeat step 1 twice for two other structure types.
3. Take the balsa wood to create the three different structure types you will put inside each building.
4. Take all the items you have made and glue them together to make the three buildings.
5. Now that you have all the models you need take the first three and put a series of weights on each one.
6. Continue to put more and more weight until each structure has collapsed.
7. Record the data found in step 6.

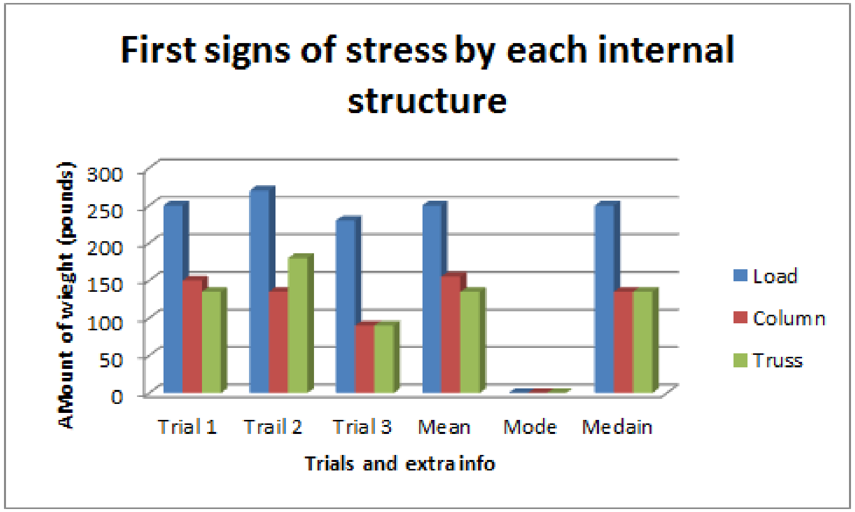
Ethan Data/Results

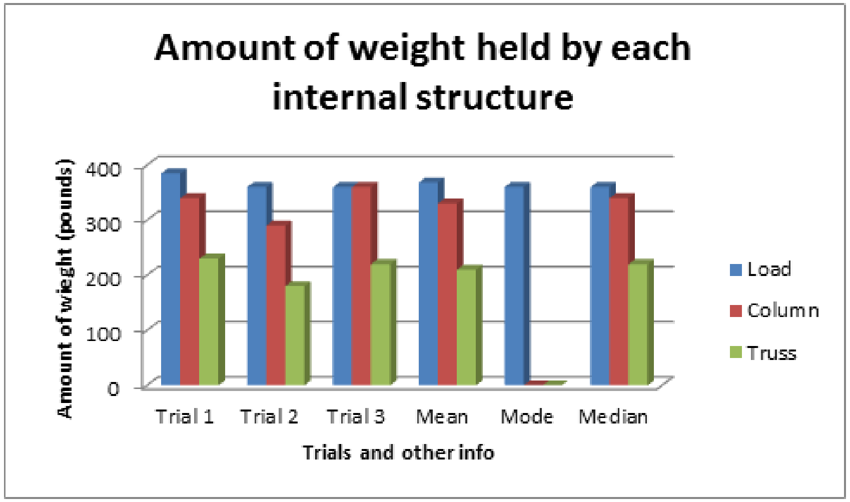
First signs of stress by each internal structure

	Trail 1	Trail 2	Trial 3	Mean	Mode	Median
Load	250lb	270lb	230lb	250lb	N/A	250lb
Column	150lb	135lb	90lb	155.3	N/A	135lb
Truss	135lb	180lb	90lb	135lb	N/A	135lb

Amount of weight held by each internal structure

	Trial 1	Trial 2	Trial 3	Mean	Mode	Median
Load	385lb	360lb	360lb	368.3lb	360lb	360lb
Column	340lb	290lb	360lb	330lb	N/A	340lb
Truss	230lb	180lb	220lb	210lb	N/A	220lb





