

Sunday, April 30th

Ohm's Law: Channeling Resistance to a Higher Power
Jim Fisher, Worship Leader
Kay Wilkins, Worship Associates

Centering Thought:

The pre-socratic philosophers wondered about the fundamental essence of the universe. Earth, Air, Water, Fire. Following on Heraclitus emphasis on fire and the fundamental importance of change, we too will consider energy, resistance, transformation and religion. .

We are energy. Our thoughts, feelings and actions are all the channeling of energy from subatomic particles to the infinite and expanding universe. Resistance channels that energy, our collective energy, to shape a brighter future.

We will now see a short performance of Vivaldi's Summer Presto from Four Seasons four Tesla Coils. I'll say a little more about this in about 2 minutes.

[The Four Seasons, Summer Presto](#) - Vivaldi



Call To Worship

May the Force be with You

By [Tori Jameson](#)

Among Star Wars aficionados, May 4th is recognized as a special day. This "May the Fourth" invocation was written by Tori Jameson with help from Earl Rogers, Kevin Mann, and Cyn Burnelle. Please use it in worship as responsibly as a Jedi uses a lightsaber.

Leader: May the force be with you!

Congregation: And also with you!

L: Lift up your lightsabers

C: We lift them up to the Rebellion

L: We cast away the spirit of Jar-Jar, bringer of mindless chatter and unnecessary anecdotes. We call forth the spirit of Obi-wan Kenobi, patient teacher and speaker of riddles.

C: Come, spirit of Obi-wan Kenobi, come.

L: We call forth the spirit of Yoda, ancient teacher of wisdom.

C: Come, spirit of Yoda, come.

L: We call forth the spirit of Padme, strong and fierce leader of nations, and mother.

C: Come, spirit of Padme, come.

L: We call forth the spirit of Han Solo, determined friend and defier of odds.

C: Come, spirit of Han Solo, come.

L: We call forth the spirit of R2-D2, humble in service and great of heart.

C: Come, spirit of R2-D2, come.

L: The force is truly with us. In a sign of community and mutuality, let us share a sign of the force with one another.

Opening Hymn [Woyaya](#) Singing the Living Tradition #1020 Choir for the Earth

This song was recorded in the 1970s by the Ghanaian-British group Osibisa. A hopeful song of journey.

Chalice Lighting

Affirmation of Covenant

Time for All Ages When Life Gives You Lemons - Jim Fisher

This is the big “sciency” part of the service. I’ll just lay my cards on the table.

$I = E / R$

Induction = Energy / Resistance.

That’s it. Ohm’s Law. If this makes perfect sense to you, I can end the service now. I’m done, you’re saved, time for coffee. I’m guessing a few of us are a little rusty.

When I was young and dinosaurs roamed the earth, I was fascinated with electronics. Back then all the parts were pretty big and would seem fairly primitive now. The first radio I built had no battery, actually no electric power at all. You tuned in a station by moving a thin wire over a small piece of crystalline galena. If your wire hit just the right space, you could faintly hear the radio over an earplug speaker. The galena rectified radio waves, creating a weak electrical signal. The radio waves were and are all around us and all kinds of frequencies, but we can feel them or hear them. The galena crystal could focus in on one frequency, convert it and amplify it to a frequency that we can hear. My crystal radio could typically only find one station that was a powerful AM pop music format. One of the secrets to building a more powerful radio is having a stable source of electricity to amplify or boost the signal. You need a battery. But what if the store is closed?

I called the time for All Ages “When Life Gives You Lemons” because lemons provide the catalyst for our small battery. We’ll take a minute to do that now. I’m not a master at doing live demonstrations on Zoom, but here goes.

- 1) Roll the lemon around to free up the juice inside
- 2) Insert nails or bits of metal
 - a) Copper
 - b) Zinc (galvanize coating on nails, metal pipes, etc. often contains zinc)
- 3) Connect a meter or very sensitive LED bulb
- 4) It works! (Usually) Electrons are flowing from the zinc anode to the copper cathode. Th

The lemon battery has some limitations.

