ivana

VISUAL DESIGN FOR STEM EDUCATION

“POSTERS”







ACIDITY

a "basic" chemical property relating taste to ion concentrations

MATERIAL PROPERTY

acidic (H_3O^+) ← **neutral** → **basic/alkaline** (OH^-)

more taste **sour** **+**

less taste

bad taste **soapy/bitter** **−**

Dr. Søren Sørensen's (1868-1939)
pH (potential Hydrogen) **Scale**
each pH level is a 10x jump

2 3 4 5 6 7 8 9 10 11 12 13 14

vinegar pH 2.9
lemon pH 2.3
lime pH 1.9
stomach acid pH 1.5
cherries pH 3.8
orange pH 3.5
grapefruit pH 3.3
plum pH 2.9
raspberries pH 3.4
apple pH 3.6
banana pH 4.8
tomatoes pH 4.6
grapes pH 4
maple syrup pH 5
cabbage pH 5.3
cheese pH 5.6
carrots pH 6.1
potato pH 5.8
avocado pH 6.4
butter pH 6.5
saliva pH 6.7
milk pH 6.6
egg yolk pH 6.5
soy milk pH 7
water pH 7
dates pH 7.5
blood pH 7.4
baking soda pH 8.2
egg white pH 8.8
antacid pH 10
bleach pH 12

H_3O^+
10,000,000 : 1
hydronium ions

pH 7 = 1 : 1

OH^-
10,000,000 : 1
hydroxide ions

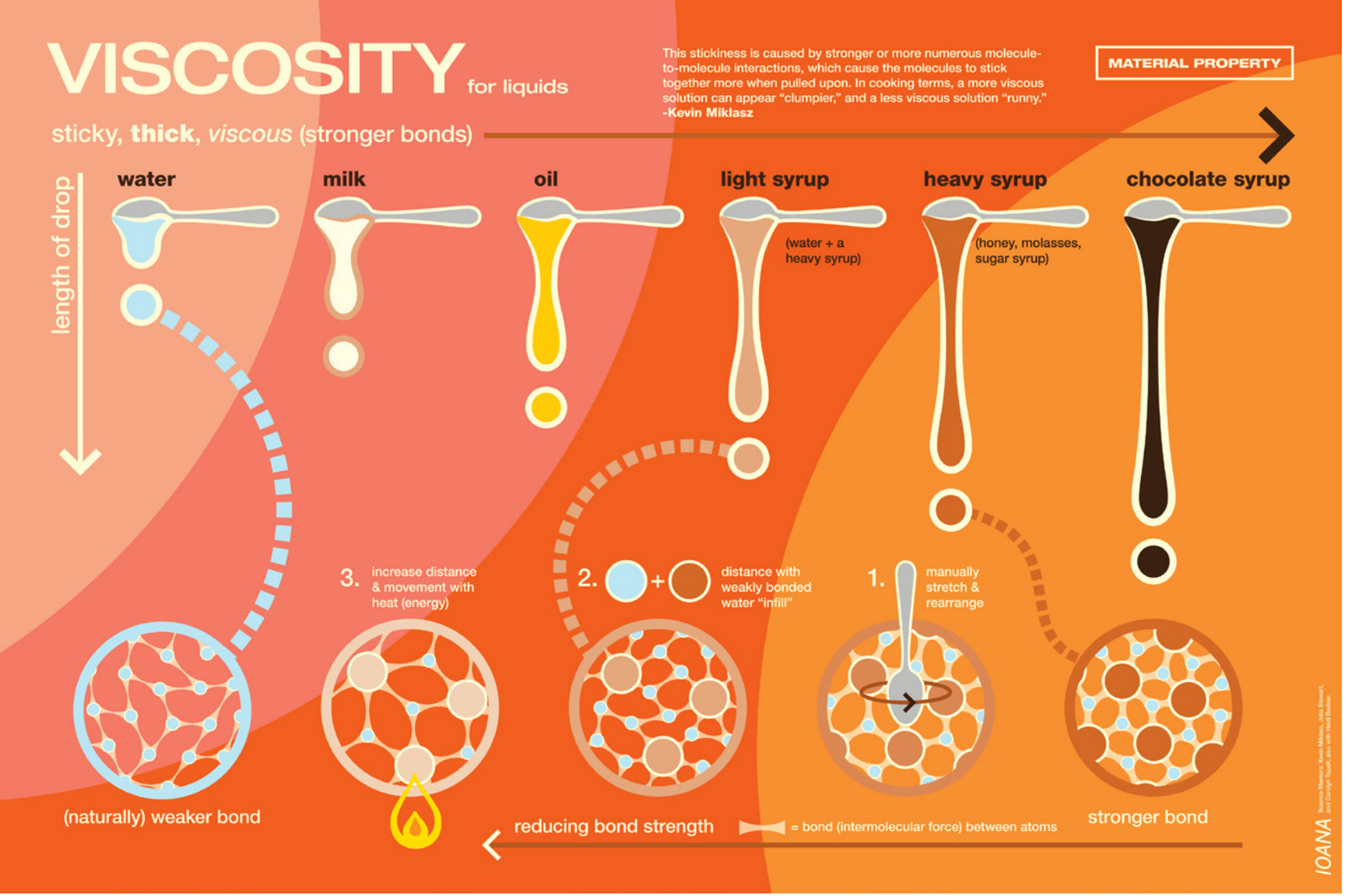
"All chemicals exist in a state of flux, with bonds being broken and re-formed to a certain extent."
-Carolyn Tepolt

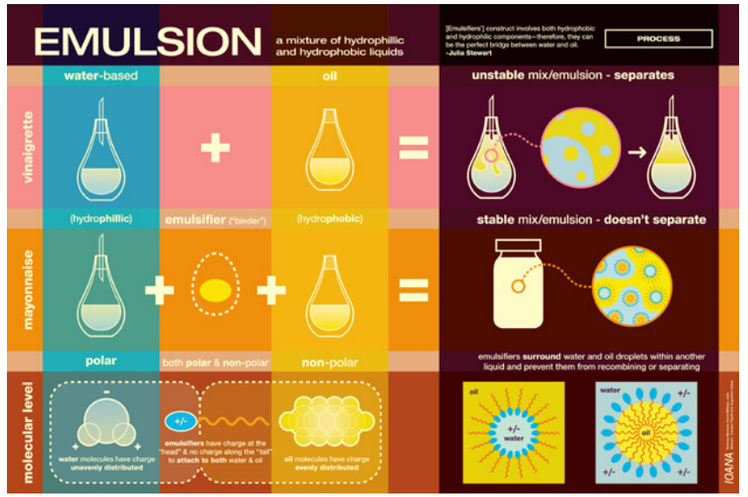
IOANA Science Mentors: Kevin Mikiasz, Julia Stewart, & Carolyn Tepolt

TV FOOD SCIENCE ILLUSTRATIONS **for:** BravoTV's Top Chef Masters "Blinded Me With Science" Episode **also in:** Warehouse 13 & science museums/exhibits

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STEM EDU

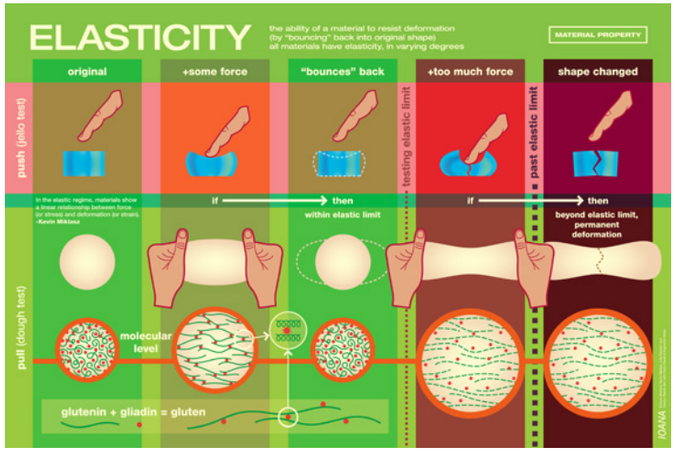




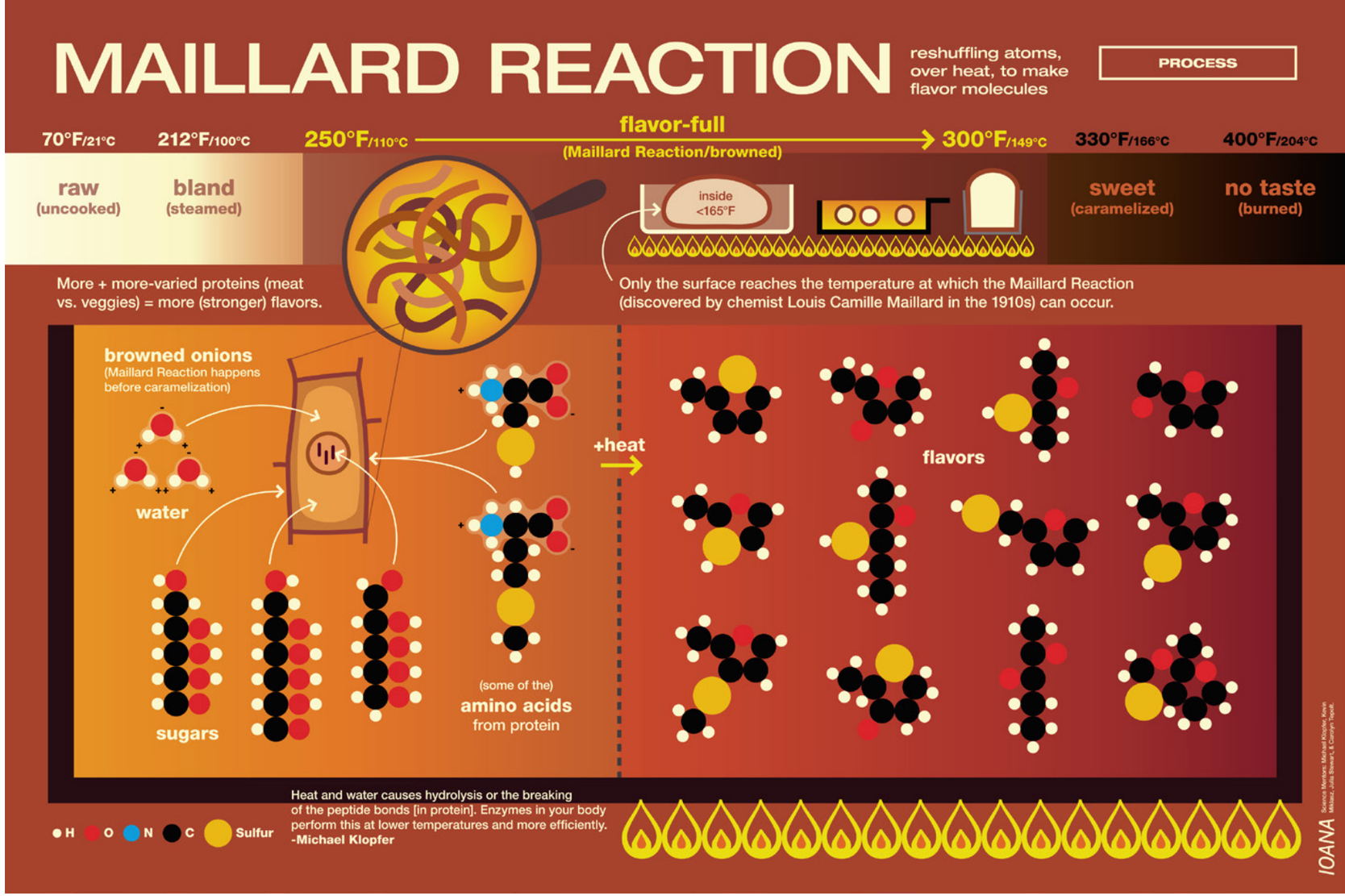


Created for Bravo TV's Top Chef Masters "Blinded Me with Science" episode, these illustrations have also been featured on SyFy Network's Warehouse 13 "Endless Wonder" episode, as well as in exhibits at the Oregon Museum of Science & Industry in Portland; during National Science Week in Victoria, Australia; and at the Australian Academy of Science in Acton, Australia.

TV FOOD SCIENCE ILLUSTRATIONS **for:** BravoTV's Top Chef Masters "Blinded Me With Science" Episode **also in:** Warehouse 13 & science museums/exhibits

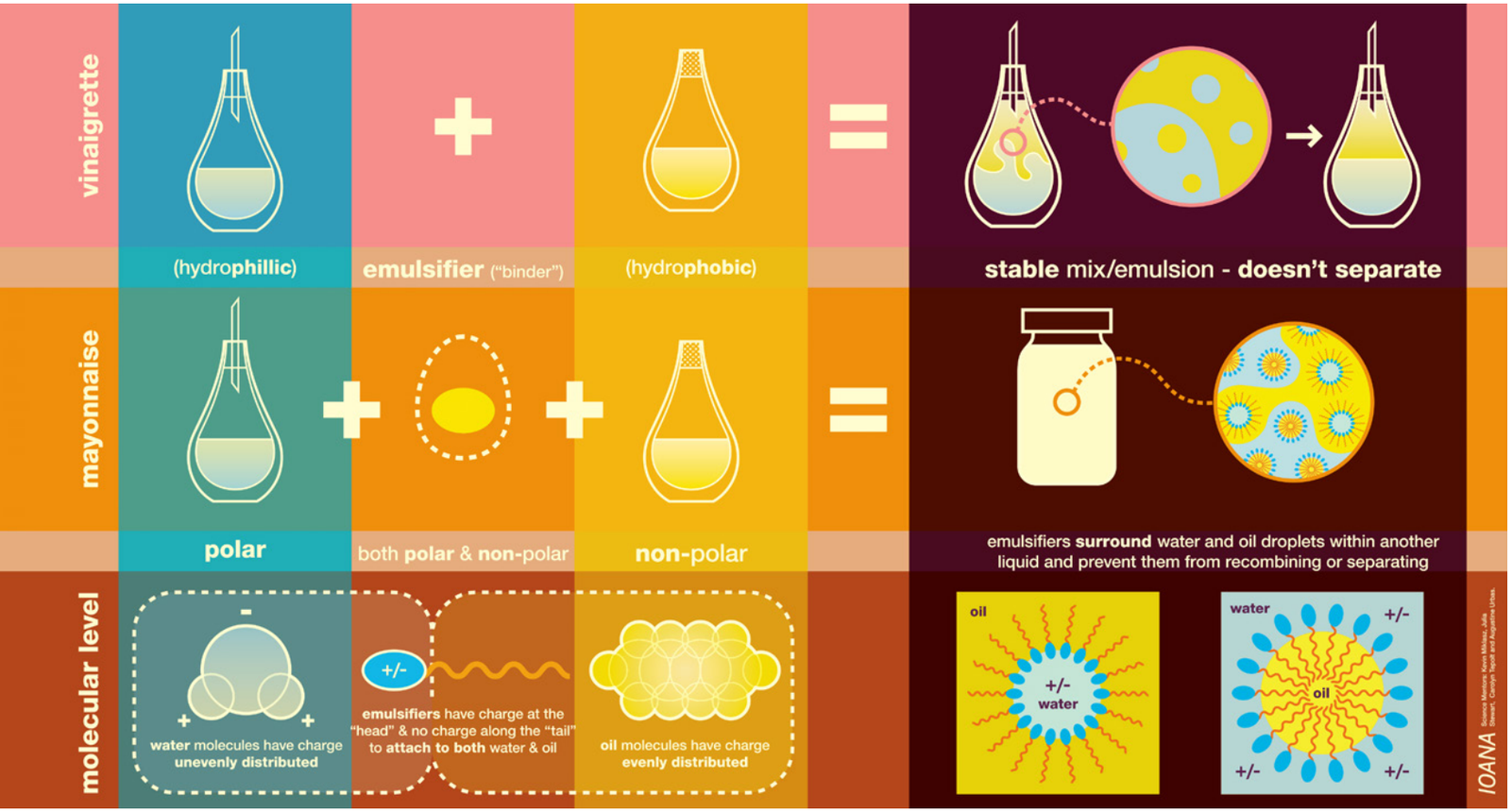




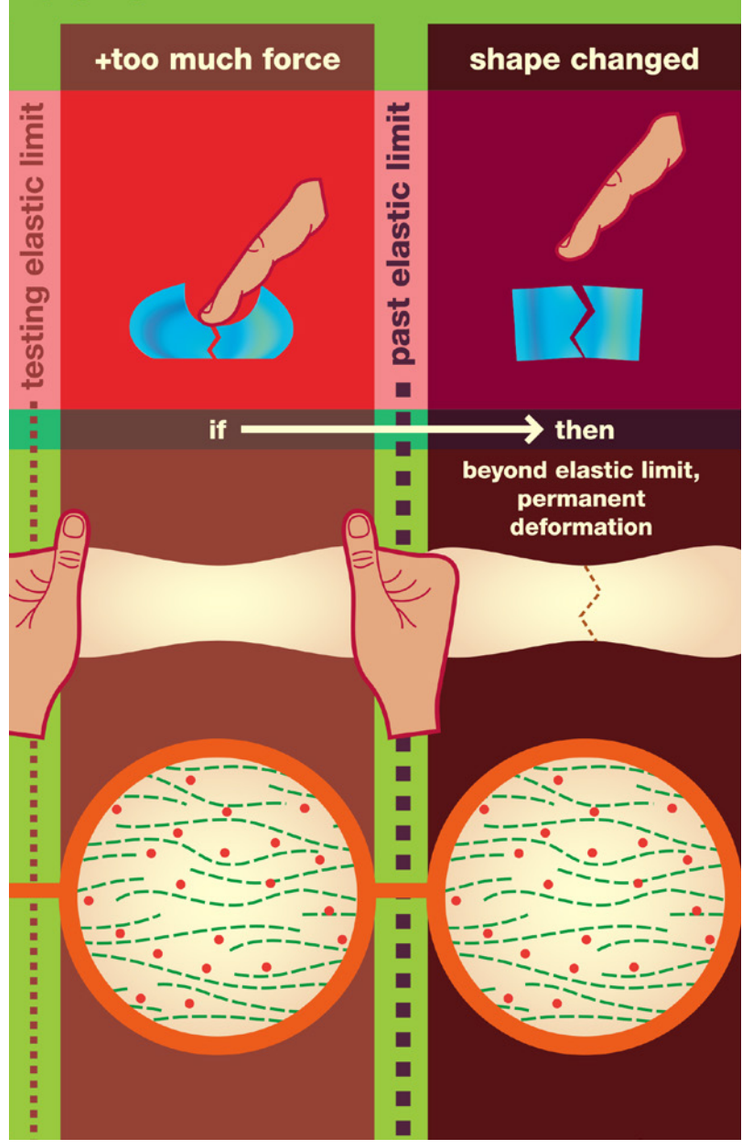


The illustrations were actually developed independent of the show, but with the knowledge that they were intended for a general TV audience, and at the high school level of the students featured in the episode. The toughest idea to convey was the Maillard reaction, which explains why browned high-protein foods are more flavorful.