Ethan Conclusions

Conclusion

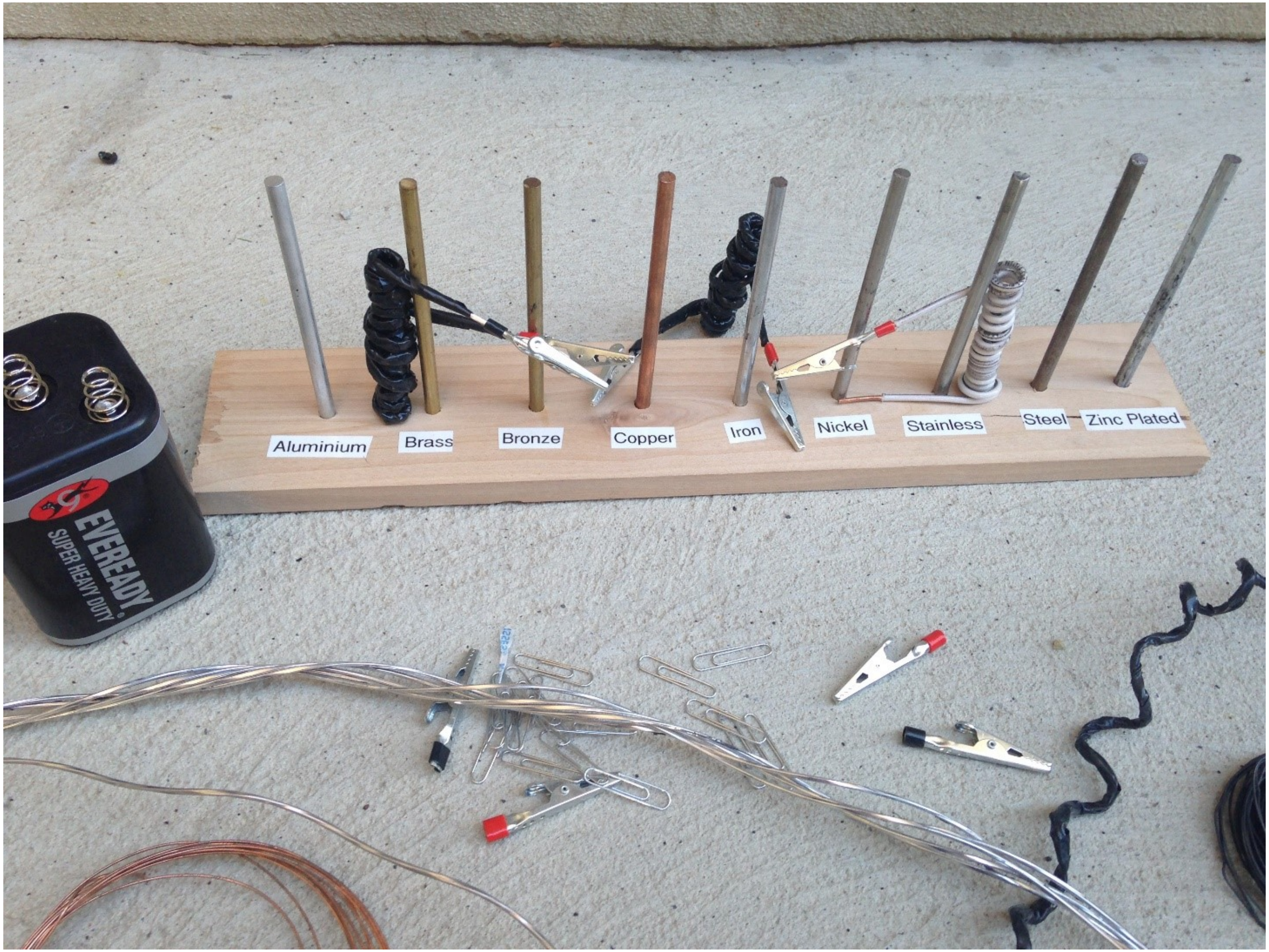
This study was done to see what internal structure element would hold the most weight. The three structural elements I used for this experiment were load bearing walls, columns, and trusses. The hypothesis was the load bearing walls would hold the most weight. The results showed that load bearing walls held the most weight with a whopping 385 lbs! Columns had the second most right behind load bearing walls at 360 lbs. And trusses had the least by a longshot at 210 lbs!

The results had to be the way they were because both load bearing walls and columns had wall and roof support so they held more weight and when it did collapse the weight slid off to one side. On the other hand trusses only supported the roof so when the weight fell it flattened the model like a pancake. Also, in a real world situation load bearing walls would be the safest because as the weight fell it slid off to one side. It didn't crush so therefore if you were inside, you wouldn't be crushed and probably would have survived. Although the experiment seemed accurate the models could have been made a little better. By that, the cuts should have been more straight, and the sizes of the pieces could have been more replicant.