- It is a lemon, worse, a lemon that has been stabbed by bits of zinc and copper. It won’t last long.
- It is a little bulky for most applications. A flashlight might need a dozen or more lemons
- Lemons are pretty expensive in Maine. Your flashlight might cost \$6/day or more in lemon batteries.
- You can’t recharge a lemon.
- The Zinc is going to deteriorate as it gives up electrons that flow to the copper. It’s called a sacrificial anode.

It turns out you can also use lemon juice, vinegar or other acid solutions. Car batteries use lead and sulphuric acid which is more efficient, but toxic.

I bet you know other ways to make electricity. Even if you don’t think you do. Feel free to type your ideas into chat while I mention a few.

- **Friction:** Combing your hair, putting on a wool sweater or petting a cat on a dry day use friction to generate static electricity. Lightning is a build up of this static electricity caused by billions of tiny collisions between ice and hail crystals in clouds.
- **Electro-Magnetism:** Turning a generator - which moves a magnet by a coil of wire converts magnetic energy to electrical energy. This process works in reverse when you use electrical energy to make a motor spin.

- **Light:** Solar power batteries convert light into electricity. The lemon tree that made your lemon is a kind of solar collector, turning the sunlight into sour lemon juice that you need for your battery.
- **Pressure:** Some things give off electricity when they are compressed. Your grandparents' telephones used "Carbon Microphones" that converted the pressure of the sound waves from your grandparents' voices into tiny amounts of electricity that carried the sound over wires to your phone.
- **Chemical:** This is our battery, but your body is a kind of battery too. You are turning the energy of the sun that grew the food you eat into your own static and kinetic energy. You charge up by eating and discharge by working. You turn the potential energy of food into motion. Your body is a hugely complex system with electrical impulses flowing between your brain and muscles.

So what does Ohm's law have to do with all of this?

Induction = Energy / Resistance
Flow = Pressure / Resistance
Amps = Volts / Ohms

Induction is like a river of electrons flowing through copper wire, or the flow of water through a hose. More electrons or water = more flow. Flow=work.

Resistance is a barrier to that flow. It makes it harder for the water or electrons to get through, like a kink in the hose. You need more pressure to move the water through that kink.

Energy is the pressure that moves electrons. If you have enough energy, it can leap long distances (overcome resistance) to find a ground. Lightning and the sparks in the first bit of music are good examples.

I could, and would go on for hours on this topic if you had the patience. My engineering son said probably most people would know the difference between parallel and series circuits. This is a key point, but I'll save that for another sermon. For now, think about how flow, energy and resistance are all around you. Even as you walk you may notice what takes more energy, what slows you down or rubs you wrong. You may also notice what comes easily, gives you greater energy. The foods you eat, resting which helps your brain to sort out all the chemicals and electrical charges from the day, give you energy. Think about it.

Two Prayers and Two Silences - a thought experiment

Close your eyes and imagine your world without resistance.

What are you thinking?

- Did you imagine a bucolic, peaceful world of daffodils and sunshine and well behaved kids?
- Did you imagine that you have no problems, that you are centered, balanced, content?
- Did you imagine yourself sliding down a snowy hill?
- Did you imagine a complete loss of self, a merging into the universe?
- Did you imagine your complete subjugation to an authoritarian power, being expendable?

- Did you imagine that you were the benevolent dictator and no others would resist your laws?
- Did you imagine a black hole in space at -273 degrees, pitch black, soundless, frozen?

Now, come back from where-ever your fertile imagination took you and sense where you are now. Consider all the forms of resistance that are present in this room and in you. Focus your fertile imagination on resistance.

- Did you feel the force of gravity pushing you into your seat?
- Did you feel the friction of your clothes, your feet pressing into the floor (and the floor pushing stubbornly back up.)
- Did you recall the irritation you felt when someone resisted your will?
- or perhaps the irritation they expressed when you resisted their will?
- Did you feel the electric energy racing around your body, carrying messages from your sore back or itchy foot to your brain, and the messages your brain sent back to get you to your back and foot?
- Did all this recollection tire you out?