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“BUILD-A-BIRD” APP ILLUSTRATIONS **for:** Iridescent & the Cornell Lab of Ornithology **featured in:** a Weeds TV show, a Samsung ad, science museusm/exhibits







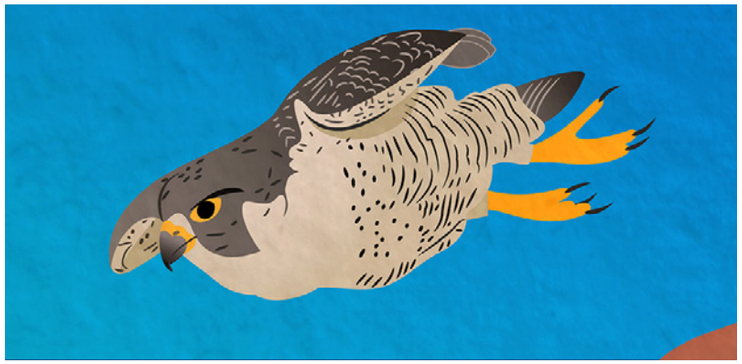


Created for the educational “Build-a-Bird” app, the illustrations show 7 bird species – Hummingbird, Barn Owl, (Rock) Pigeon, Turkey Vulture, Peregrine Falcon, (House) Sparrow, and Wandering Albatross – engaged in a variety of life-sustaining activities.

“BUILD-A-BIRD” APP ILLUSTRATIONS **for:** Iridescent & the Cornell Lab of Ornithology **featured in:** a Weeds TV show, a Samsung ad, science museusm/exhibits









Large prints of the illustrations were featured in natural science exhibits at the Museum of Natural History, in Santa Cruz, CA; at the Savannah College of Art & Design in Savannah, GA; and at Galeria Tonantzin in San Juan Bautista, CA.

"BUILD-A-BIRD" APP ILLUSTRATIONS **for:** Iridescent & the Cornell Lab of Ornithology **featured in:** a Weeds TV show, a Samsung ad, science museusm/exhibits





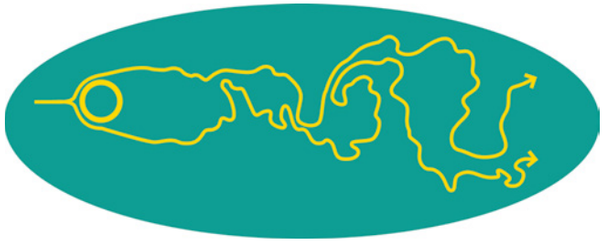


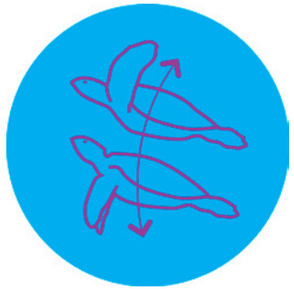
Some prints of the illustrations were also featured on a Weeds TV show and in a Samsung commercial.

“BUILD-A-BIRD” APP ILLUSTRATIONS **for:** Iridescent & the Cornell Lab of Ornithology **featured in:** a Weeds TV show, a Samsung ad, science museusm/exhibits

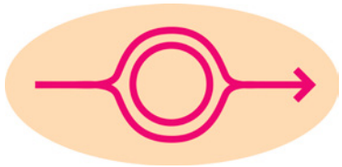
WEARABLES+

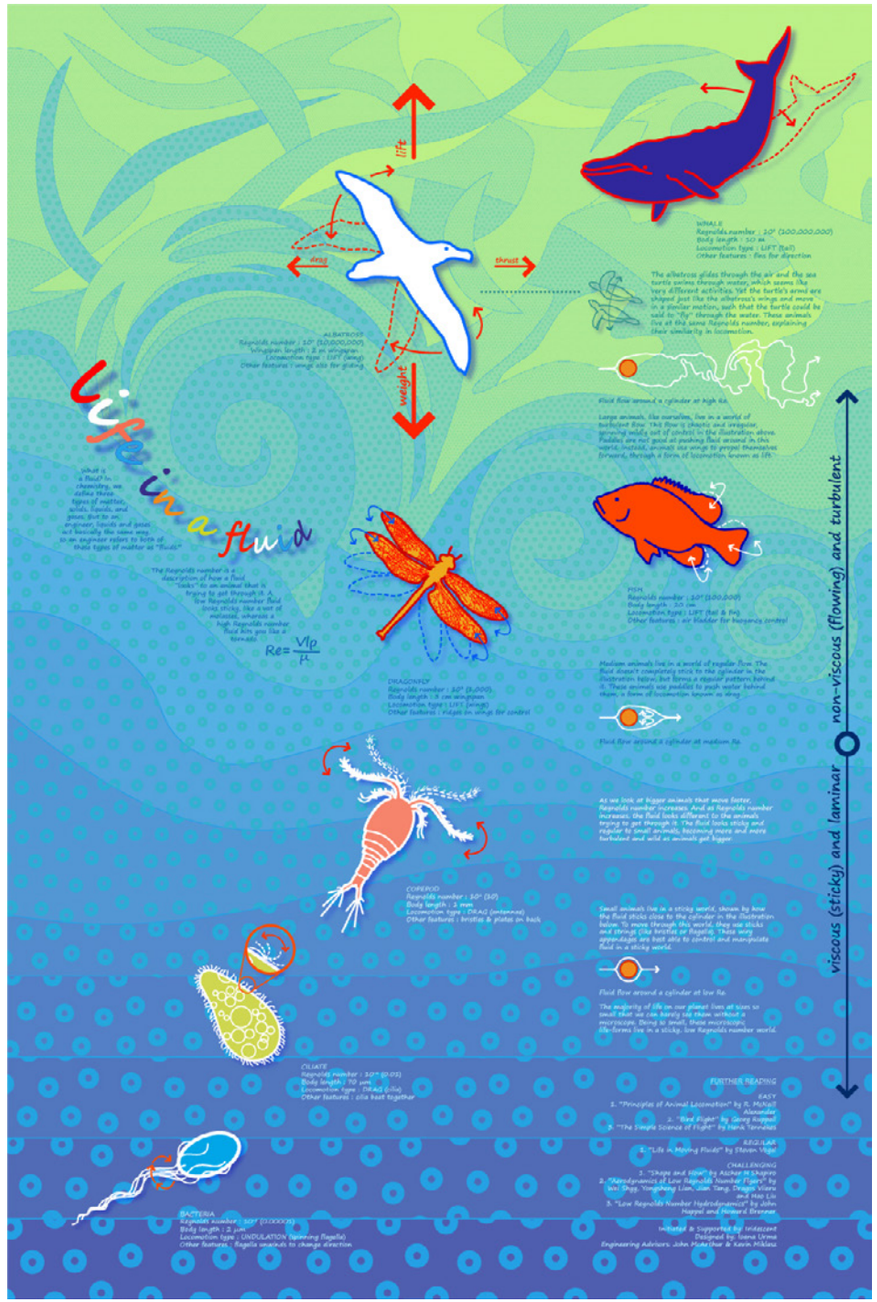












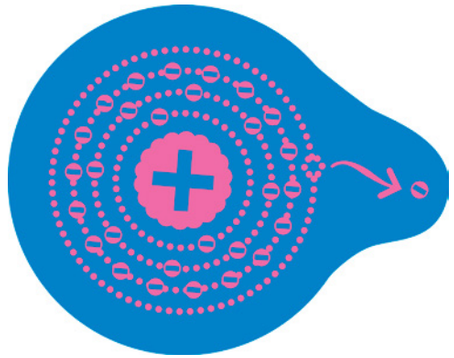


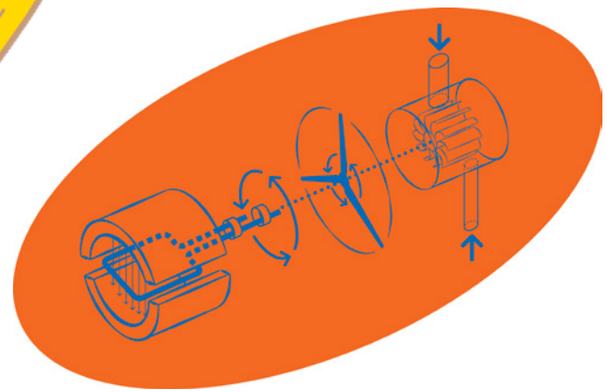
The "Life in a Fluid"/Reynolds number poster was a semi-finalist in the 2010 NSF Visualization Challenge.

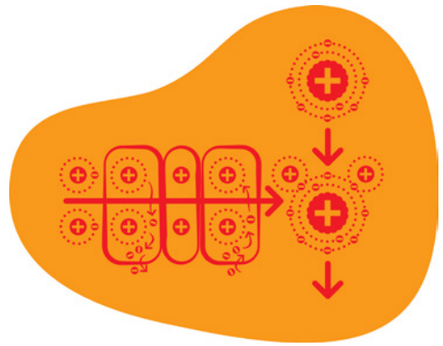
After completing the Reynolds number poster, I suggested to create wearable science T-shirts instead, to get kids more directly in touch with STEM topics. On some of the topics – mainly Reynolds number and the MRI process – I collaborated with PhD student advisors from USC.

WEARABLE SCIENCE+ **for:** Iridescent, later partnered with ONR/Office of Naval Research











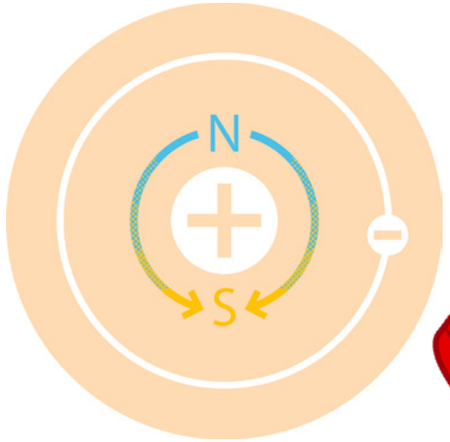
Iridescent staff & USC engineering student volunteers

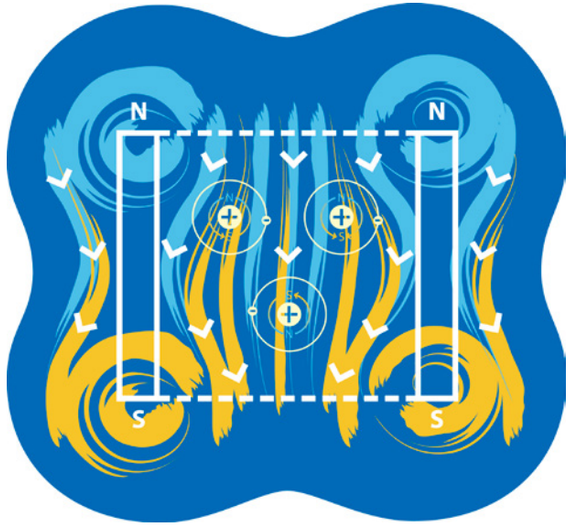


For the Electricity T-shirt, I studied MIT Physics videos to figure out a conceptual direction, because the topic is so vast.

WEARABLE SCIENCE+ **for:** Iridescent, later partnered with ONR/Office of Naval Research











It was challenging to fit the complex MRI Process on a T-shirt, even using both sides. For this reason, and for the fact that hydrogen is present in water molecules (tissues), simple one-electron hydrogen atoms are featured in the diagrams.

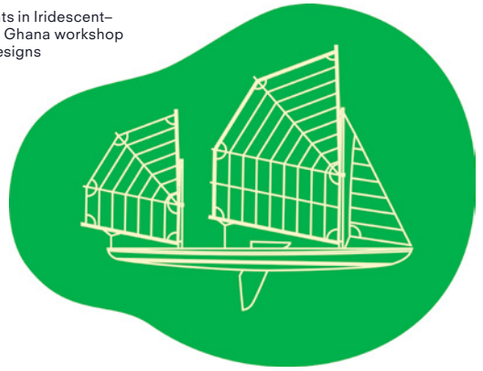
WEARABLE SCIENCE+ **for:** Iridescent, later partnered with ONR/Office of Naval Research

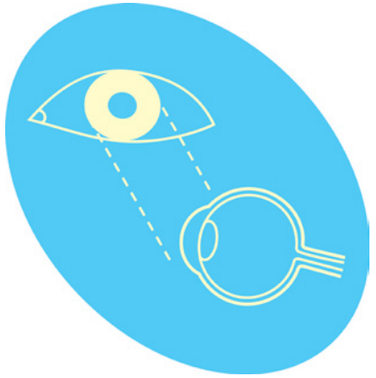


Staff & students in Iridescent–
Cooper Union Ghana workshop
wearing the designs











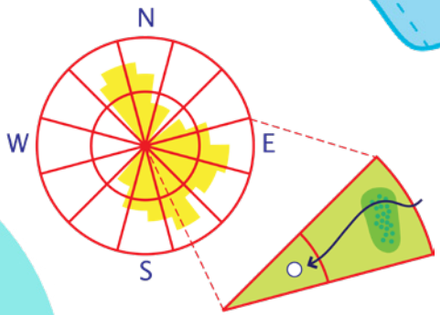


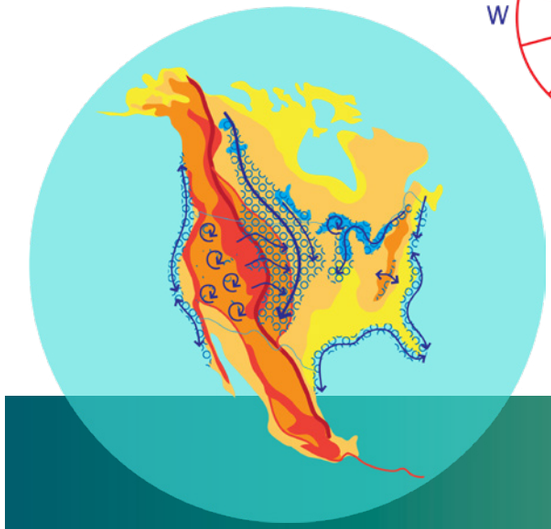
WEARABLE SCIENCE+ **for:** Iridescent, later partnered with ONR/Office of Naval Research

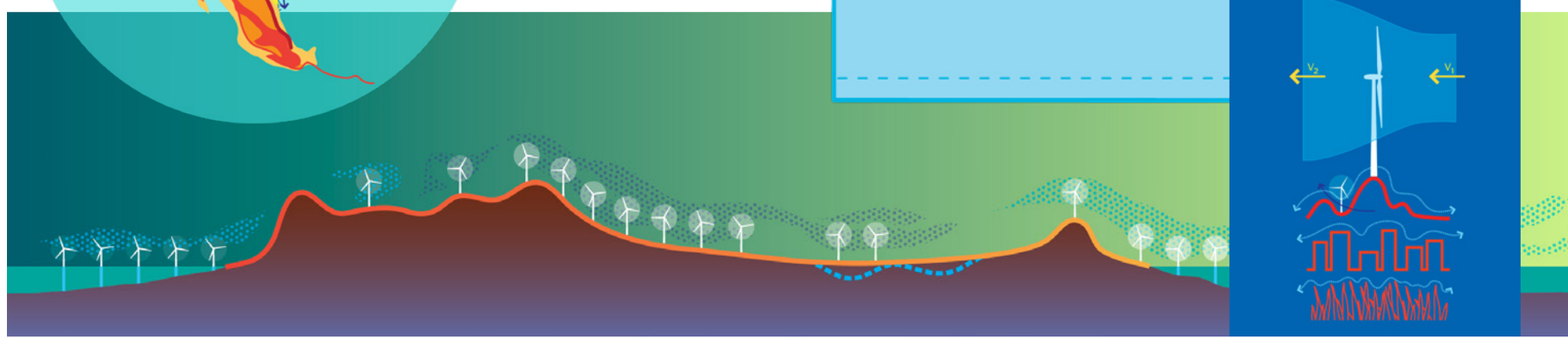














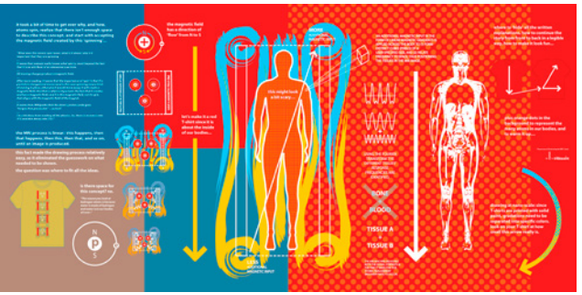
KidWind staff & students wearing original wind-energy design

The most fascinating aspect of researching wind energy was to realize that it is a form of solar energy, as wind is created by the earth's spin and differences between global temperatures. I insisted to feature this often ignored concept on the front of the shirt.