Bibliography

- **http://en.wikipedia.org/wiki/Load-bearing_wall**
- http://en.wikipedia.org/wiki/Beam_(structure)
- http://en.wikipedia.org/wiki/Building

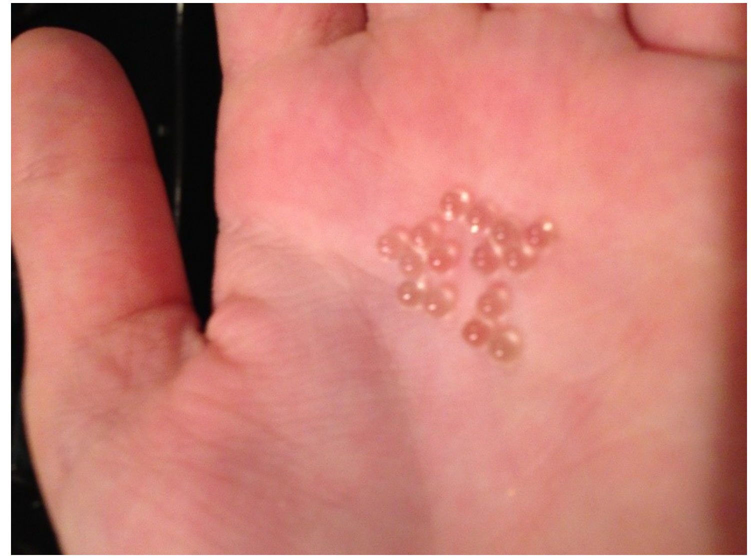
Grant’s Report



Colby’s Report




Taylor's Report



Ella's Report

Condensation Update

A Safety Net for the Drought-Stricken

In the foggy, desolate hillsides outside Lima, Peru, water for drinking and irrigation is a luxury. The area's 1.5 centimeters of annual rainfall barely helps, and buying water isn't an option for residents of this poverty-stricken region. Surprisingly, a piece of mesh hung vertically between two poles is an idea that holds water, literally. Invented by the Meteorological Service of Canada, the so-called fog fences capture water droplets in fog, and they trickle into a collection trough and drain into buckets or tanks. During the nine foggiest months of the year, the community of Bellavista (pop. 200) can harvest 75 gallons of water every night using five large fog fences. "These fog nets have improved our quality of life," says resident Noe Neira Tocto. "We can grow vegetables for our families." Fog fences are also helping irrigate arid regions in other parts of South America and in Africa. Recently, researchers from the Netherlands and China developed an absorbent fabric that may help fog fences collect even more water. R

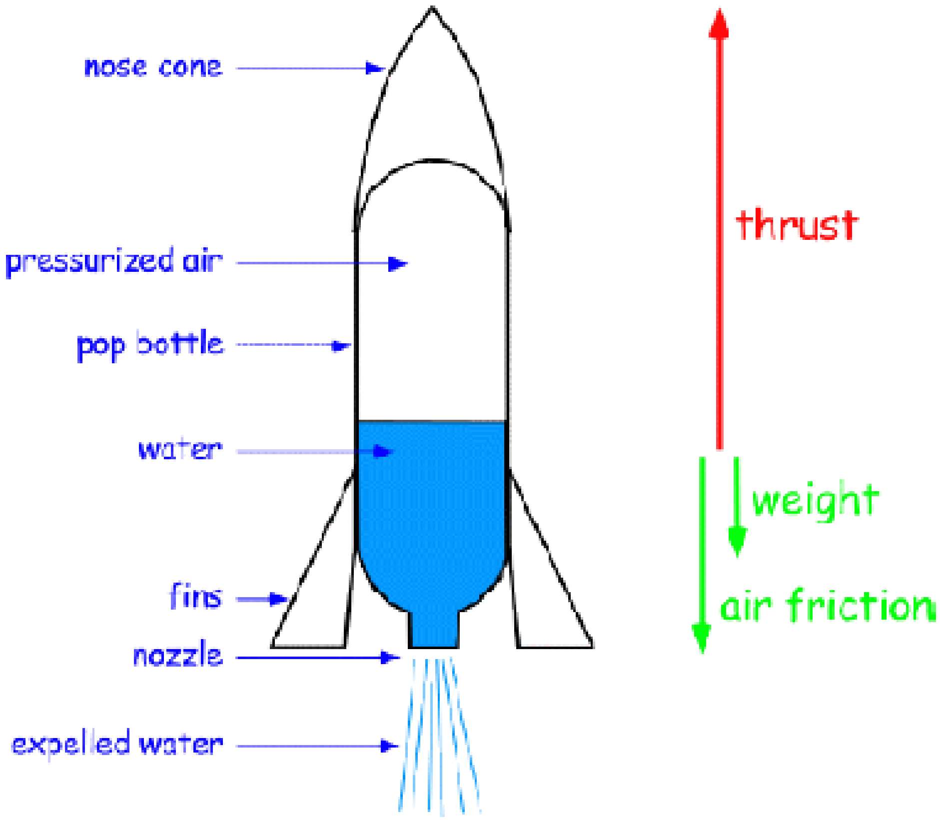
Halle's Report

Notes

Water Bottle Rockets

2-Liter Water Bottle Rockets Overview

Great detailed website: http://www.et.byu.edu/~wheeler/benchtop/flight.php



The equation for thrust, caused by water exiting the nozzle, is:

$$T = (P_{in} - P_{out}) \cdot A_n$$

where P_{in}-P_{out} is the difference between pressure within the rocket and atmospheric pressure, and A_n is the cross-sectional area of the nozzle opening. Thrust is dependent on pressure, nozzle diameter. The amount of water dictates how long the thrust force will be applied, and therefore contribute to the rocket's total kinetic energy.