Readings

Star Trek: The Next Generation

The Borg : Strength is irrelevant. Resistance is futile. We wish to improve ourselves. We will add your biological and technological distinctiveness to our own. Your culture will adapt to service ours.

Capt. Picard : Impossible. My culture is based on freedom and self-determination.

The Borg : Freedom is irrelevant. Self-determination is irrelevant. You must comply.

Capt. Picard : We would rather die

The Borg : Death is irrelevant.

Carl Jung

“Resistance to the organized mass can be effected only by the man who is as well organized in his individuality as the mass itself.”

Harry Belafonte

I'm not quite sure precisely when social and political activism became a visible brand of my DNA, but it seems to me that I was born into it. It is hard to be born into the experience in the world of poverty and not develop some instinct for survival and resistance to those things that oppress you.

Thomas Jefferson

The spirit of resistance to government is so valuable on certain occasions that I wish it to be always kept alive.

Maya Lin

To fly we have to have resistance.

MEDITATIVE HYMN:

Step By Step The Longest March Pete Seeger

SERMON

Ohm's Law: Channeling Resistance to a Higher Power

I have been fortunate to be the last one at bat on these Zoom-Only services. I like being with you in the sanctuary, for sure, but I also like hearing what others have said about the monthly theme. We didn't say much this time, and I think that may be part timing and part our resistance to talking about resistance. Easter and the pledge drive were good reasons to avoid talking about resistance. Sarah took it on more directly in her April 16 sermon "Breathe, said that wind..." in which Sarah took a very personal look at resistance, and the challenge of not giving in to cynicism, anger and rage.

Last week we took on earth justice, which is perhaps the most important social - environmental movement of our time. One is never sure who is resisting who in social movements. Greenpeace is clearly resisting the forces behind environmental degradation. They are also part of a more important movement to harness technology and human organization that will create sustainable, renewable solutions to mitigate the harm that our consumptive lifestyle has caused. In that sense, the fossil fuel energy sector is resisting creation of a sustainable world.

When Sarah offered me the chance to talk about resistance, I almost immediately thought of Ohm's Law.

$$I = E / R$$

And, as you have seen, I am happy to dwell on that for half or more of the service. In fact metaphors abound between the physics of energy. So much so that my inner sociologist wrestled with the opportunity to dwell in the land of symbolic interaction and not the big social resistance movements like Greenpeace, Me Too, 98%, Arab Spring, Unitarian-Universalism and for that matter Right To Life. The difficulty with dwelling in symbolic interaction is that it is not very relatable.

Still, I want to go there for a minute to build our vocabulary.

Symbols of Resistance and Symbols of Ohm

How many of you thought of this first?

Om The word Om is defined by Hindu scripture as being the primordial sound of creation. It is the original vibration of the universe. From this first vibration, all other vibrations are able to manifest. It isn't really where I'm heading, but it is a nice symbol.



Ohm The ohm is a measurement of resistance between two points of a conductor when a constant potential difference of one volt (V) is applied to those points and a current of one ampere (A) is produced. In simpler terms, it's the equivalent of one volt per one ampere (V/A).



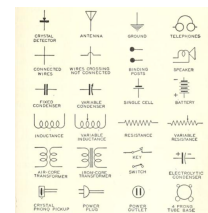
Resistance is a measure of the opposition to current flow in an electrical circuit. This is my favorite symbol for resistance. It tells the story - the path of resistance is going to slow things down. It will take more pressure to get through, and if resistance is strong enough, you will need another path.



Resistance underground organization composed of groups of private individuals working as an opposition force in a conquered country to overthrow the occupying power,



There are many other symbols that help left-side brain engineers to interpret the world.



I suppose my cartographer's love of maps is born from all the mental maps and schematic diagrams I have built over the years. In fact all of us build these maps and our memories may be more a function of the maps that we have created than bank vaults that retain specific events or images. Electrical engineers employ schematic maps that are, to most of us, so technical and detailed and yet so abstract that we glaze over.

So here's the rub (get it - friction). We cannot exist, in fact our planet cannot exist without resistance. We cannot stand up, our car's brakes cannot function, all the material earth simply dissolves without friction. Our induction or flow is a function of our energy divided by our resistance. Without resistance flow becomes infinite. It all just flows, a sort of high speed process of entropy, or maximum disorder. We now longer have energy that we can harness for work.