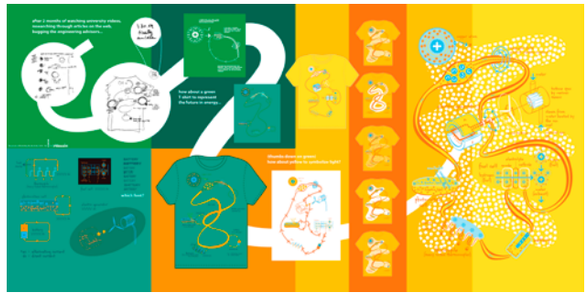
WEARABLE SCIENCE+ **for:** KidWind

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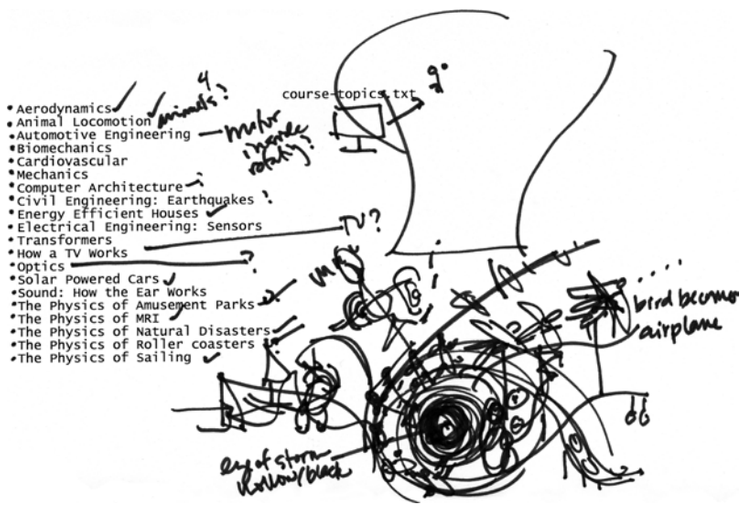




This exhibit – held to celebrate the opening of the Iridescent-ONR NY STEM Design Studio – was designed to show kids the work that goes into illustrating science concepts (research, trial, decision-making), and that it is not always "pretty" along the way.

EXHIBIT DESIGN: "THE PROCESS OF ILLUSTRATING SCIENCE" **for:** Iridescent-ONR's NYC K-12 STEM Studio **in:** Bronx, NY

MURAL



Balancing activating the space with creating a calm atmosphere, the mural features a lot of negative white space and lines-only drawings. Bolder colors unravel away from the sit-down eye-level interior, up and out toward the storefront.



"CORRELATION COLLAGE" MURAL **for:** Iridescent's K-12 STEM Studio **in:** Historic South-Central LA, CA

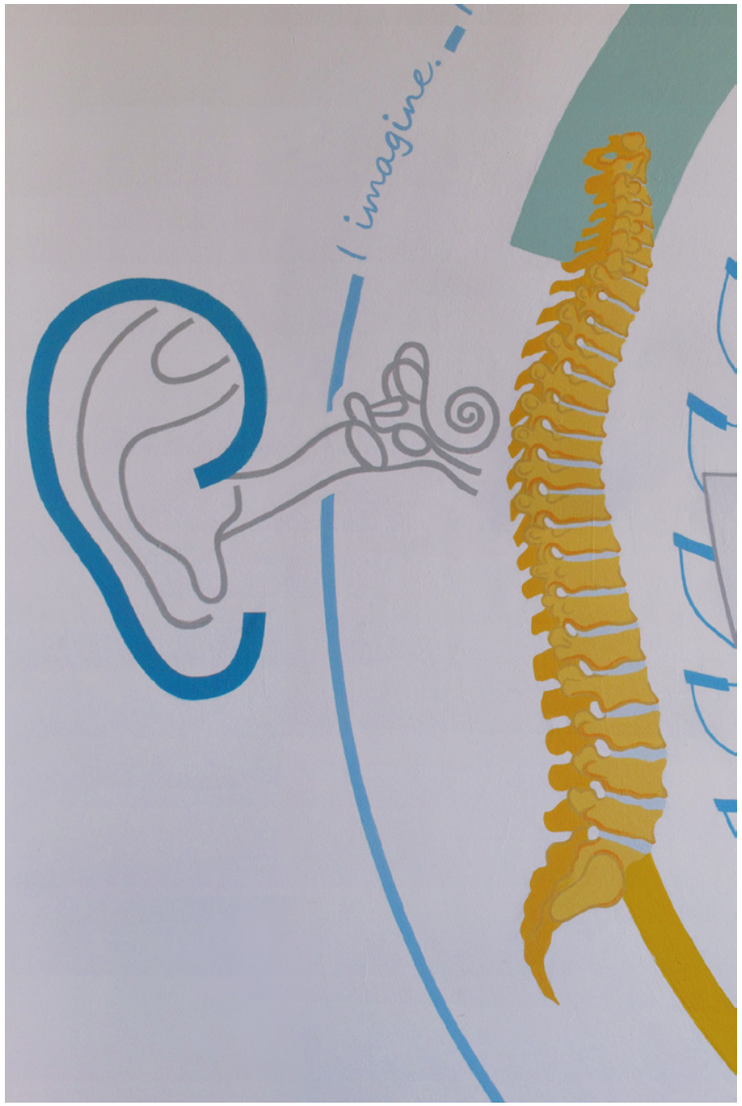


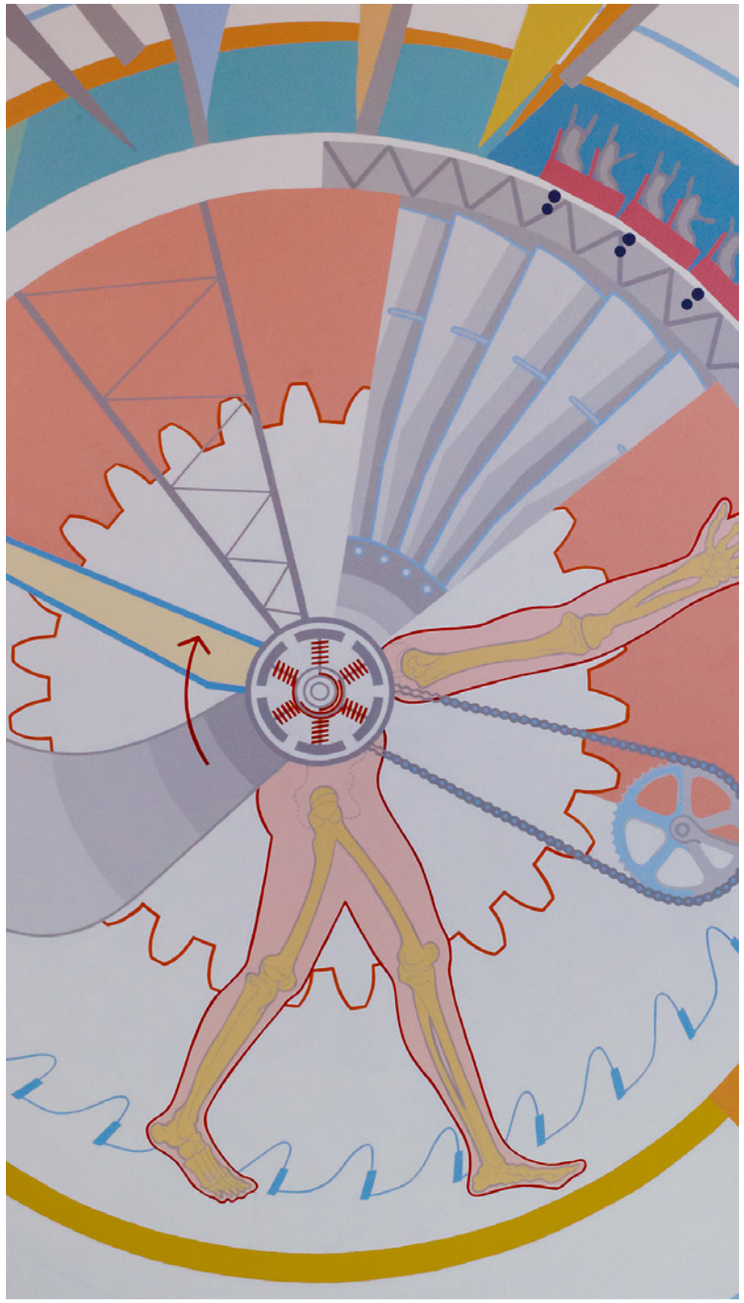


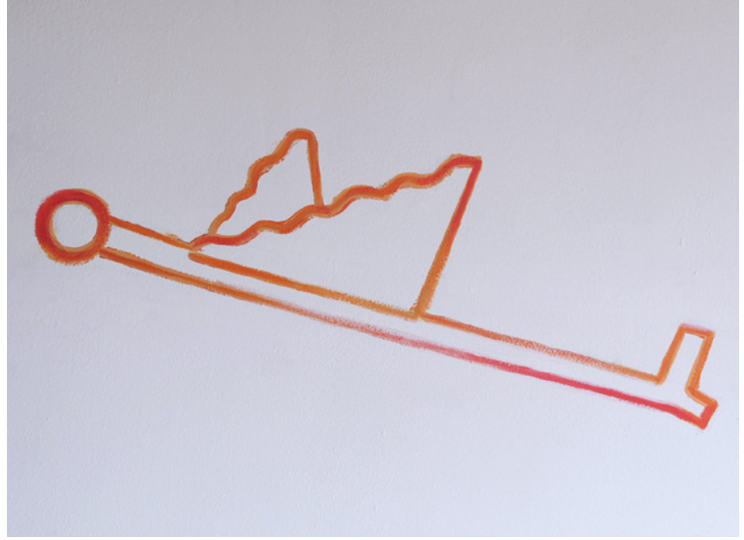


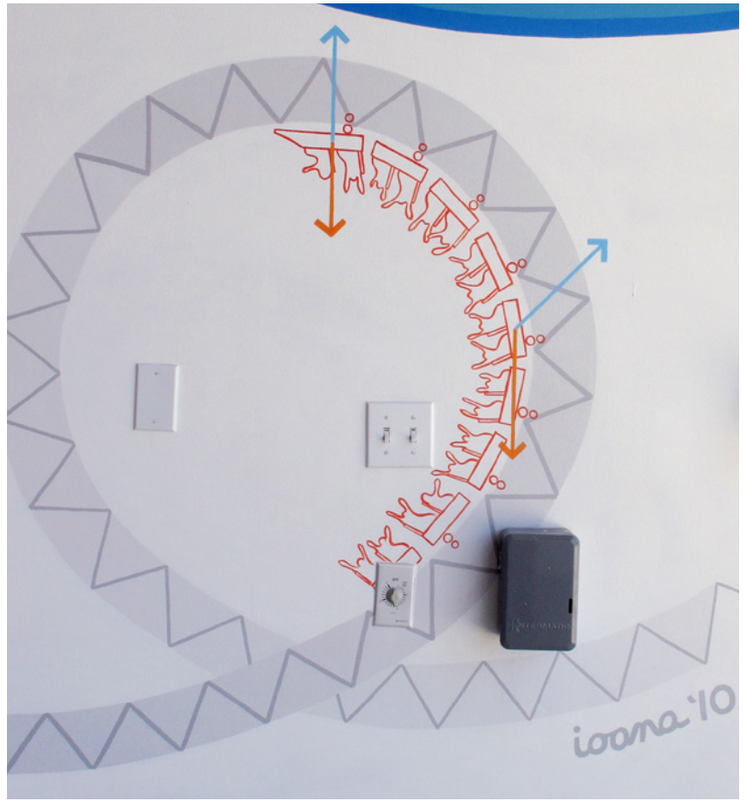
With the goal of inspiring curiosity, the mural juxtaposes biological and mechanical elements to suggest functional or behavioral relationships. Elements rotating about an axis form the central "globe" from which spin out many course topics. A bird, a paper airplane, a fighter jet, and a stingray move in a linear formation to suggest a related means of locomotion.

"CORRELATION COLLAGE" MURAL **for:** Iridescent's K-12 STEM Studio **in:** Historic South-Central LA, CA









As with other murals I have designed and painted, I broke up gradations into distinct color areas, in case the mural would need to be patched up by someone unskilled.

"CORRELATION COLLAGE" MURAL **for:** Iridescent's K-12 STEM Studio **in:** Historic South-Central LA, CA

BRANDING











The logo featuring a little girl throwing a paper airplane, with her father behind her – embodying the non-profit's mission of women in STEM, learning engineering by making, and parental involvement – was one of the first graphics I developed for Iridescent. The Technovation logo which came later grew out of that. I also helped coin the slogan: "I imagine, I invent, I engineer."

BRANDING: LOGOS, BROCHURES, FLYERS+ **for:** Iridescent

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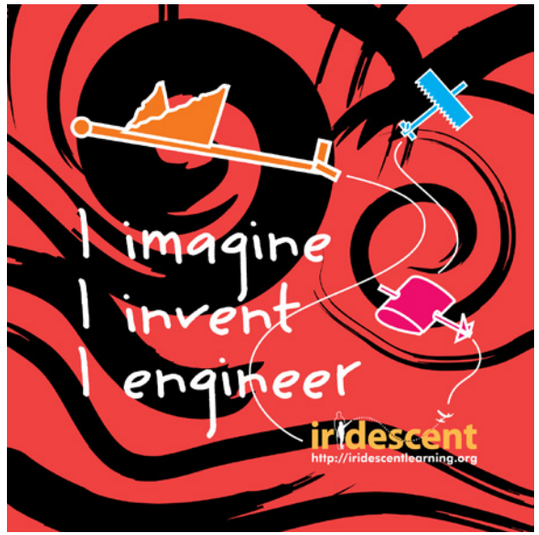
STEM EDU







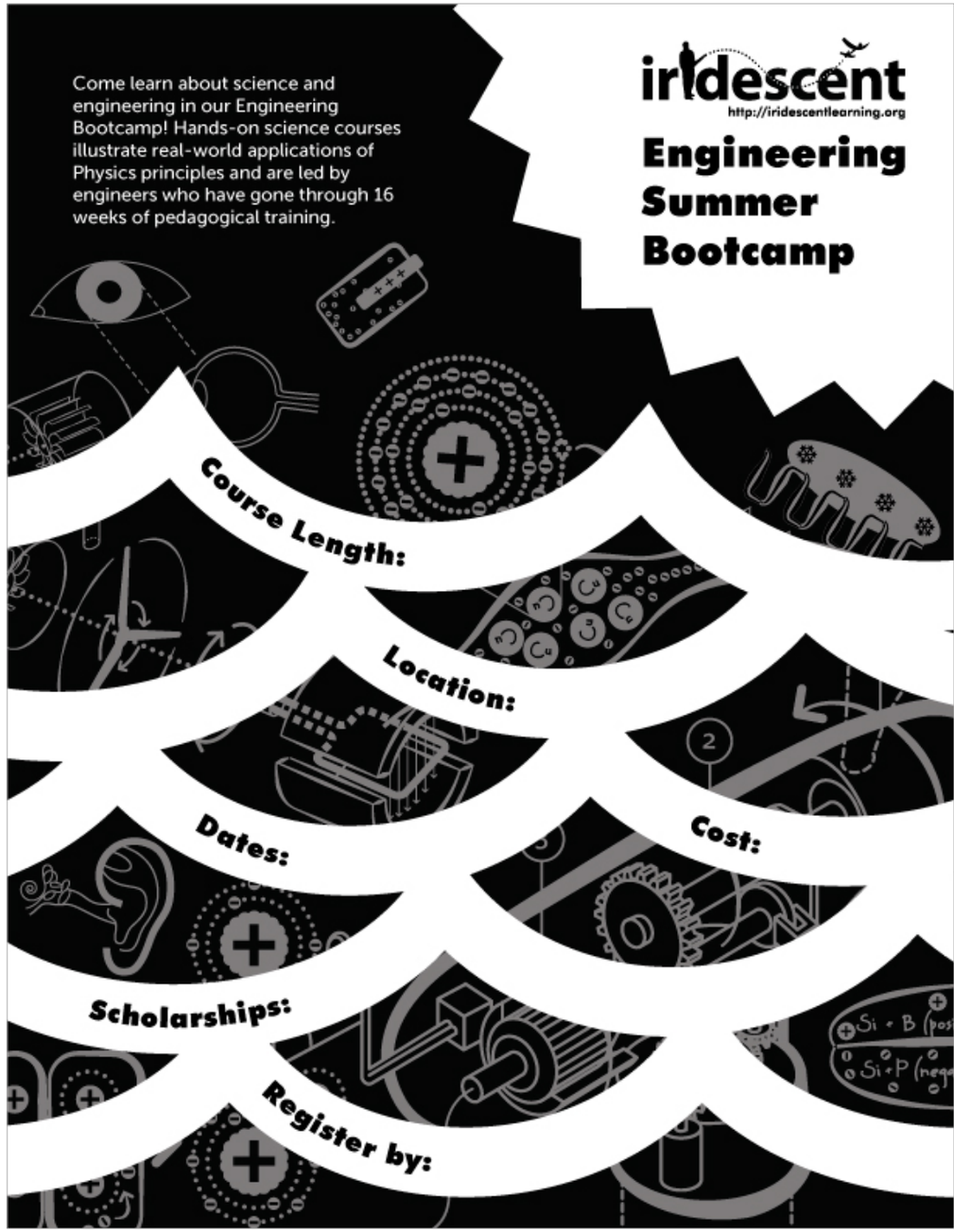






A lot of the work – illustrations, flyers, and books – was translated into Spanish, so as to reach the biggest target audience. This was a bit challenging to implement because the translations are much longer.


iridescent
http://iridescentlearning.org
Noches de Ciencia para las Niñas y Madres