Water Bottle Rockets continued

The following values are the optimal values for maximum height at 90 psi:

- Air/Water ratio = 0.5 liters
- Dry Weight = 220 grams
- Stabilizer Length = 3.5 inches
- Maximum Height = 350 ft (impact pressure = 120 mph baseball pitch)

Water Bottles with thicker plastic (cord strength) can be pressurized greater; many European bottles have much stronger cord strengths than U.S. plastic bottles.

The following mathematical expression yields ~apogee height for a given total flight time:

$$h_{ap} = (g/8)(t_{end})2 – 3.5 \text{ meters}$$

Water rockets, requiring a largish capacity for air and water, are usually large in diameter, this causing a large amount of drag and limiting the height achieved. However, the impulse rating for even a 2 liter water rocket is normally E - four times the impulse of a pyro motor that can be bought over the counter in a high street toy shop.

Motor Impulse Classes	
Impulse /Ns	**Class**
I <= 0.625	¼A
0.625 < I <= 1.25	½A
1.25 < I <= 2.5	A
2.5 < I <= 5	B
5 < I <= 10	C
10 < I <= 20	D
20 < I <= 40	E
40 < I <= 80	F
80 < I <= 160	G
160 < I <= 320	H
320 < I <= 640	I
640 < I <= 1280	J
1280 < I <= 2560	K
2560 < I <= 5120	L
5120 < I	>L

FAMILY

The Little Boat That Sailed Through Time

BY ARNOLD BERWICK

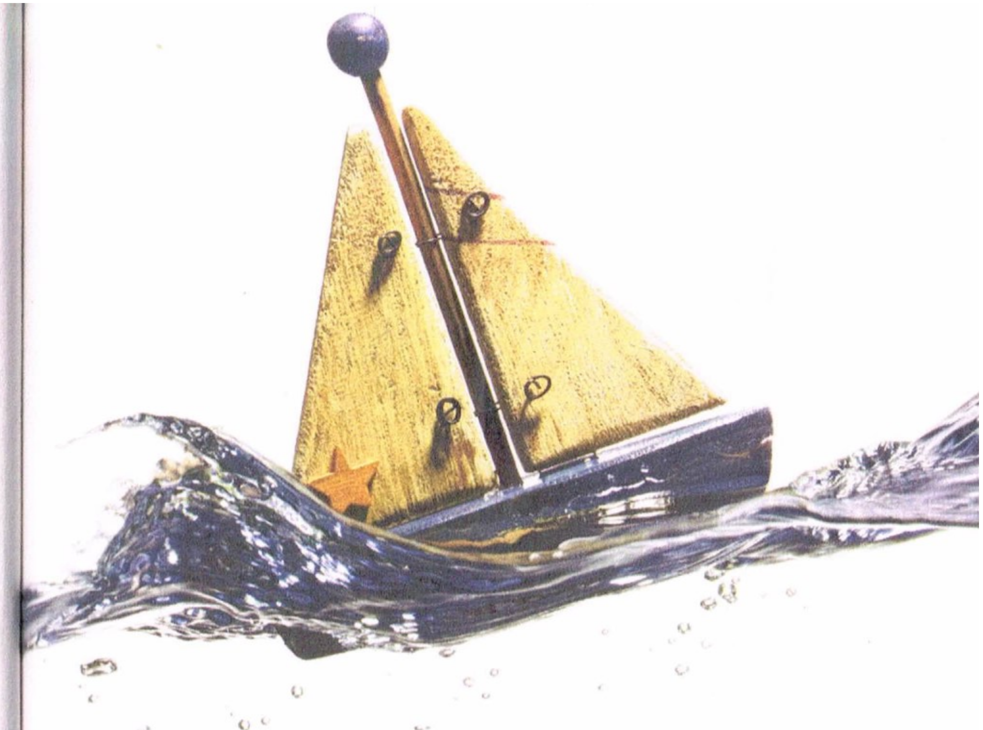
I SPENT THE tenth summer of my childhood, the most memorable months of my life, in western Norway at the mountain farm where my mother was born. What remains most vivid in my mind are the times I shared with my grandfather Jørgen.

