



EVERYTHING IS ART



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Icebreaker

- Meet your neighbors:
 - Are you a secret (or public) artist? Have you ever wanted to be?
 - Do you have a hobby or passion that requires creativity?
 - Is your art related to your profession or discipline?
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Art in Engineering Courses

- Flow Visualization and Aesthetics in Design Courses
- Mixed teams of students do STEM work for aesthetic purposes : engineers are allowed/expected/encouraged to be artists.
- Flow Vis: fluid physics are beautiful, not hard to make art



- Aesthetics of Design: Students can make anything, as long as they consider aesthetics



Piet Mondrian
LED Dress by
Anfal
Abdulrahman



Fiber-optic
Jellyfish by
Brittany Warly



Back-lit
Flatirons
Panorama by
Roshan Misra



Arrow Shaft
Artwork by
Sami
Maierhofer



"The
Illusionist"
Locket by
Jeffrey Gay



Context

- Science once was Art
 - All human endeavors were 'arts'
 - Early university structure: liberal arts
 - Grammar, rhetoric, **logic, arithmetic, geometry**, music, and **astronomy**
 - 18th Century: Fine Arts (and art criticism) were invented
 - painting, sculpture, architecture, music and poetry
 - Other endeavors (Science, Technology, Engineering, Math) are excluded from 'art'
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Since Then

Arts

- Photography freed art for Expressionism
- Emotion became prized
- 'Art' is now mostly 'Fine Art', created for aesthetic purposes;
- Aside from a limited subset decreed by the Establishment, art is devalued as 'basket weaving'

Science/ STEM

- Objectivity is prized
- Emotions are dangerous, may bias, invalidate, work
- Engineers' work is utilitarian, in service to employers, to society
- Time is money; this can separate our work from meaning

This is a problem



A Theory of Art

- Go back towards 'All human endeavors are arts'
 - **Art is the embodiment, the instantiation, the execution or enactment of a vision.**
 - Any endeavor can be raised to the level of art: mathematics, physics, cooking, sports.
 - This is a broad definition, but it allows everyone to aspire to be artists. What would happen then?
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What is a work of art in your discipline? What gives you joy in your discipline?

- Astronomy: what stars are made of
 - Iphy: Biology of humans. Human bodies are a work of art
 - ME: Uncle's barbell collar
 - AE: Aesthetics of power; rockets
 - Iphy: Endurance sports, taking it to the limit
 - Art/Microbiology: Microscale organisms
 - Psych: Art therapy. Disturb the comfortable, comfort the disturbed
 - Iphy: Human anatomy
 - Iphy: seeing the microscale
 - Physics: beauty of the equations
 - Philosophy. Contemplation is beautiful
 - Chem Laws of physics are everywhere
 - Psych/neuro: Gives insight
 - MCDB: Bacteria are beautiful
 - MCDB: Cell function
 - ArchE: Art of living spaces
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What is a work of art in your discipline?
What gives you joy in your discipline?

- Fluid mechanics: flow visualization
 - Mathematics: the elegant solution
 - Education: inducing a transformative experience
 - Civil Engineering: giant earthmoving. Time lapse construction
 - Geology: gemstones to jewelery
 - Neuroscience: visualize the workings of our brains
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Art is the embodiment, the instantiation, the execution or enactment of a vision.

How can we bring this idea into our daily practice as engineers, scientists, researchers, artists, students, ordinary humans?



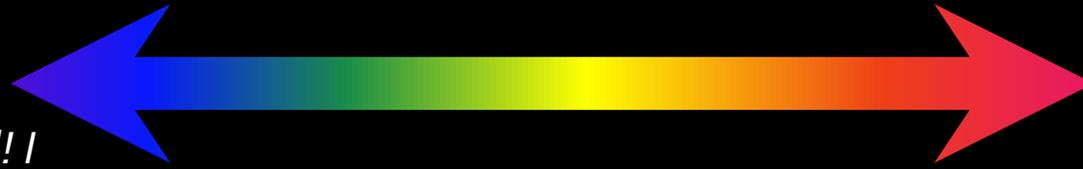
Definitions of Aesthetics

- Study of beauty
- Metric for art: is it art? Is it good art?
 - What is art, what good is art = art theory
- Psychological measure of affect
 - *[We define]aesthetics to be the study of those mental processes that underlie disinterested evaluative experiences that are anchored at the positive end by feelings that would accompany verbal expressions such as "Oh wow! That's wonderful! I love it!" and at the negative end by "Oh yuck! That's awful! I hate it!"*

Palmer, Stephen E, Karen B Schloss, and Jonathan Sammartino. "Visual Aesthetics and Human Preference." *Annual Review of Psychology* 64 (January 3, 2013): 77–107. doi:10.1146/annurev-psych-120710-100504.

Aesthetics as Continuum

*Oh wow!
That's
wonderful! I
love it!"*



*"Oh yuck!
That's awful!
I hate it!"*

- Aesthetic responses in many contexts
 - Art / fine art (Traditional sense)
 - Engineering products or processes
 - STEM instruction
 - Daily choices: food, shampoo, clothing, entertainment
- Aesthetics of art are endlessly discussed
- Today's discussion: What are the aesthetics of STEM topics?
- And why should we care?



What is Art? Major Art Theories

- Realism
 - Plato: Representations should be truthful. Beauty = truth. Human perceptions are fallible, invisible true world has ideal 'Forms'.
 - Aristotle: Beauty = both appearance (order, harmony, symmetry) and functionality.
- Expressionism (1850's)
 - Art is to embody and stimulate emotion, often through metaphor.
 - Cognitivism: Art can teach. Dewey's 'aesthetic experience' gives meaning and value.
- Formalism (1900's):
 - Only the form is important. Emotion, narrative, functionality are irrelevant.
 - Abstract art context
- Postmodernism (1968)
 - Art and aesthetics cannot be separated from the social, ethical and political world.
 - Pluralism. No theory is absolute; context is essential.



Barrett, Terry. *Why Is That Art?: Aesthetics and Criticism of Contemporary Art*. 2nd ed. Oxford University Press, USA, 2011.

Aesthetics and Emotional Engagement: Feynman vs Twain

“I have a friend who’s an artist ... he’ll hold up a flower and say ‘look how beautiful it is,’ and I’ll agree. Then he says ‘I as an artist can see how beautiful this is but **you as a scientist take this all apart and it becomes a dull thing,**’ and I think that he’s kind of nutty...

I see much more about the flower than he sees. I could imagine the cells in there, the complicated actions inside, which also have a beauty...the science knowledge **only adds to the excitement, the mystery and the awe of a flower. It only adds. I don’t see how it subtracts.**”– Richard Feynman

Feynman, Richard P. *"What Do You Care What Other People Think?": Further Adventures of a Curious Character*. Edited by Ralph Leighton. Reprint edition. New York: W. W. Norton & Company, 2001.



Mark Twain: TMI = Loss of Affect



All the grace, the beauty, the poetry had gone out of the majestic river!”

“Now when I had mastered the language of this water ... I had made a valuable acquisition. But I had lost something, too. I had lost something which could never be restored to me while I lived.



Examples of Aesthetics in Engineering

- Flow Vis
 - Beauty, power, destruction, oddness
- Civil Engineering
 - Bridges
 - Giant earthmovers, site clearing (power, destruction)
- Design
 - Form and function, puzzle solution, elegant solution, difficult achievement (aesthetics of process vs product)
 - Steampunk: gears, mystery
 - Maker movement, DIY, joy of hacking



What are the disciplines here today?