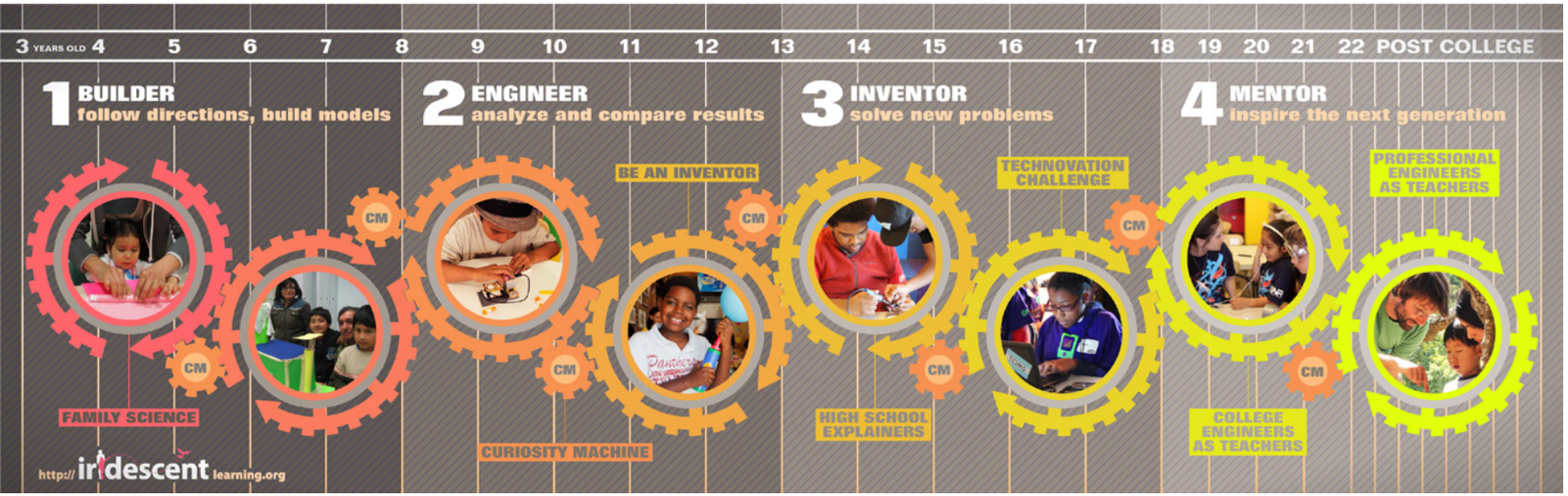

Come learn about science and engineering in our Engineering Bootcamp! Hands-on science courses illustrate real-world applications of Physics principles and are led by engineers who have gone through 16 weeks of pedagogical training.
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http://iridescentlearning.org
Engineering Summer Bootcamp
Course Length:
Location:
Dates:
Cost:
Scholarships:
Register by:









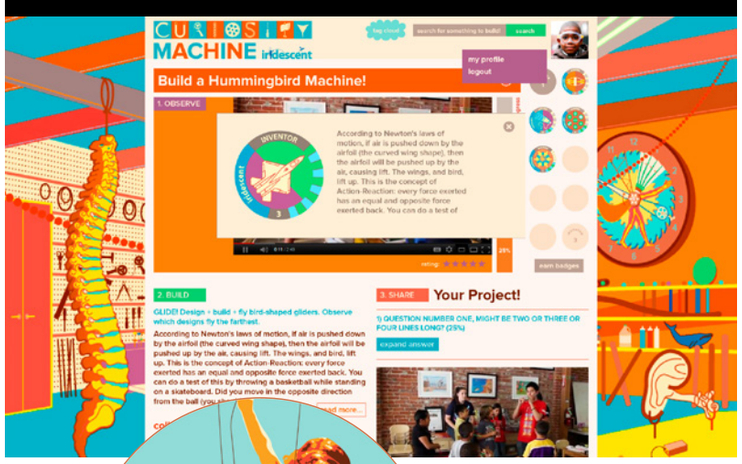


BRANDING: LOGOS, BROCHURES, FLYERS+ **for:** Iridescent

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STEM ACTIVITY APP





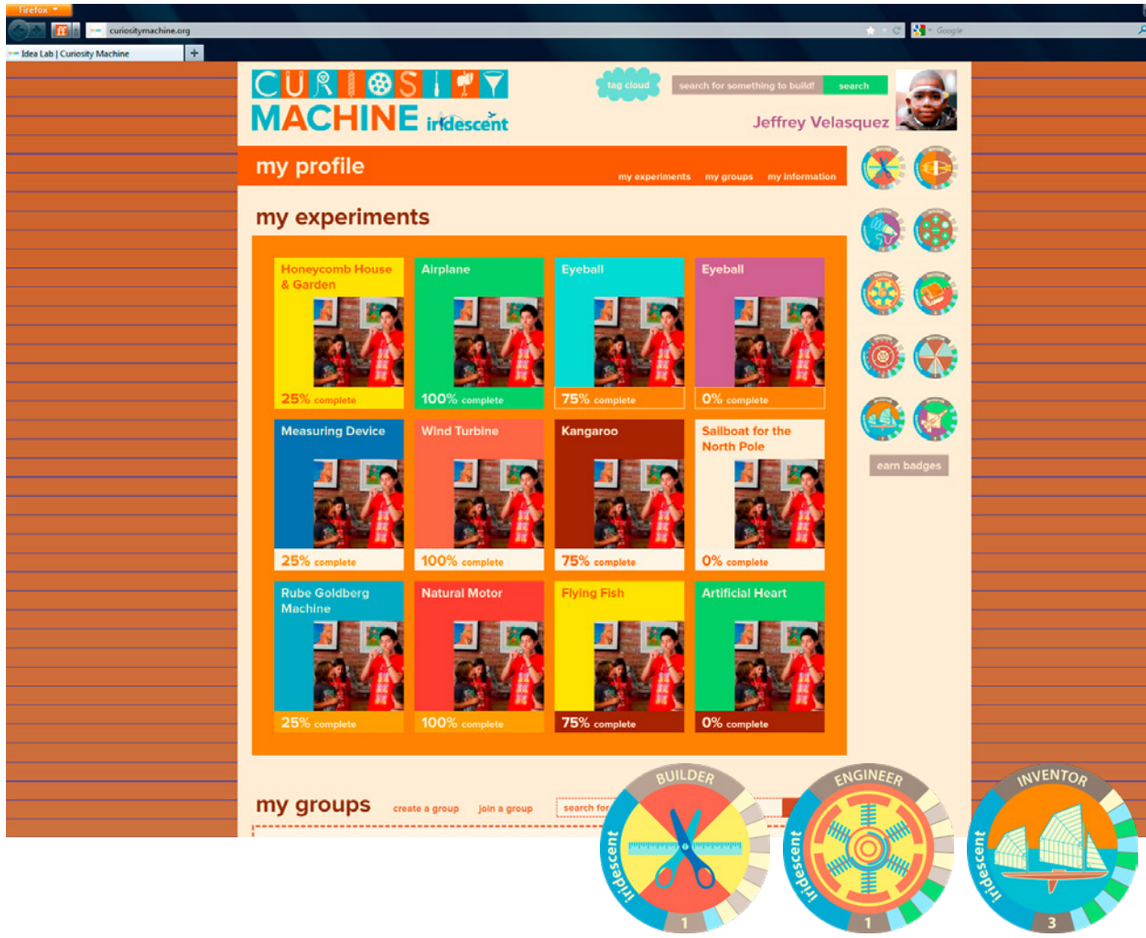


The cover animation depicted a hands-on workshop filled with elements from past projects, including the logo and the mural.

For the online learning platform Curiosity Machine, I developed logos, graphics, and layouts in warm colors and deep browns: to fall closer to (human) nature, to appear more inviting, and to feel more tangible than the virtual world of web-based education.

CURIOSITY MACHINE LEARNING APP **for:** Iridescent





CURIOSITY MACHINE

The logo of the Curiosity Machine platform contains illustrations of maker-type objects easily found in the home and used in Iridescent's hands-on STEM projects.

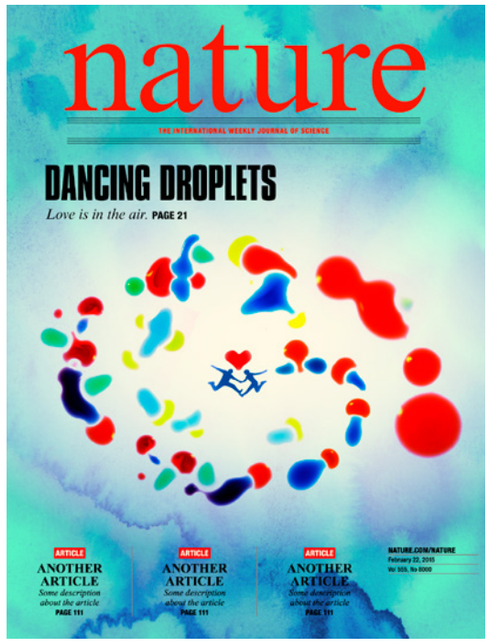
CURIOSITY MACHINE LEARNING APP **for:** Iridescent

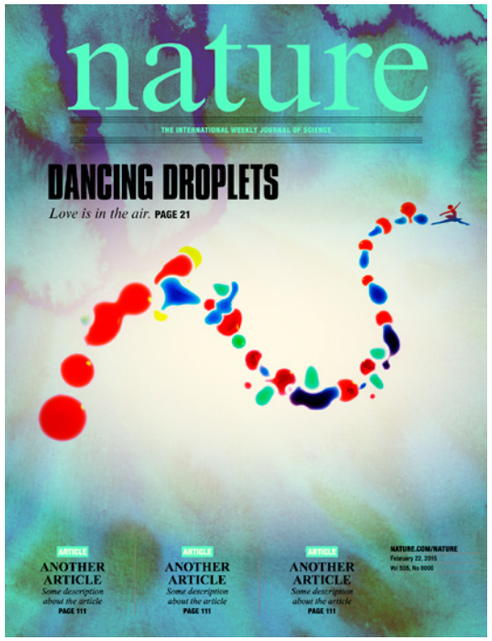
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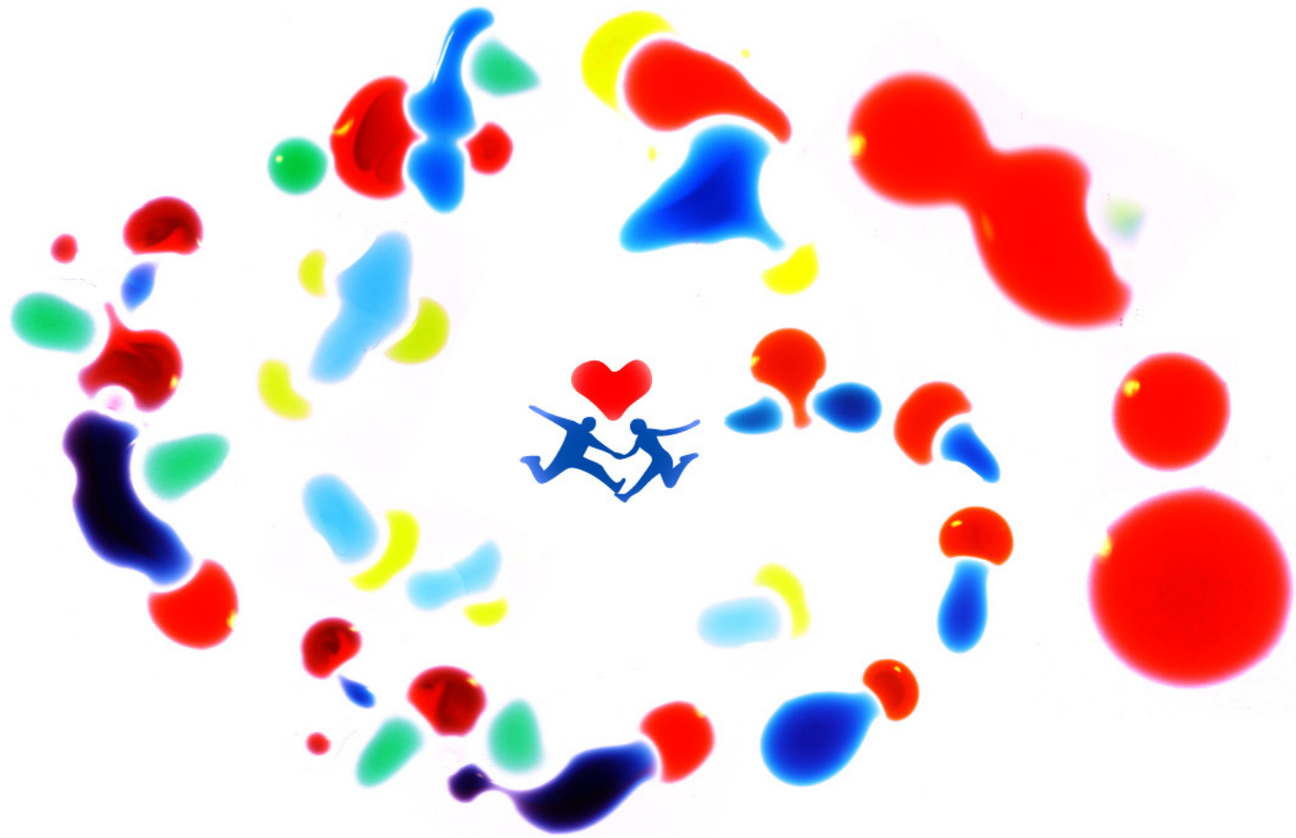
FOR INSTITUTIONS







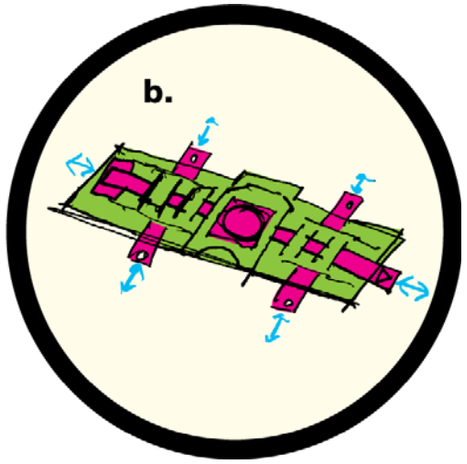


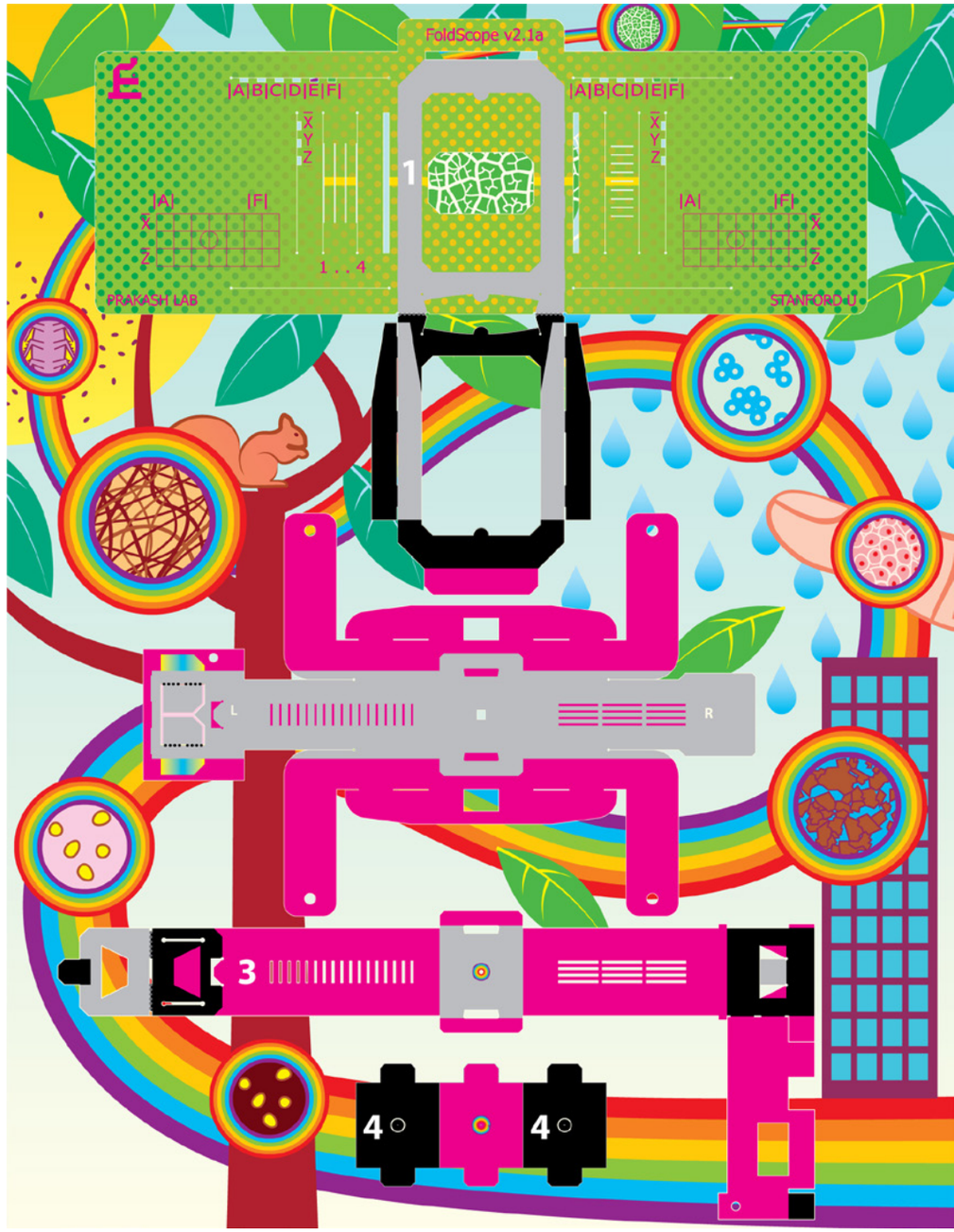


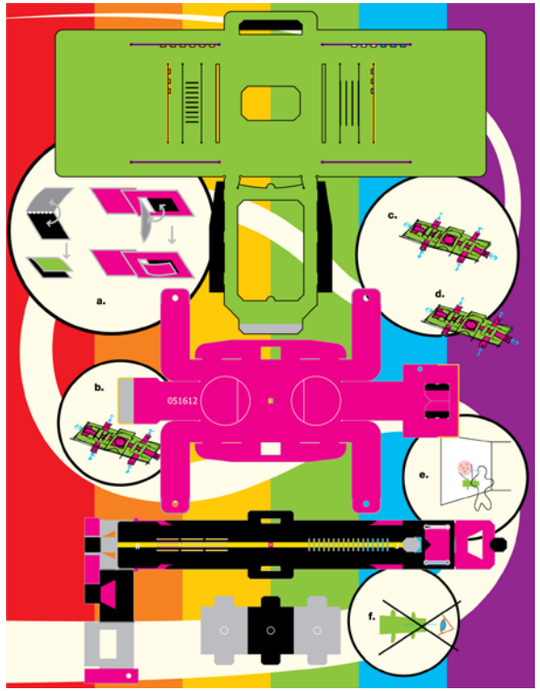
Playing on the research paper's "Dancing Droplets" concept, these metaphorical collages hoped to land the study on the cover of Nature magazine. (The researchers examined how water molecules containing food dye "sense" each other, and interact accordingly.)