The first thing I noticed about Grandfather was his thick, bushy mustache and broad shoulders. The second thing was how he could work. All summer I watched him. He mowed grass with wide sweeps of the scythe, raked it up, and hung it on racks to dry. Later he gathered the hay in bundles tied with a rope and carried them on his back, one after another, to the barn.

He sharpened the scythes on a grindstone, slaughtered a pig, caught and salted fish, ground barley in a water-driven gristmill, and grew and stored potatoes. He had to produce enough in the short summer to carry the family and the animals through the long, snowbound winter. He stopped only long enough to eat and to sleep a few winks.

And yet he found time for just the two of us. One day after a trip to a faraway town, he handed me a knife and sheath, saying, "These are for you. Now watch."

He slipped his own knife from its sheath, cut a thin, succulent branch from a tree, and sat down beside me. With callused hands, he showed me how to make a flute. Even today, 63 years later, whenever I hear the pure notes of a flute, I think of how he made music from nothing but a thin branch of a tree. Living on an isolated mountain farm, far from neighbors and stores, he had to make do with what he had.



PROP STYLIST: ROBIN FINLAY

As an American, I always thought people simply bought whatever they needed. Whether Grandfather knew this, I don't know. But it seems he wanted to teach me something because one day, he said, "Come. I have something for you."

I followed him into the basement, where he led me to a workbench by a window. "You should have a toy boat. You can sail it at Storvassdal," he said, referring to a small lake a few miles from the house.

Swell, I thought, looking around for the boat. But there was none.

Grandfather picked up a block of wood, about 18 inches long. "The boat is in there," he said. "You can bring it out." Then he handed me a razor-sharp ax.

I wasn't sure what to do, so Grandfather showed me how to handle the tool. I started to chop away to shape the bow. Later, after he taught me the proper use of the hammer and chisel, I began to hollow out the hull.

Often Grandfather joined me in the basement, repairing wooden rakes or sharpening tools. He answered my questions and made suggestions, but he saw to it that I did all the work myself.

PHOTOGRAPH BY ADAM VOORHES

"It'll be a fine boat, and you'll be making it all with your own hands," he said. "No one can give you what you do for yourself." The words rang in my head as I worked.

Finally, I finished the hull and made a mast and sail. The boat wasn't much to look at, but I was proud of what I had built.

Then, with my creation, I headed for Storvassdal. Climbing the mountain slope, I entered the woods and followed a steep path. I crossed tiny streams, trod on spongy moss, and ascended slippery stone steps—higher, higher, until I was above the timberline. After four or five miles, I came at last to a small lake that had been carved out by a glacier. Its sloping sides were covered with stones of all shapes and sizes.

I launched my boat and daydreamed while a slight breeze carried the little craft to an opposite shore. The air was crisp and clean. There was no sound but the warble of a bird.

I would return to the lake many times to sail my boat. One day, dark clouds came in, burst open, and poured sheets of rain. I pressed myself against a large boulder and felt its captured warmth. I thought of "Rock of Ages" (" ... let me hide myself in thee"). Through the rain, I saw my little boat pushing its way over the ripples. I imagined a ship bravely fighting a turbulent sea. Then the sun came out, and all was well again.

A crisis developed when we were ready to return to America. "You cannot bring that boat home with you," my mother said. We already had too much baggage.

I pleaded, but to no avail.

With a saddened heart, I went to Storvassdal for the last time, found that large boulder, placed my boat in a hollow space under its base, piled stones to hide it, and resolved to return one day to recover my treasure.

"No one can give you what you do for yourself." The words rang in my head as I worked.

I said goodbye to my grandfather, not knowing I would never see him again. "Farewell," he said as he clasped my hand tightly.

In the summer of 1964, I went to Norway with my parents and my wife and children. One day, I left the family farmhouse and hiked up to Storvassdal, looking for the large boulder. There were plenty around. My search seemed hopeless.

I was about to give up when I saw a pile of small stones jammed under a boulder. I slowly removed them and reached into the hollow space beneath the boulder. My hand touched something that moved. I pulled the boat out and held it in my hands. For 34 years, it had been resting there, waiting for my return. The rough, bare-wood hull and mast were hardly touched by age; only the cloth sail had disintegrated.

I shall never forget that moment. As I cradled the boat, I felt my grandfather's presence. He had died 22 years before, and yet he was there. We three were together again—Grandfather and I and the little boat, the tangible link that bound us together.

I brought the boat back to the farm for the others to see and carved *1930* and *1964* on its side. Someone suggested I take it home to America. "No," I said. "Its home is under that boulder at Storvassdal." I took it back to its resting place.