There is a lot of energy flowing through the planet, from subatomic particles to energy bombarding us from outer space. The energy gains meaning when we can use it for

work. Lightbulbs are resistors that produce light as a byproduct. Motors are coils of resistance wire that produce motion as a byproduct.

Every smartphone, table, computer, television, car, toaster and even flashlight now uses a semi-conductor. A device that acts as a switch between off (0) and on (1), in a binary world. The system cannot work with resistance. Our brains, similarly, cannot work without resistance.

[OPTIONAL] There are cases where we really do want to minimize resistance. The pursuit of "Superconductors" is a case in point. We would like to run trains with a minimum of wasted energy. This means eliminating wheels and for that matter any contact with the ground, such as with magnetic levitation. The superconductor may need to operate close to absolute 0 (-460 degrees Fahrenheit). Still, that high speed, highly efficient train will never stop without friction. Either we control the resistance or we crash.

I would argue that in a social context we also must have resistance. As Maya Lin said, to fly you must have resistance. Your wings need to press against molecules of air for you to fly. Your ideas fall into a frozen, dark hole if they do not encounter resistance and thereby create a little bit of light.

You are all familiar with social resistance movements. Our lives are filled with the efforts of people to shape the world. There are immensely consequential movements right now, the war in Ukraine, the effort to take away rights of women in America to control their bodies, the challenge of mitigating or adapting to climate change, the explosion of applications of artificial intelligence to manipulate our perceptions of reality and more.

[OPTIONAL]

I employed AI, Chat GPT and Bard, asking them to write my sermon for me. I would have been really distressed had either of them done a good job.

God is like a high voltage source of power. He is full of love, grace, and mercy. He wants to give us all of these things, but we have to be willing to receive them.

Our resistance is like the resistance in a circuit. It is anything that gets in the way of the current flowing from God to us.

Our resistance can be caused by many things. It can be caused by our sin, our doubt, or our fear.

But no matter what the cause, our resistance keeps us from experiencing the full power of God's love.

Needless to say, I chose a different direction...

I'll conclude with the immensely important and ongoing challenge of systemic racism in America and resistance to society's critical need for equity and inclusion. We are stronger together, as my son would say, working in parallel circuits to increase our amperage.

As you are all aware, Harold George Bellanfanti Jr. (aka Harry Belafonte) passed away on April 25. He was a remarkable man, born in 1927 in Harlem, and spent his early adolescence in Jamaica with his grandmother. He rose from the position of janitor's assistant to a megastar in music and acting. He never lost sight of the racism that resisted his flight and the racism that challenges other people of color. His programs generally featured mixed race performers, something we take for granted now. Was he a source of resistance? Was he a conductor that swept away resistance. I'll leave that to you.

Blessed Be

CLOSING SONG/HYMN

[Earth Song](#), Harry Belafonte #1074 Teal Hymnal

"Turn the World Around" was popularized by Muppets creator Jim Henson. One of his guests, Harry Belafonte, introduced this song on a Muppet episode. According to author of the Blog "Notes from the Far Fringe", Kimberley Debus, Belafonte said "I discovered that song in Africa, in Guinea. I went deep into the interior of the country, and in a little village, met a storyteller. That storyteller began to tell this story about the fire, the sun, the water, the Earth." According to Debus, Belafonte states that the storyteller pointed out that the whole of these things, put together, turns the world around. All of us are here for a very, very, short time. In that time, there really isn't any difference in any of us, if we take the time to understand each other. (Source:

<https://huuc.net/uu-hymn-of-the-week-turn-the-world-around/>)

BENEDICTION

Jim Fisher

Feel the earth under your feet.
Feel the wind in your face.
Feel the heat from the sun.
Feel your love's embrace.

You will only feel when you encounter resistance
Your energy, your power, your capacity in this world will be greatest
When you embrace resistance as a life force and turn it to good.

POSTLUDE

[Modern Unitarian](#)

First Unitarian Church of Salt Lake City