COVER CONCEPTS **for:** Prakash Lab, Stanford University



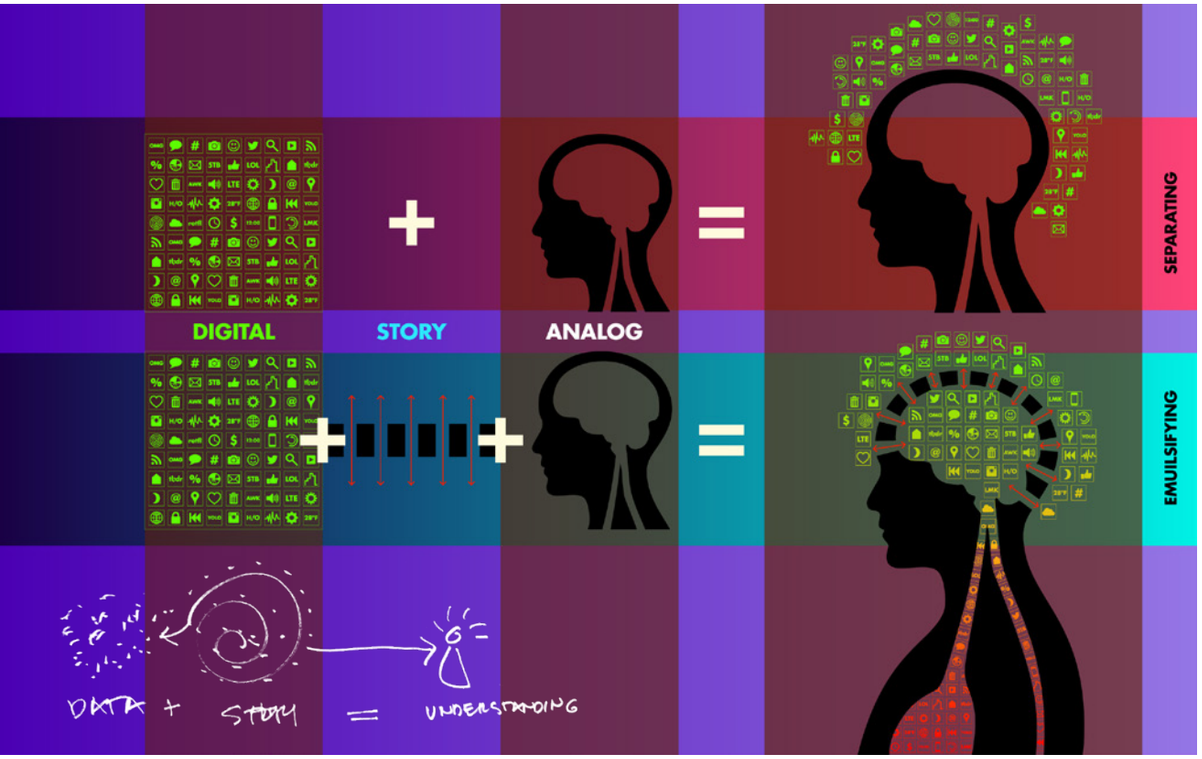


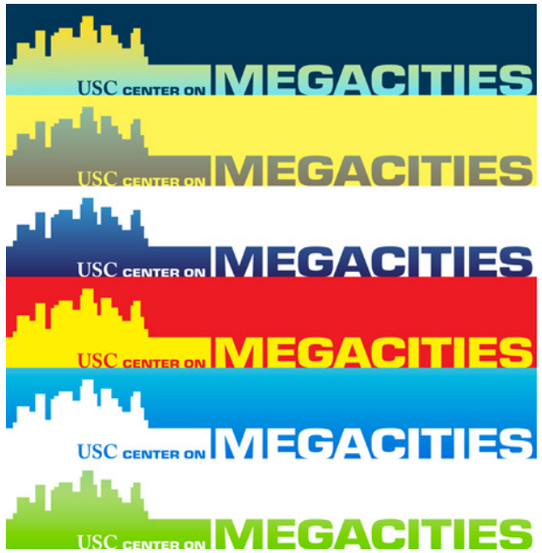




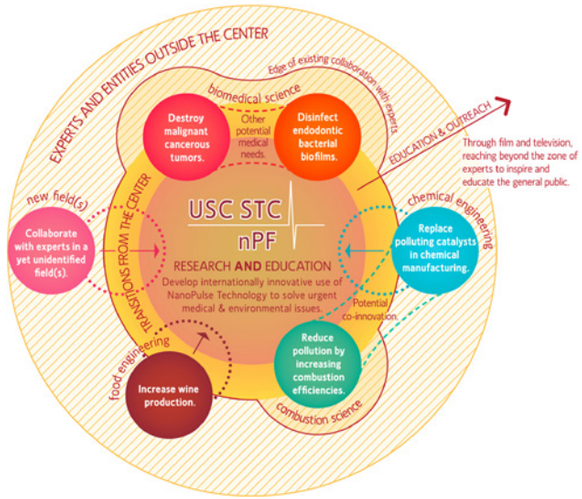
The rainbow (representing light) weaves through pieces of the paper microscope while highlighting cells found in the “neighborhood,” to get the audience (kids in developing countries) excited to explore their environment. The seemingly complex assembly is clarified through strongly differentiated areas of that need to be matched.

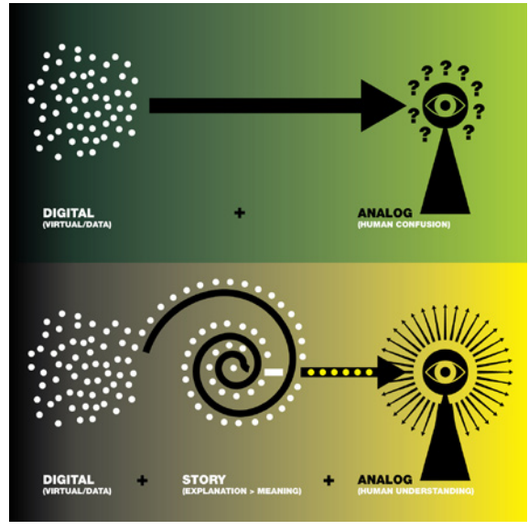
GRAPHIC DESIGN: FOLDSCOPE **for:** Prakash Lab, Stanford University

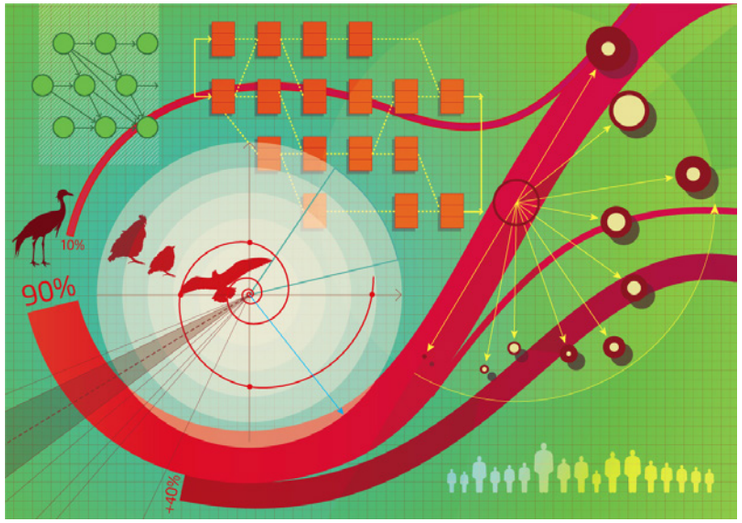












Graphics for reports, NSF proposals, signage, program launches, and public communication.

DIAGRAMS & LOGOS **for:** USC, Viterbi School of Engineering & Institute for Creative Technologies; and Long Beach Gas & Oil

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STEM EDU

GAMES





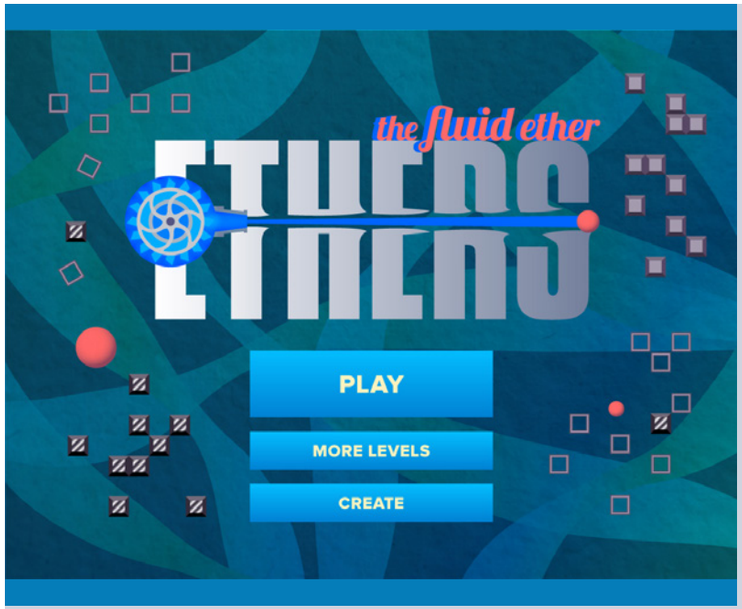


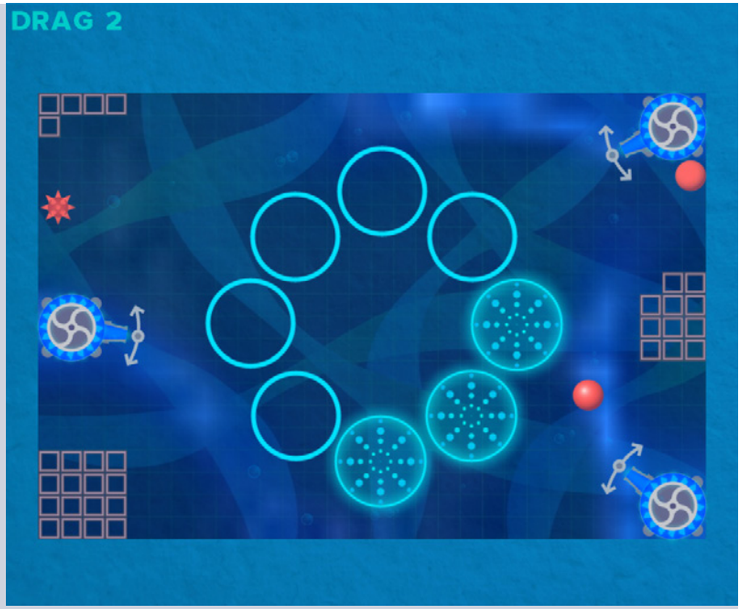
For these educational physics games – created by Kevin Miklasz of Iridescent – the logos were designed first, as part of fundraising efforts. Of the six games, Fluid and Gravity were the only ones fully completed.

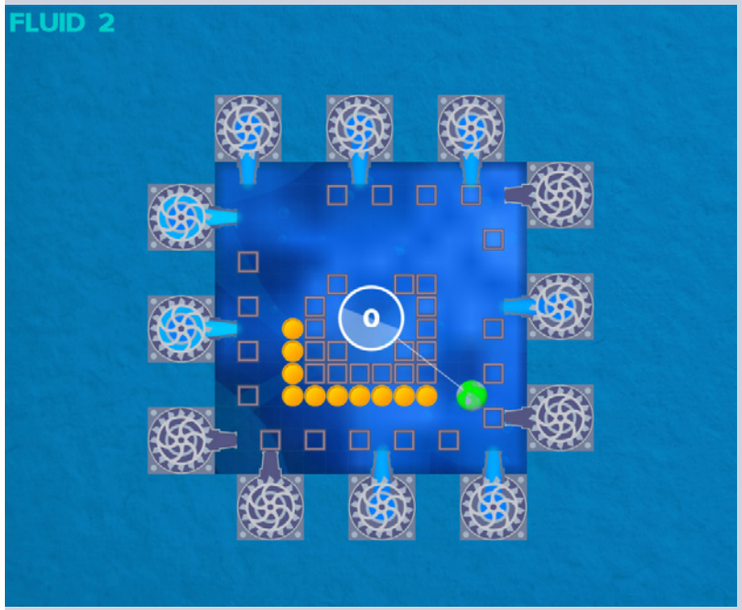
VISUAL DESIGN: **ETHERS PHYSICS GAMES** **for:** Iridescent & ONR/Office of Naval Research

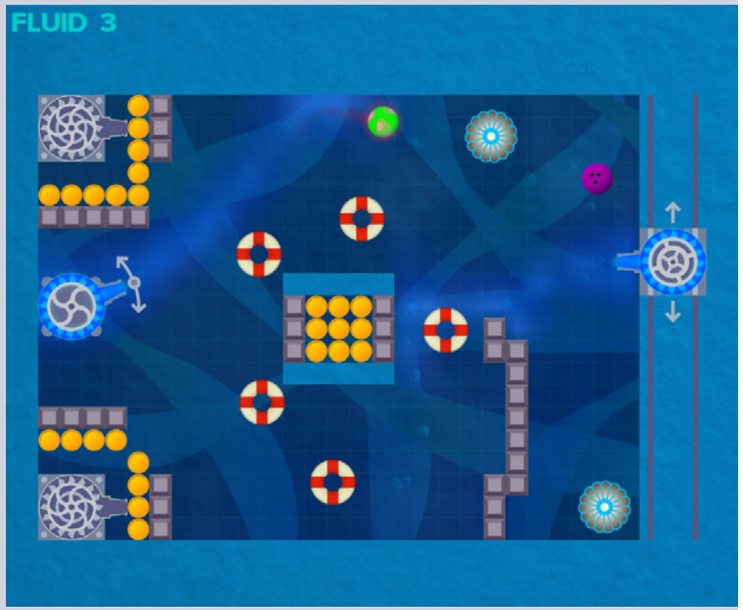
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STEM EDU









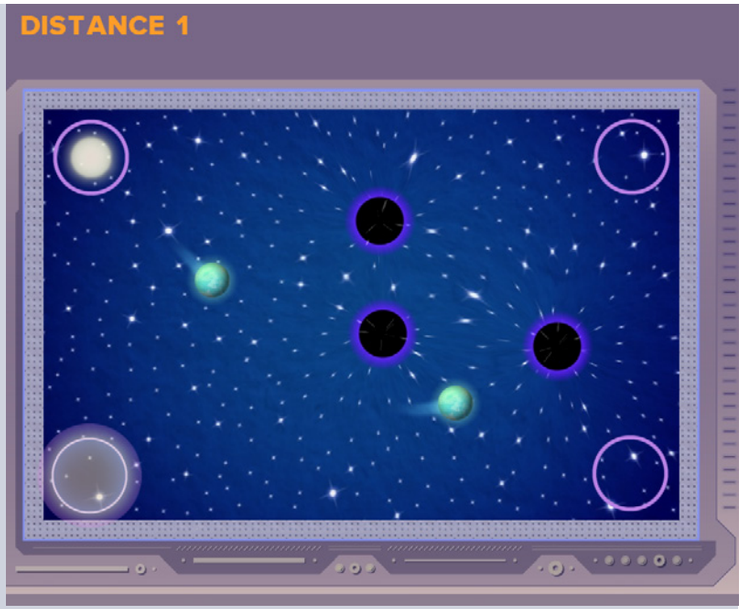


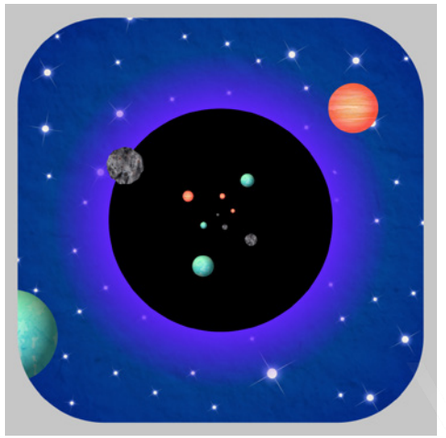
VISUAL DESIGN: **ETHERS PHYSICS GAMES** **for:** Iridescent & ONR/Office of Naval Research

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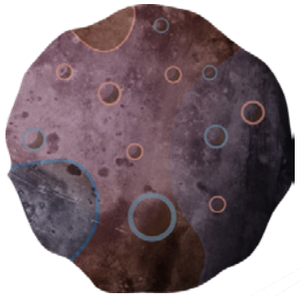
STEM EDU