I returned to the lake in 1968, 1971, 1977, and 1988. Each time as I held the little boat and carved the year on its side, my grandfather seemed near.

My last trip to Storvassdal was in 1991. This time, I brought two of my granddaughters from America: Catherine, 13, and Claire, 12. As we climbed the mountain, I thought of my grandfather and compared his life with that of my granddaughters. Catherine and Claire are made of the same stuff as their ancestors.

They are determined and independent—I see it in the way they carry themselves at work and play. And yet my grandfather seemed to have so little to work with, while my granddaughters have so much.

Usually the things we dream of, then work and struggle for, are what we value most. Have my granddaughters, blessed with abundance, been denied life's real pleasures?

Working tirelessly on that isolated farm, my grandfather taught me that we should accept and be grateful for what we have—whether it be much or little. We must bear the burdens and relish the joys. There is so much we cannot control, but we must try to make things better when we are able. We must depend on ourselves to make our own way as best we can.

Growing up in a comfortable suburban home, my granddaughters have been presented with a different situation. But I hope—I believe—they will in their own way be able to cope as well as my grandfather coped and learn the lesson my grandfather taught me all those years ago. On the day I took them to Storvassdal, I hoped they would somehow understand the importance of the little boat and its simple message of self-reliance.

High in the mountain, I hesitated to speak lest I disturb our tranquillity. Then Claire broke my reverie as she said softly, "Grandpa, someday I'll come back." She paused. "And I'll bring my children." R

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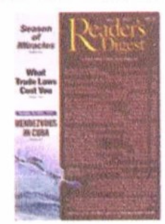
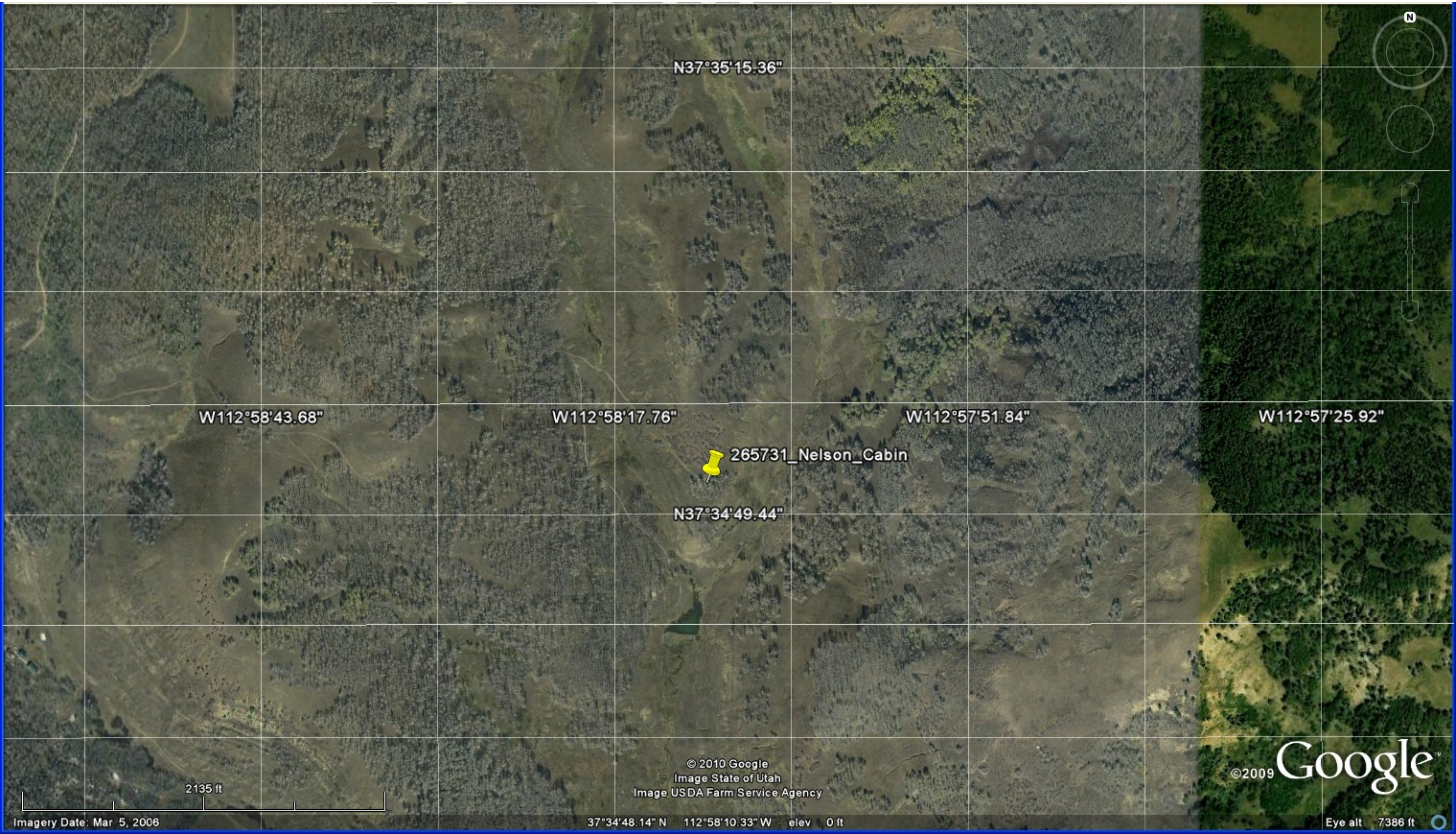


