

Introduction to Bioengineering

BIOE/ENGR.80

Stanford University

Spring 2020 Class Slides

Day 7

20 April 2020

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Week 2 reprise

CONCEPT
SKILL

Domains of opportunity

- People health (from disease to wellness)
- Planet health (from species to ecosystems)
- Political health (from citizenship to governance)

Framestorming

- The question you ask frames the answers you get
- Framestorm before you brainstorm (or if you get stuck)

Futures wheel

- What will happen as a consequence of doing something?
- Direct impacts?
- Indirect impacts?

Week 3 look ahead

CONCEPT
SKILL

Who are you and how are you motivated?

How should engineers think about tools?

Analysis and design of biomolecules

Analysis and design of genetic systems

Build your own microscope

Tools for representing biomolecules

Tools for representing genetic systems

Finding your natural “stance”



Doing so **familiar** for physical activities but **less clear** for mental activities?

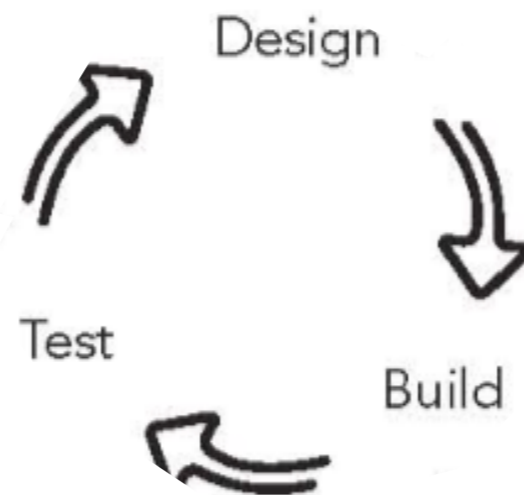
COOL!!! versus DARN!?!?



Do you *prefer* to learn by **discovering** first or **tinkering** first?
Both approaches are valid and essential!

Design, build, & test

(model) (make) (**measure**)



Improving the tools that enable the core engineering cycle (above) is a big part of bioengineering.

“Tools” are not “tools”

(the specific form a tool takes matters greatly)

The HISTORY of the ARTISTS' COLOUR TUBE.