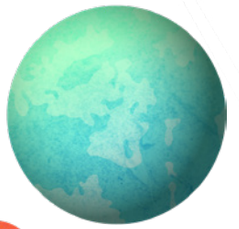




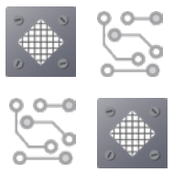


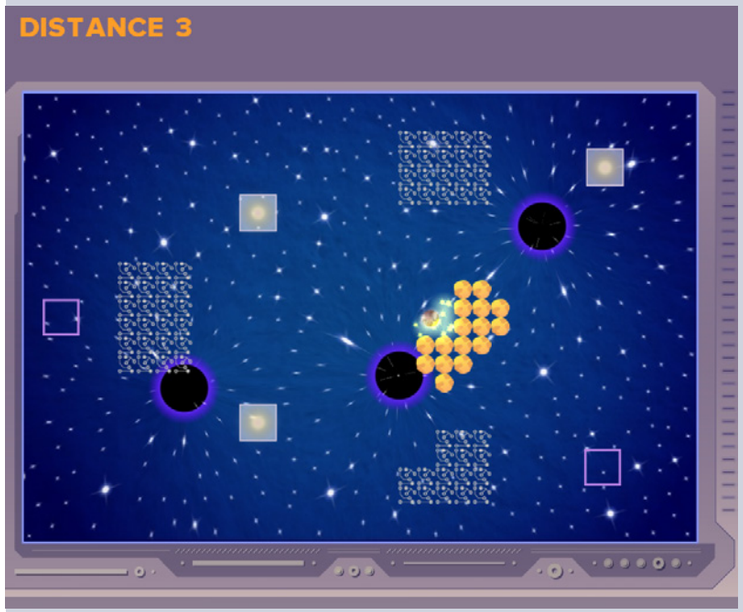


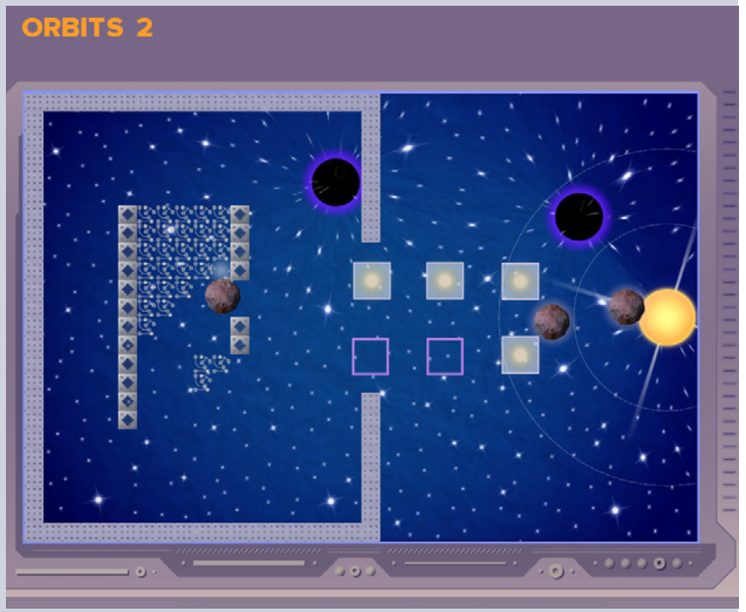










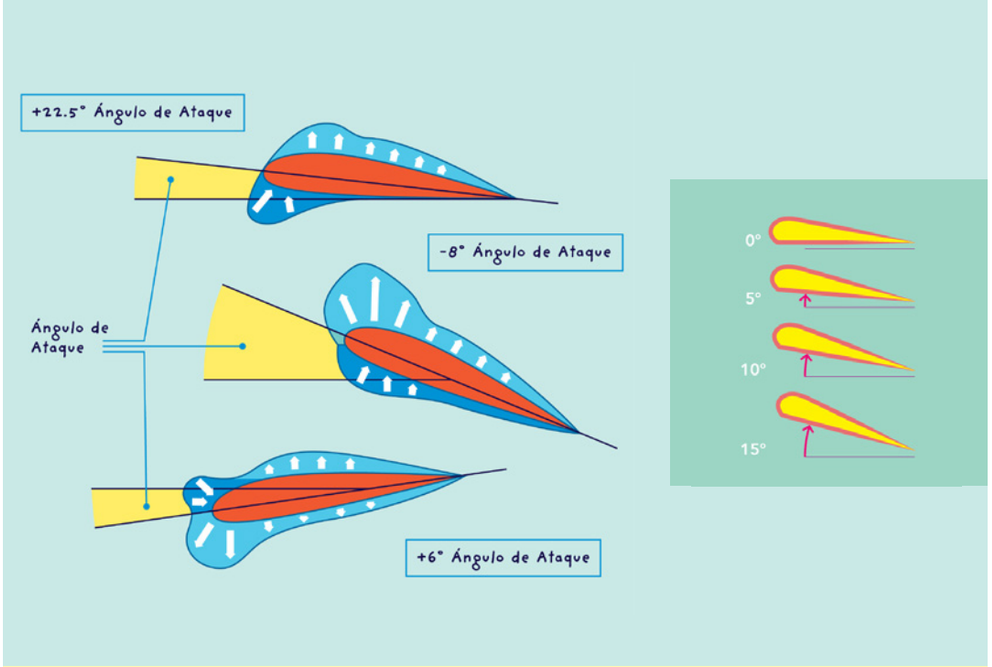


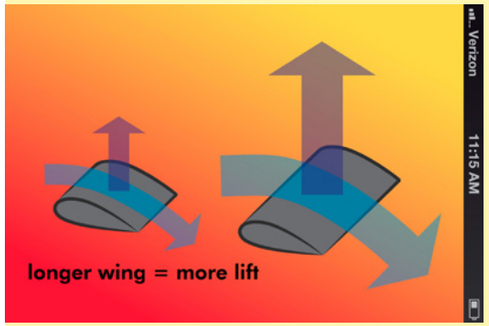
VISUAL DESIGN: ETHERS PHYSICS GAMES **for:** Iridescent & ONR/Office of Naval Research

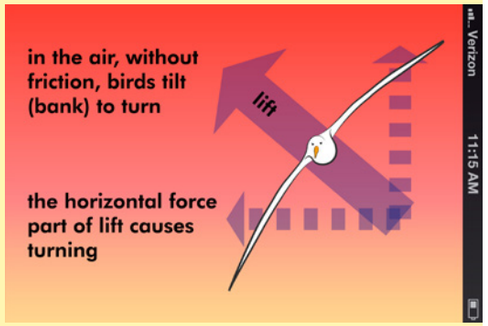
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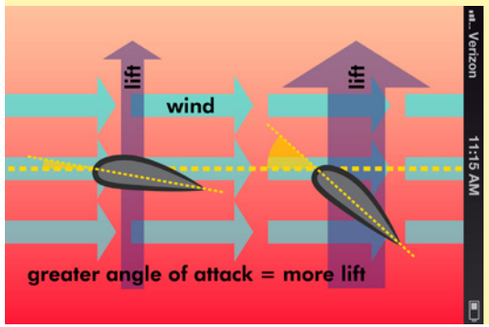
STEM EDU

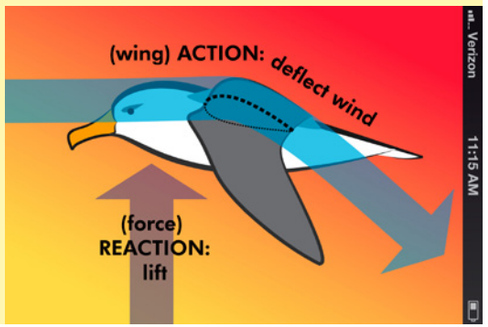
ILLUSTRATED ANALYSIS

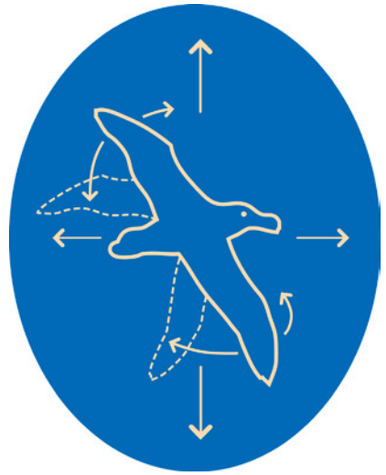






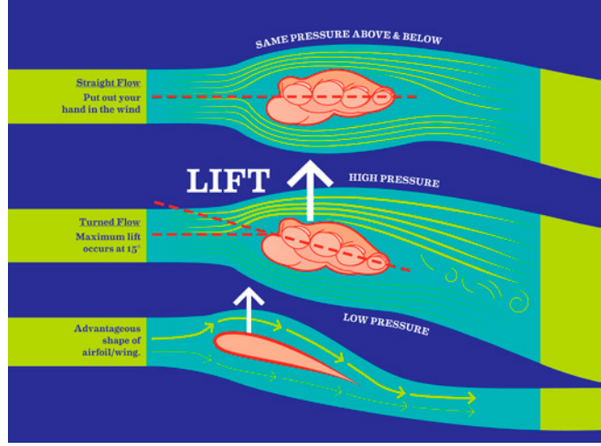


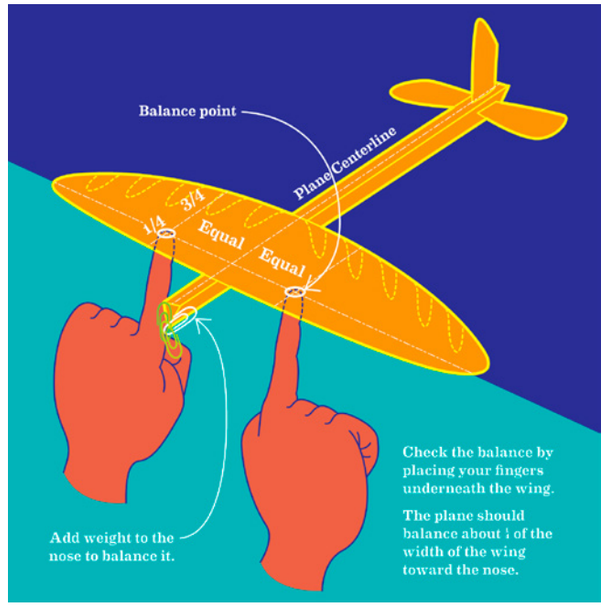


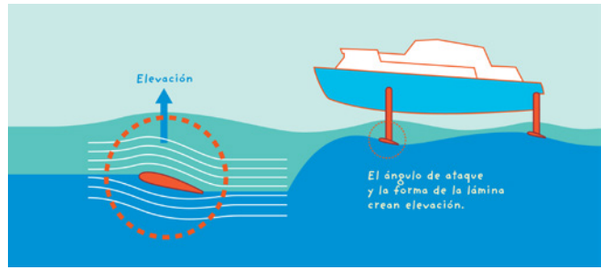






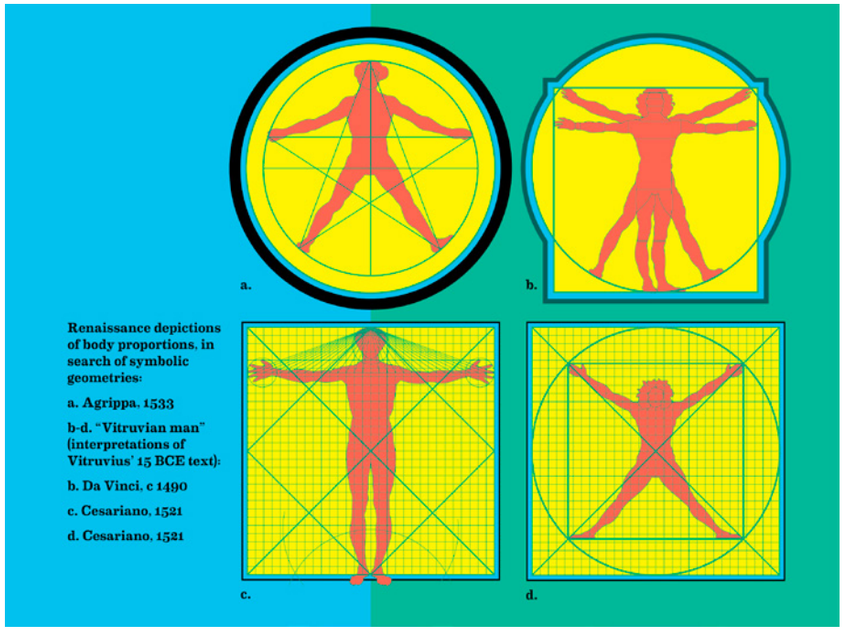


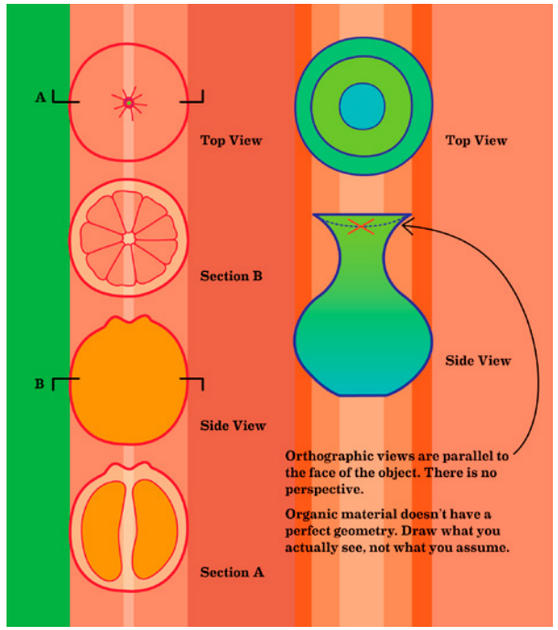


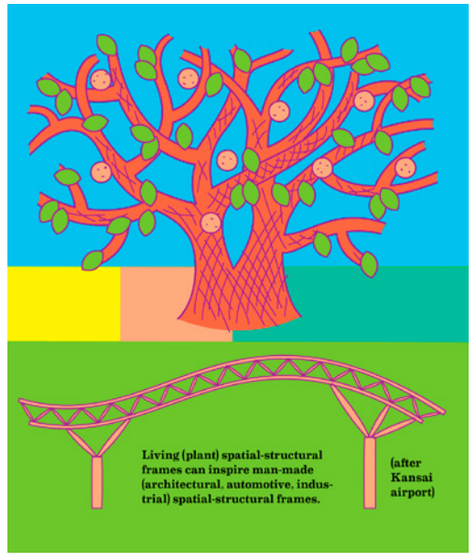


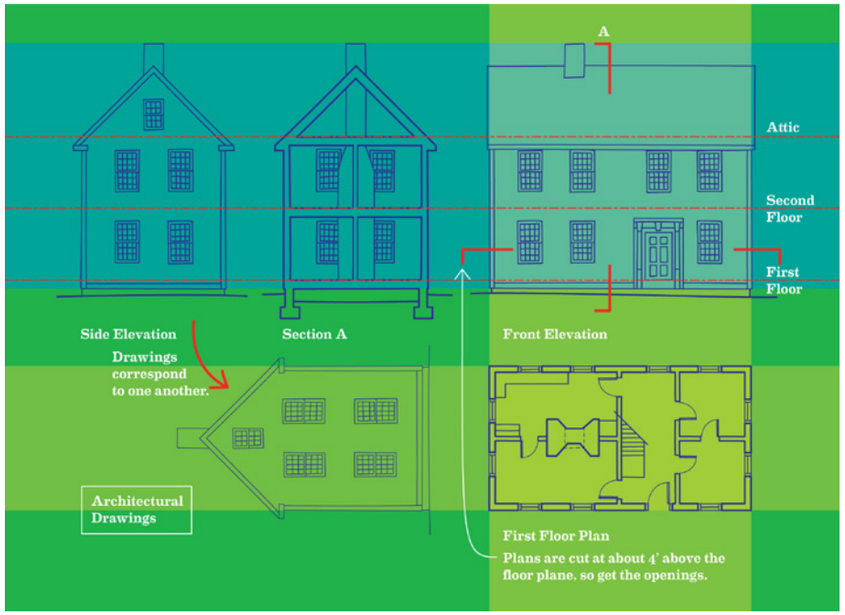
As the founder of Iridescent, Tara Chklovski, studied aeronautical engineering, a lot of the STEM non-profit's educational topics focused on fluid dynamics and flight.

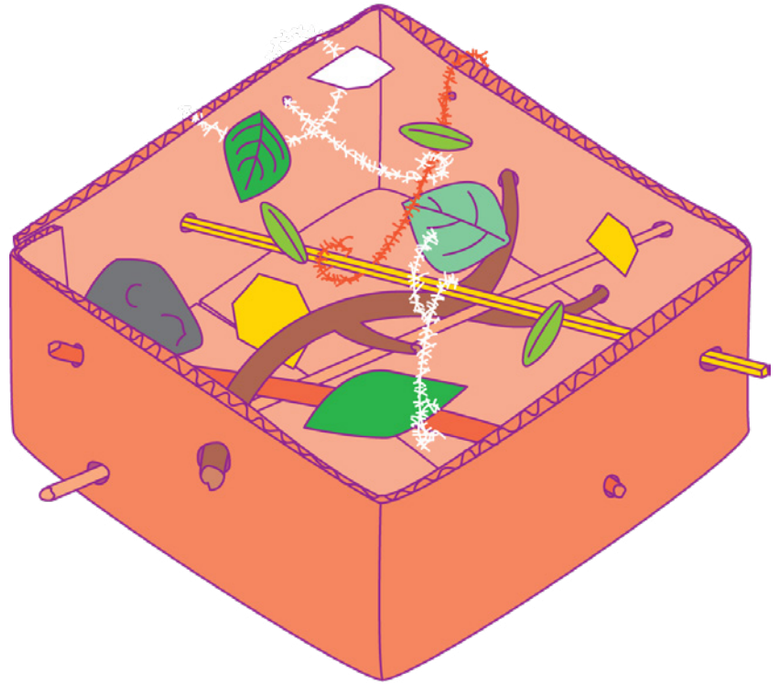
DIAGRAMS FOR BOOKS & APPS **for:** Iridescent, later partnered with ONR/Office of Naval Research











I was asked to author some of the chapters in a book of K-6 exercises, and chose (architectural & anatomical) geometry and spatial relationships.

DIAGRAMS FOR BOOKS & APPS **for:** Iridescent, later partnered with ONR/Office of Naval Research

BOOKS





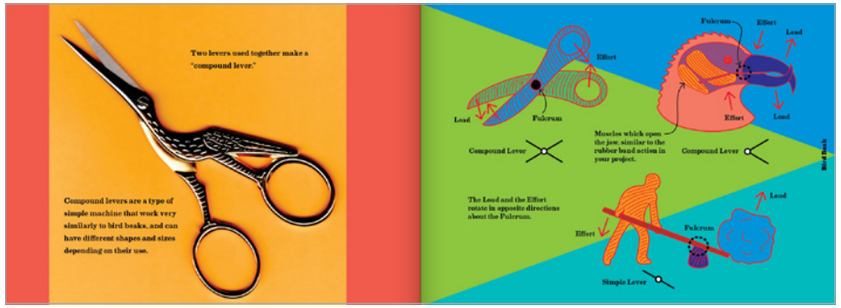
Designed, illustrated, and co-authored this 80 page K-6 STEM activity book. The project was put on hold when the US Navy grant ended.