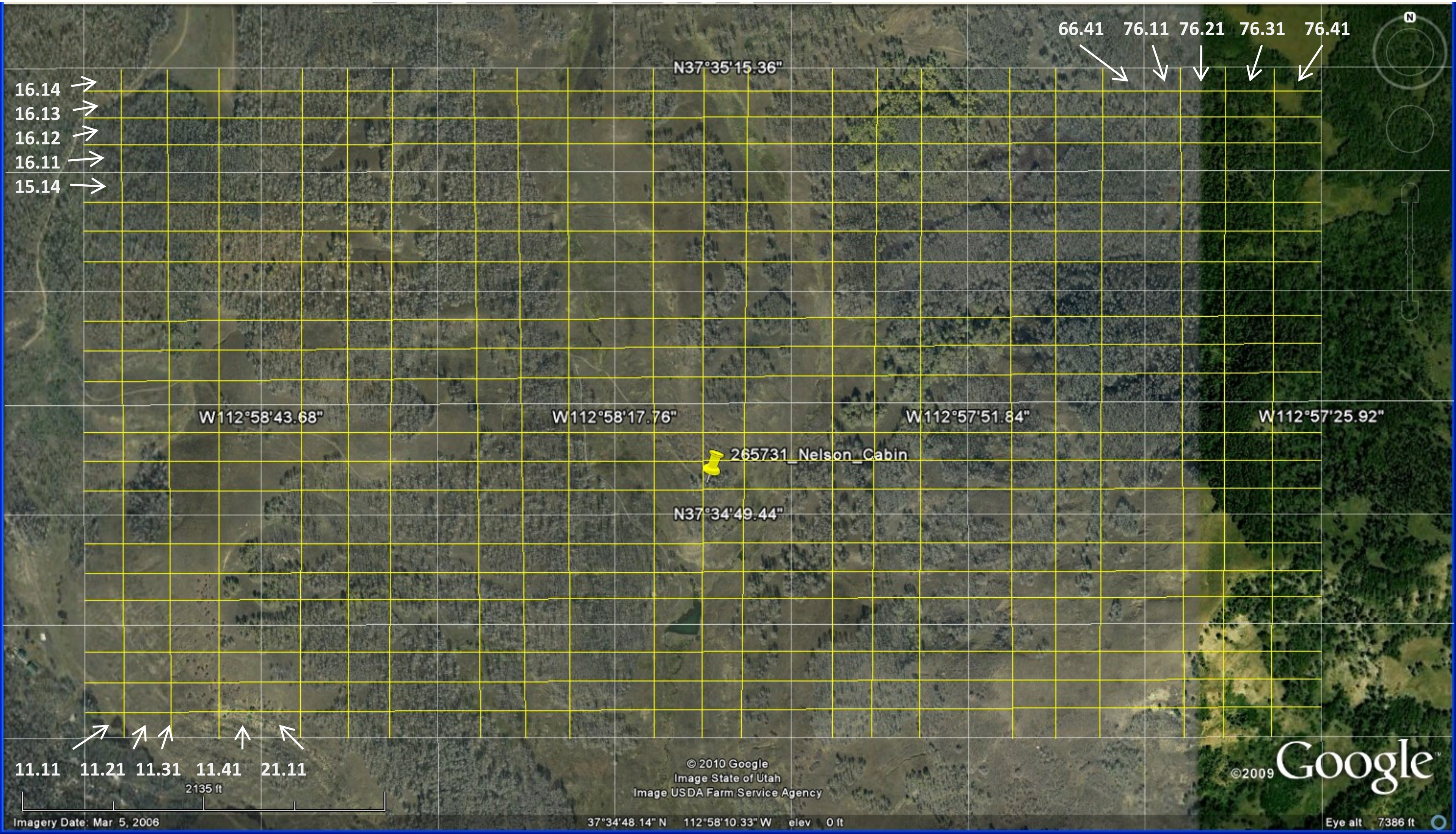
Reader's Digest first published this article in May 1993. Arnold Berwick passed away in December 2013, at the age of 93.