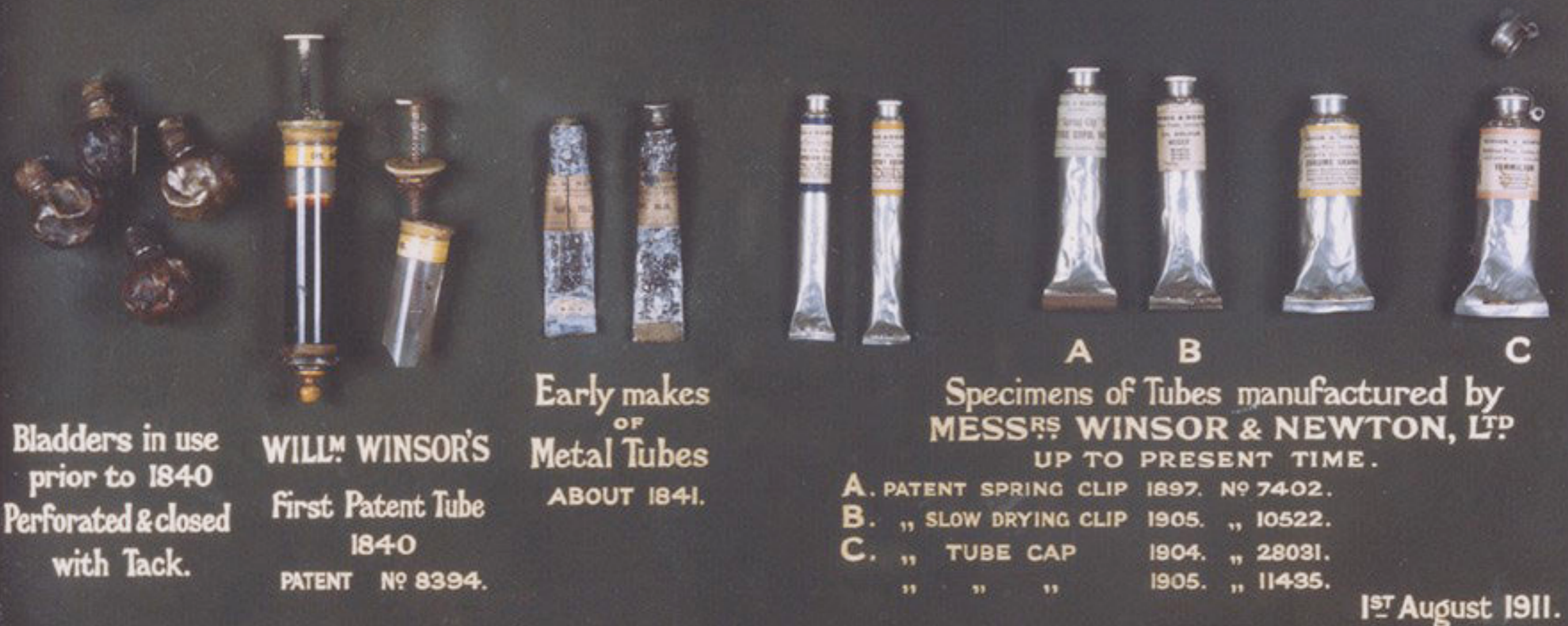


Photo © Winsor & Newton. Used with Permission.

Who can use a tool **where** is often the most impactful aspect of a tool

Who is painting where?

(i.e., access shapes practice)



Sand in the oil paint, showing that this work was at least partly executed on the beach

Monet, [The Beach at Trouville, 1870](#)

http://www.nationalgallery.org.uk/paintings/learn-about-art/guide-to-impressionism/guide-to-impressionism/*/viewPage/4



Who is being painted?

(i.e., practice is representation)



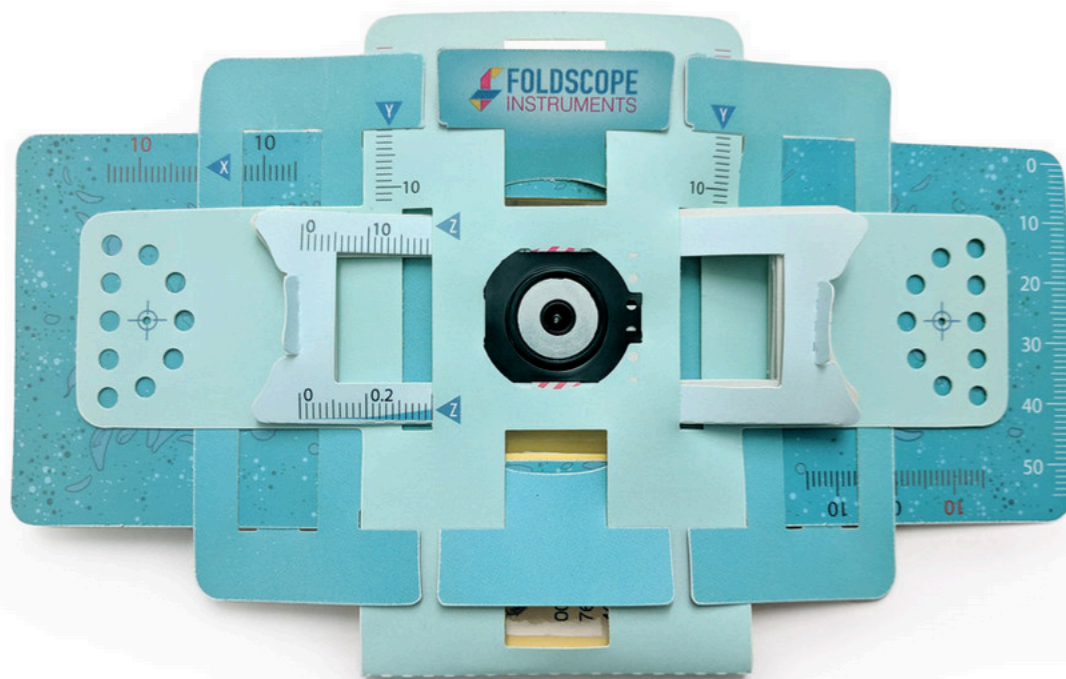
<http://www.gallery.ca/en/see/collections/artwork.php?mkey=2108>

Representation underlies “meaning making” and culture...

Radicals in their time, early Impressionists violated the rules of academic painting. They constructed their pictures from freely brushed colours that took precedence over lines and contours, following the example of painters such as Eugène Delacroix and J. M. W. Turner. They also painted realistic scenes of modern life, and often painted outdoors. Previously, still lifes and portraits as well as landscapes were usually painted in a studio.^[1] The Impressionists found that they could capture the momentary and transient effects of sunlight by painting *en plein air*. They portrayed overall visual effects instead of details, and used short "broken" brush strokes of mixed and pure unmixed colour—not blended smoothly or shaded, as was customary—to achieve an effect of intense colour vibration.

(not only “ready-made” paints but also the “personal” computer and likely the “personal” bioengineering toolkit, etc..)

Engineering for biology to see better...



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#knowyourself

#tools

#backtonature

#BioEquality

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