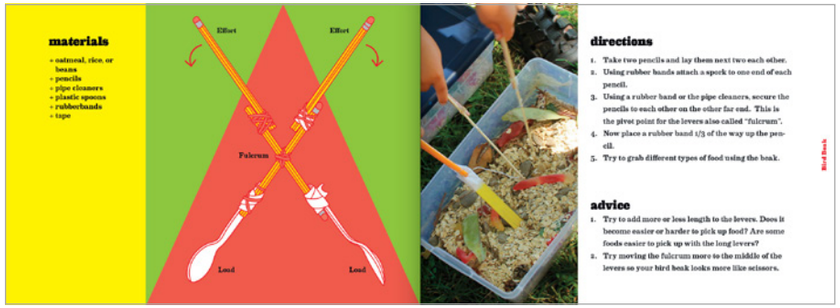
BOOK: DESIGN, ILLUSTRATION, & CO-AUTHOR **title:** "Nature's Machines" **for:** Iridescent & ONR/Office of Naval Research

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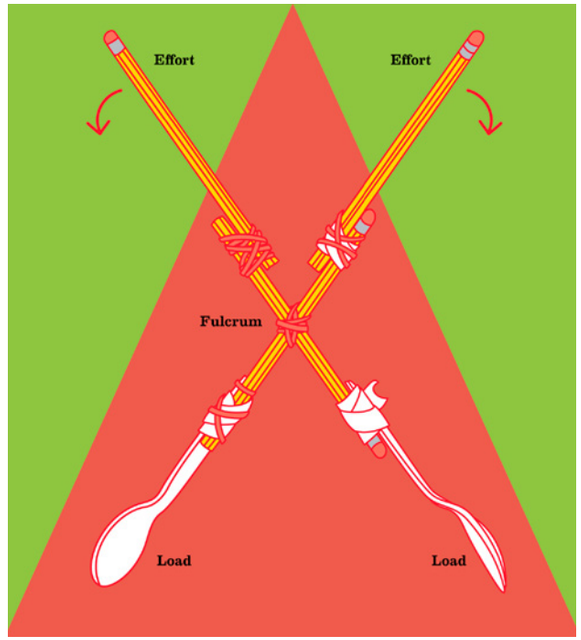
STEM EDU











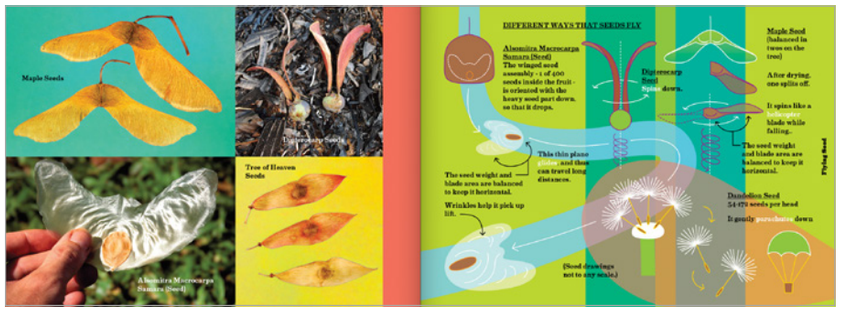


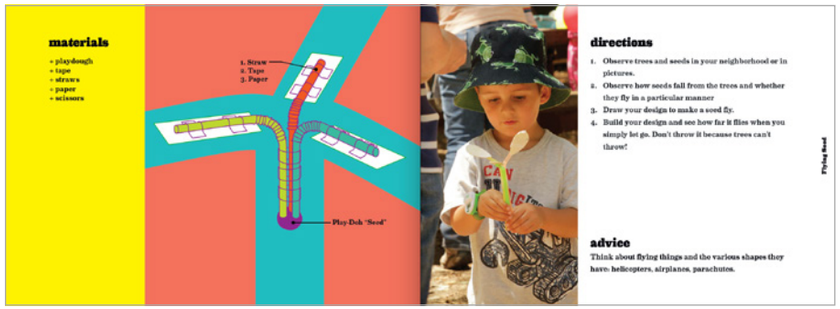
BOOK: DESIGN, ILLUSTRATION, & CO-AUTHOR **title:** "Nature's Machines" **for:** Iridescent & ONR/Office of Naval Research

IOANA URMA ARTIST ARCHITECT LLC ioana

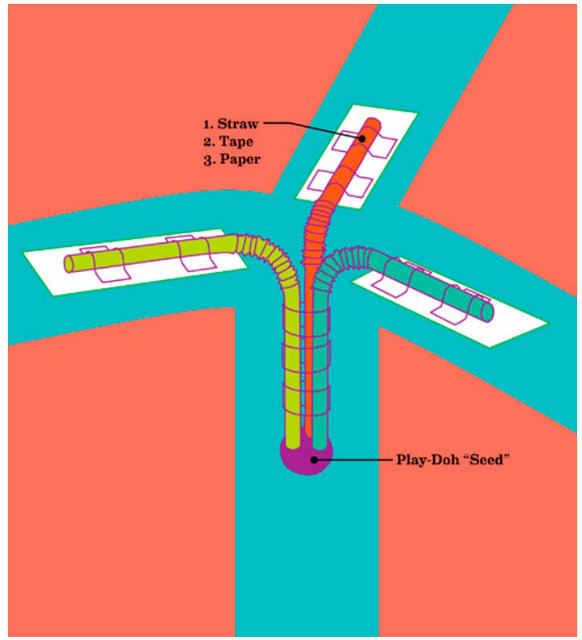
STEM EDU

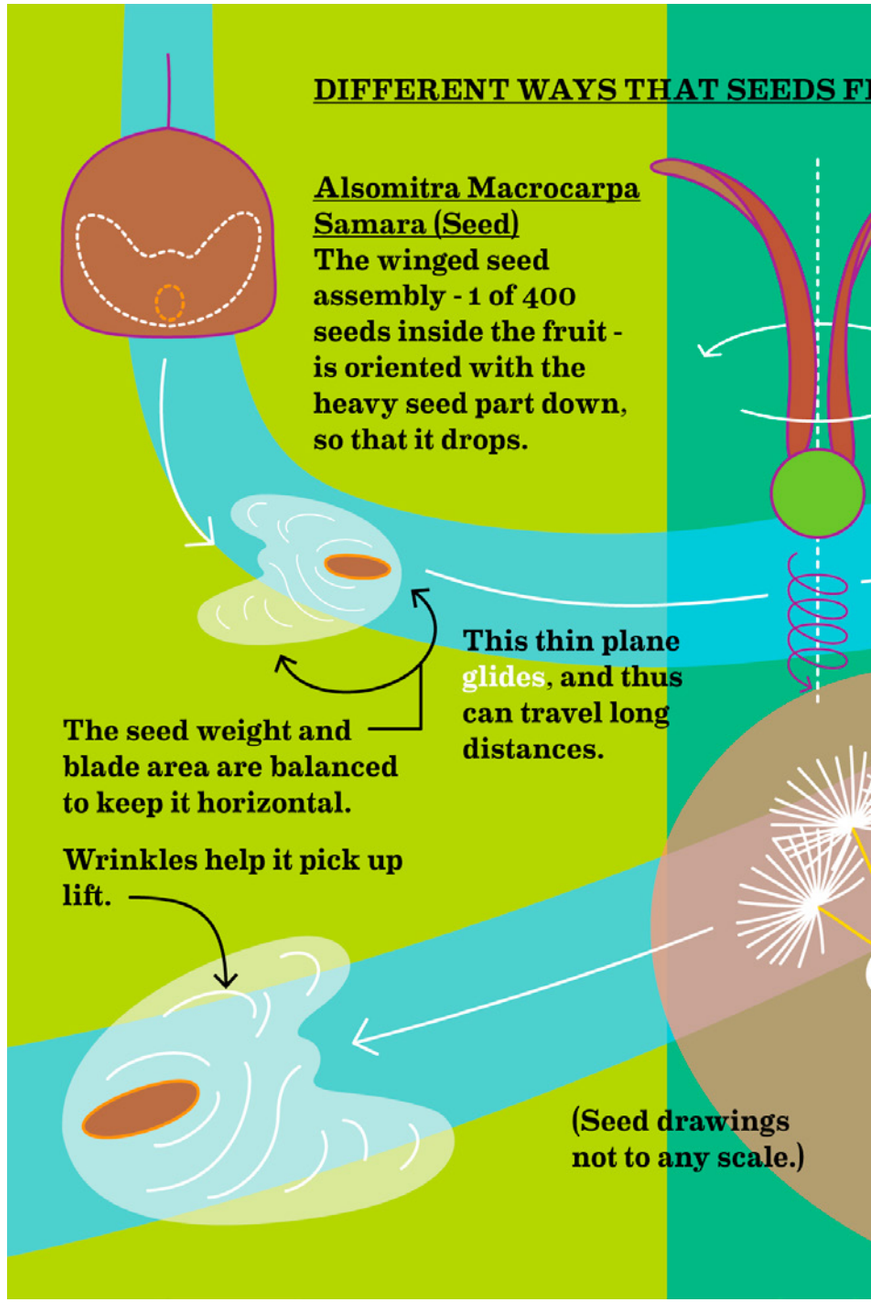






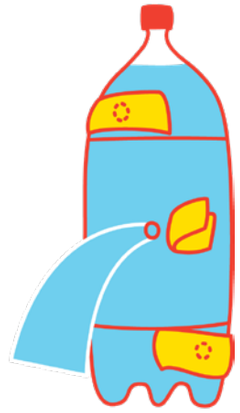






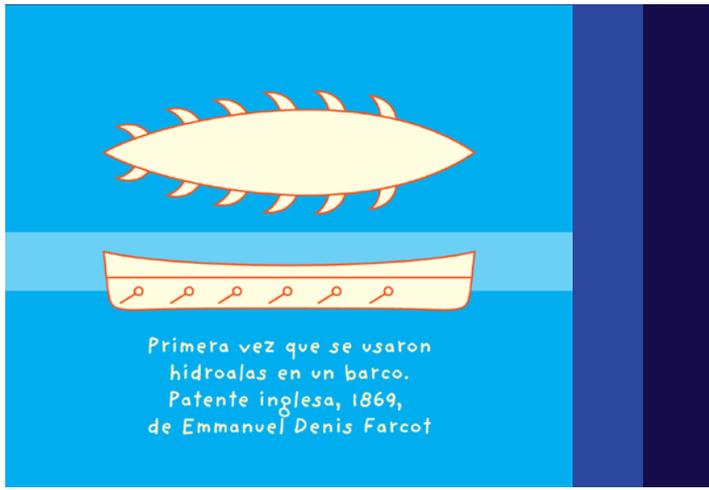
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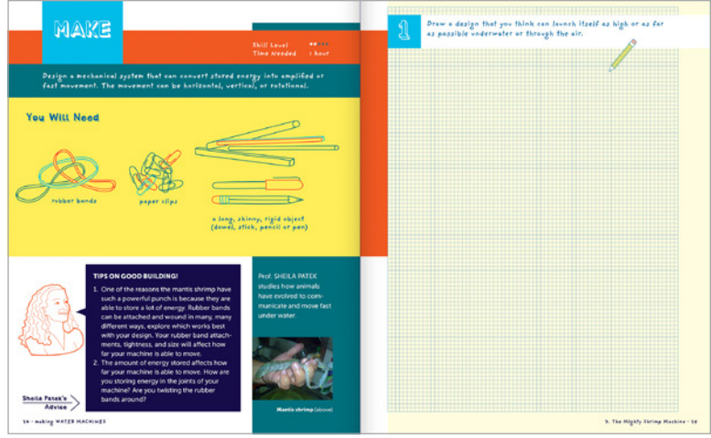


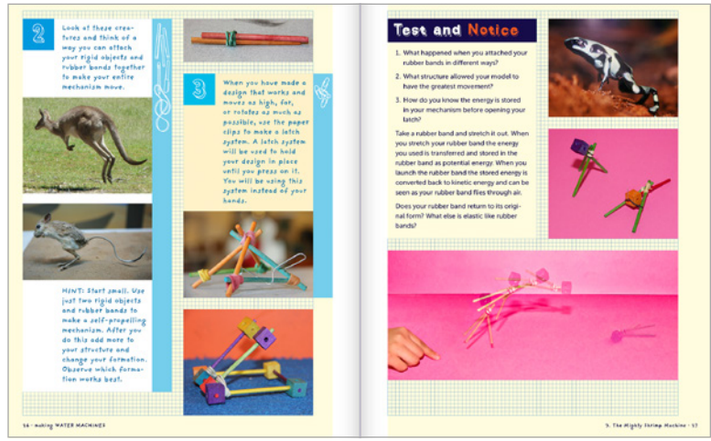
My authorship on this book – aside from the design and illustrations – was adding historic content, reference images, and copy editing.

The concept for the book layout is a collage of educational material: making the science and engineering concepts appear fun, and tying the visual material together, as the activity photos vary greatly.

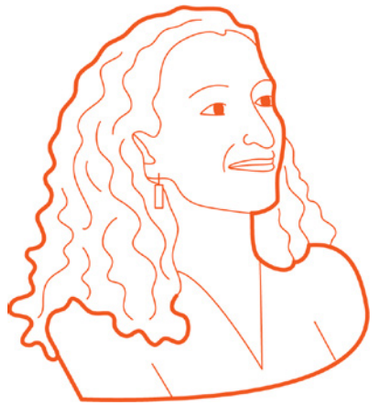
BOOK: DESIGN, ILLUSTRATION, & CO-AUTHOR **title:** "Making Water Machines" **for:** Iridescent & ONR/Office of Naval Research







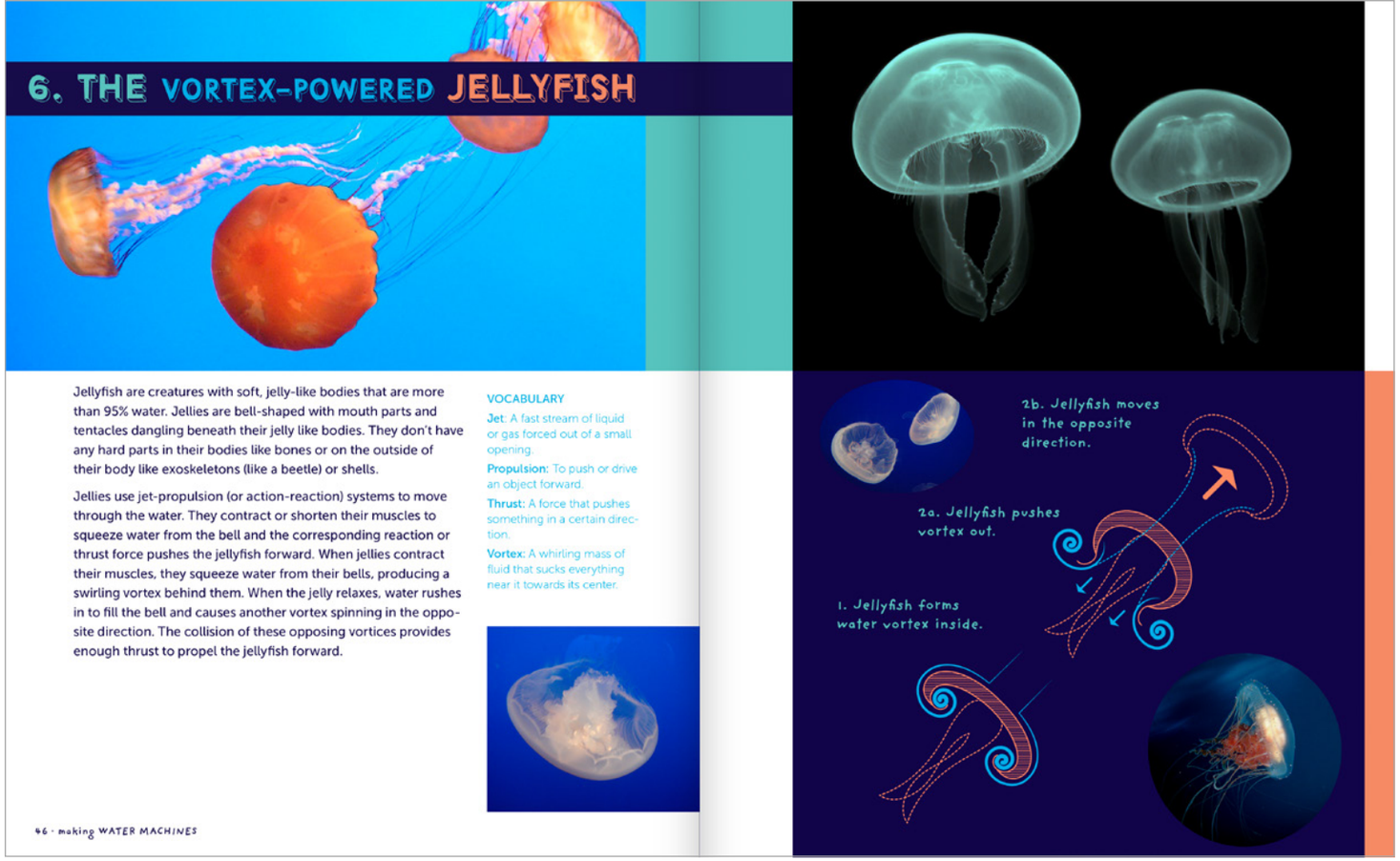


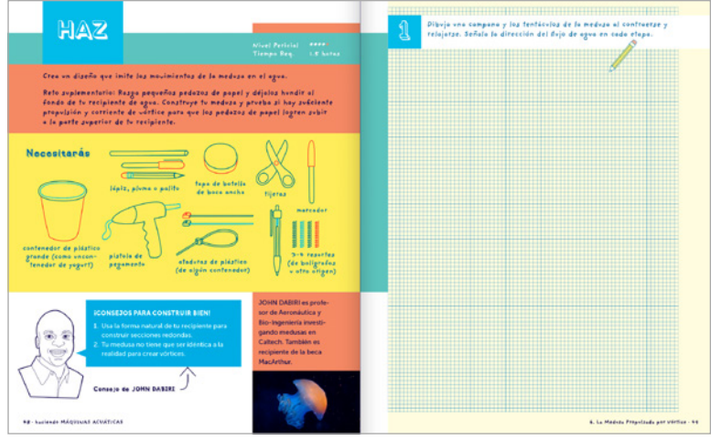


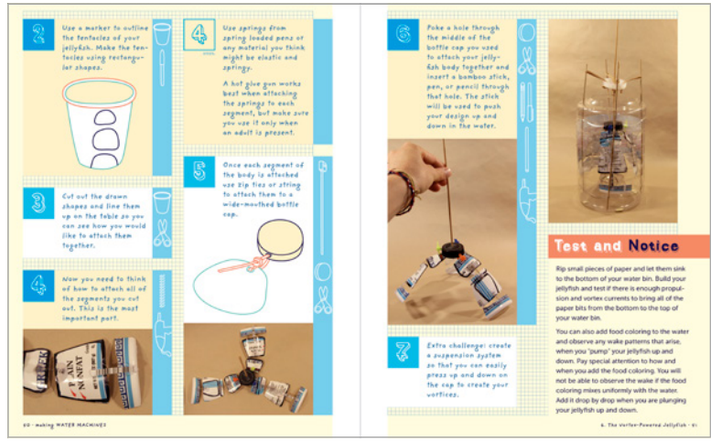
Both historic "celebrities" and contemporary scientists from marginalized groups are featured throughout the book, so that kids can both learn history and see themselves in the modern examples.