Nelson Cabin Map

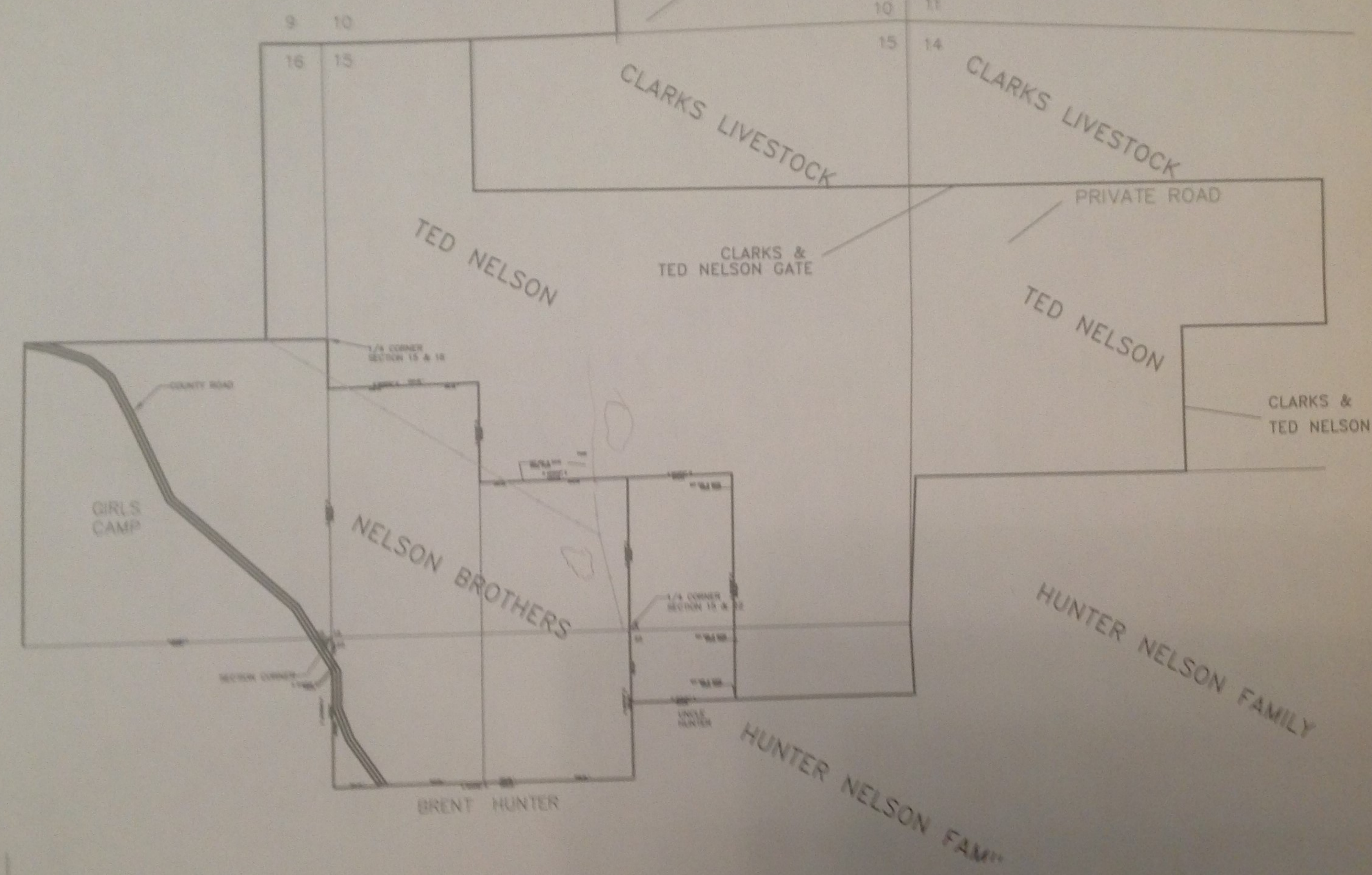


Reference Grid

More Detail Reference Grid



Find Quarter Section Corners at Cabin



Notes

2014 Science Camp

- What was best about 2014 Science Camp?
  - ______________________________
  - ______________________________
  - ______________________________

- What would be your ideal 2015 Science Camp?
  - ______________________________
  - ______________________________
  - ______________________________