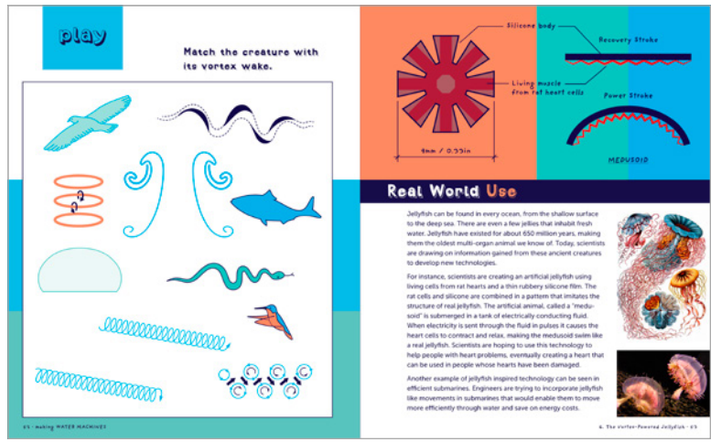
BOOK: DESIGN, ILLUSTRATION, & CO-AUTHOR **title:** "Making Water Machines" **for:** Iridescent & ONR/Office of Naval Research

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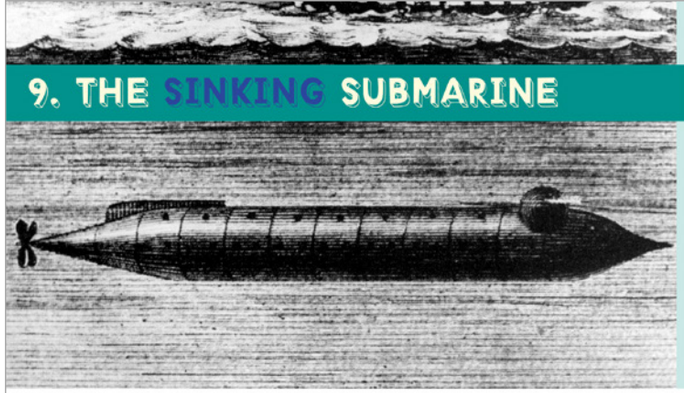




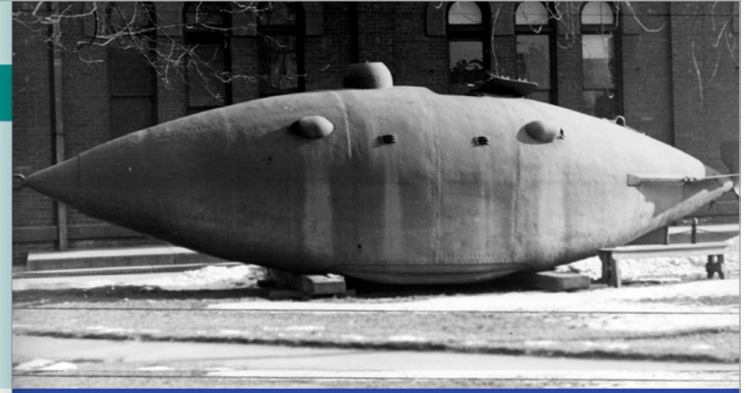
This Gr 7-12, 114 page STEM activity book was published both in English and Spanish, to reach Iridescent's largest target audiences.

BOOK: DESIGN, ILLUSTRATION, & CO-AUTHOR **title:** "Making Water Machines" **for:** Iridescent & ONR/Office of Naval Research

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9. THE SINKING SUBMARINE



Submarines are special boats that can go down into the water and then return to the surface. Over the years, people have made many kinds of submarines: some for scientific research, some for exploring shipwrecks at the bottom of the sea, and some for military use.

A submarine needs to be able to control its "buoyancy" (how much it floats or sinks in the water.) To "surface" or rise, the submarine must be less dense than the water around it. To dive or go down, it has to be more dense than the water around it. And to be able to easily cruise around underwater without rising or sinking, it has to have the same density as the water around it, which is called being "neutrally buoyant. "

Submarines are able to adjust their density by filling inside tanks with different amounts of water and air. If the submarine has a lot of water inside these tanks, then it will weigh more and will dive. If it has a lot of air instead of water in the tanks, it will weigh less and surface. When the mix is just right, the submarine will be neutrally buoyant, and will not rise or sink in the water.

VOCABULARY

Buoyancy: The floating or sinking force on an object in a fluid.

Dive: To sink to the bottom.

Neutrally Buoyant: Neither floating nor sinking.

Surface: To rise up, towards the water's surface.

USS Alligator, first US bought submarine, 1862 (top)

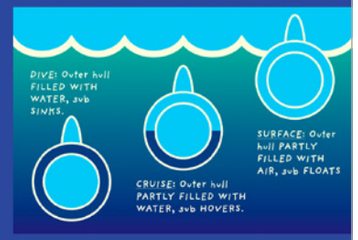
OPPOSITE PAGE

Intelligent Whale, 1863 (top)

First practical submarine, Robert Fulton, 1800 (middle left)

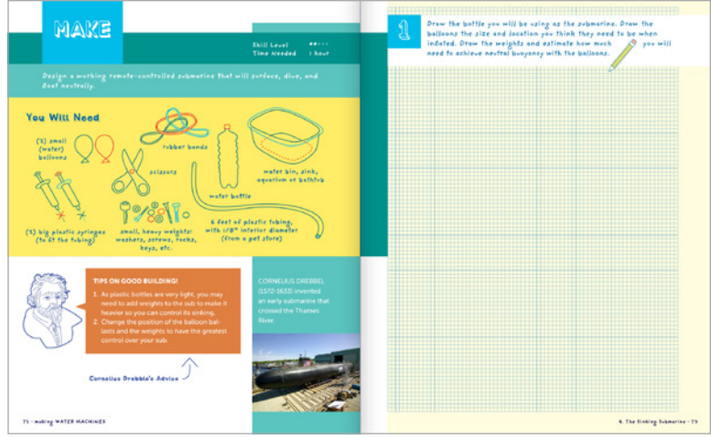
First navigable submarine, Drebbel, 1620 (bottom right)

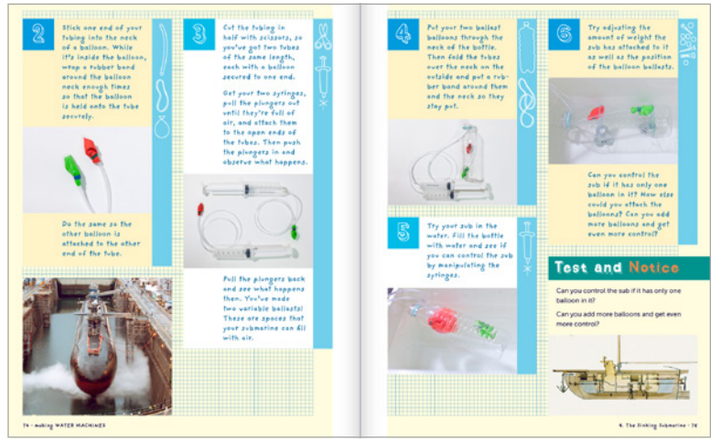


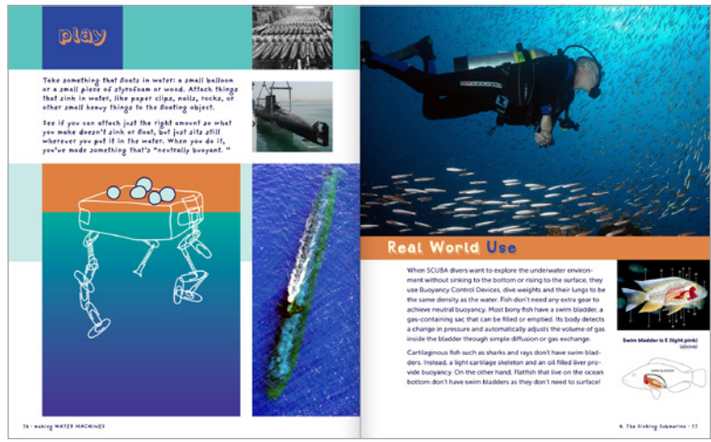










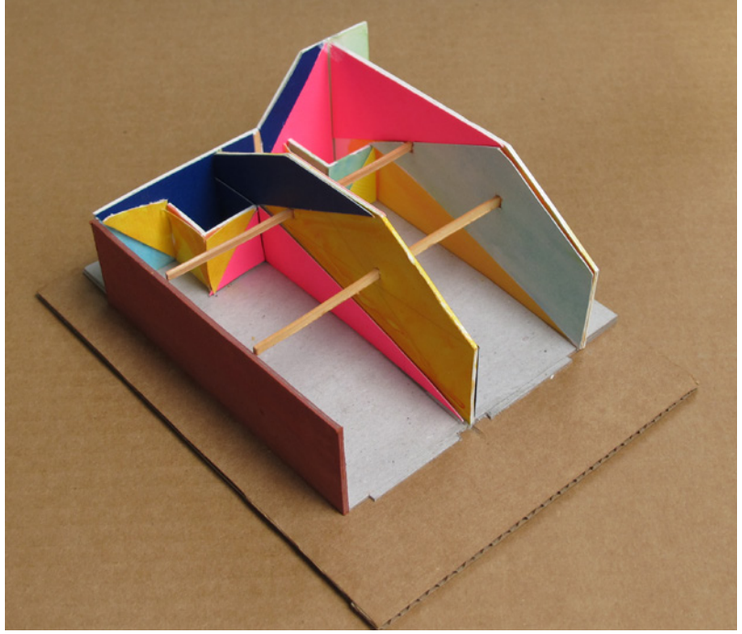




BOOK: DESIGN, ILLUSTRATION, & CO-AUTHOR **title:** "Making Water Machines" **for:** Iridescent & ONR/Office of Naval Research

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PAINT
DESIGN+



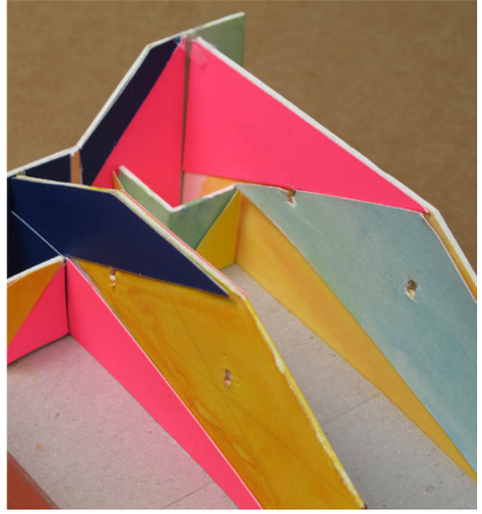


Forced perspective paint design activates and perceptually widens very long and tight studio spaces. The triangulated geometry also ties the complex roof parts together into a cohesive spatial mass.



PAINT DESIGN: FORCED PERSPECTIVES **for:** Iridescent's K-12 STEM Studio Spaces **in:** Historic South-Central LA, CA





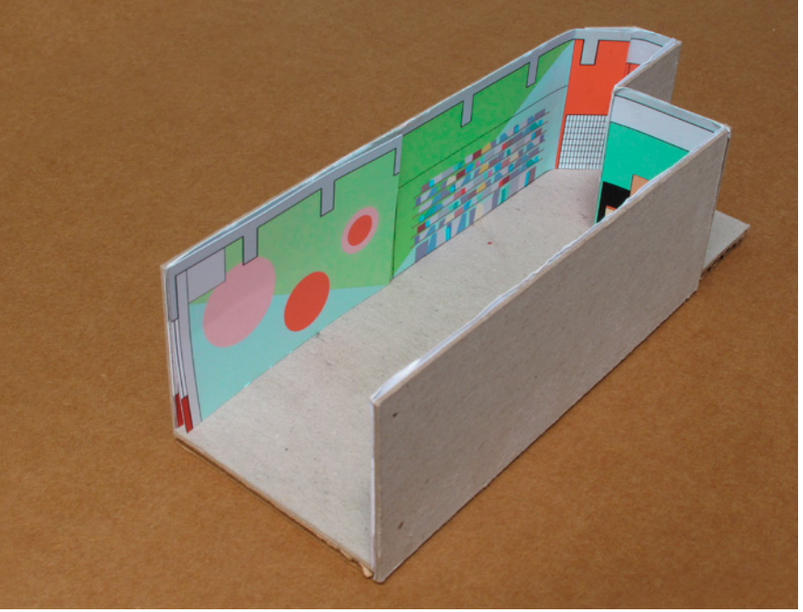


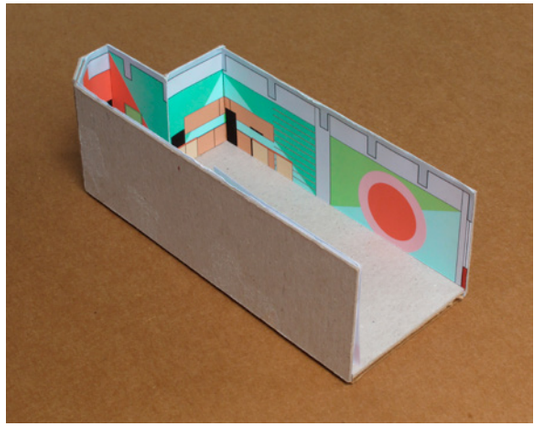


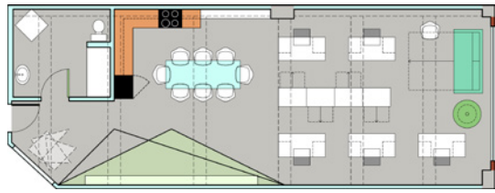


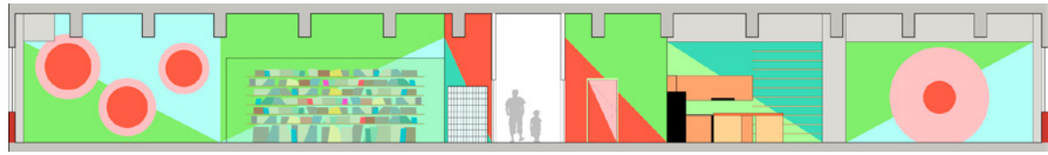
The bright colors energize the short-term workshops conducted here. For all-day classes, more toned-down colors would work better.

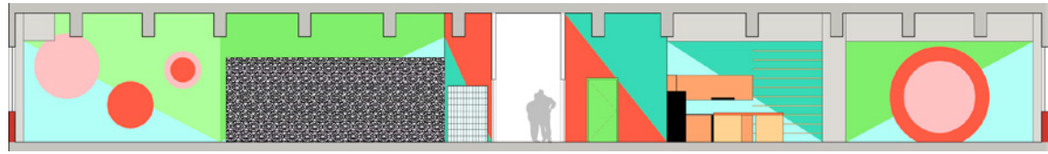
The extremely narrow size of the spaces rendered their design very difficult to convey in photos.

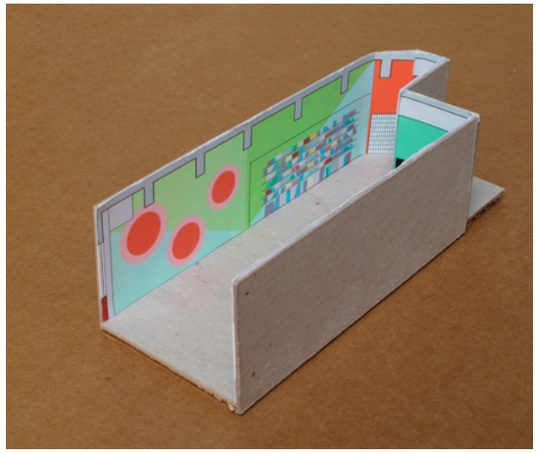


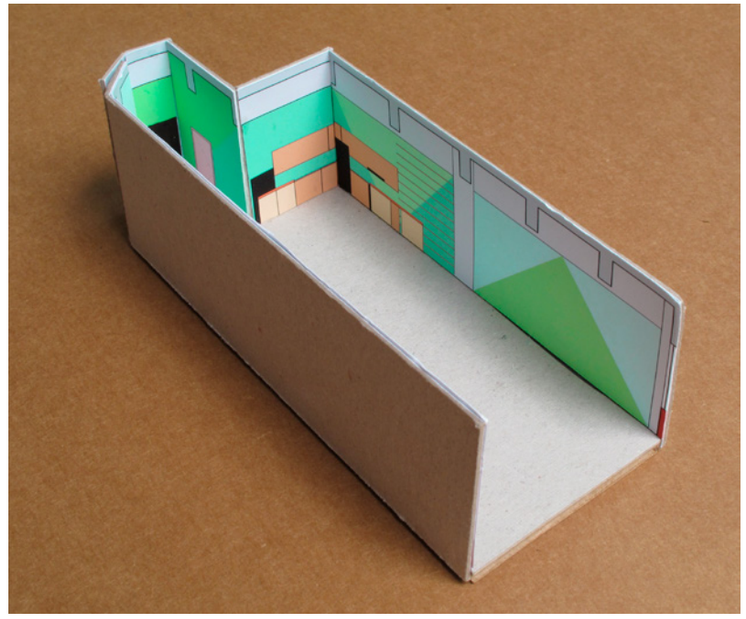












Enlarged geometries in calm but cheery spring colors – abstracted nature – proposed to enliven a north facing concrete space.

(A leaky roof postponed the project long enough for the organization to decide to work remotely.)

INTERIOR & PAINT DESIGN: ABSTRACTED NATURE **for:** Iridescent's Office Space **in:** Historic South-Central LA, CA