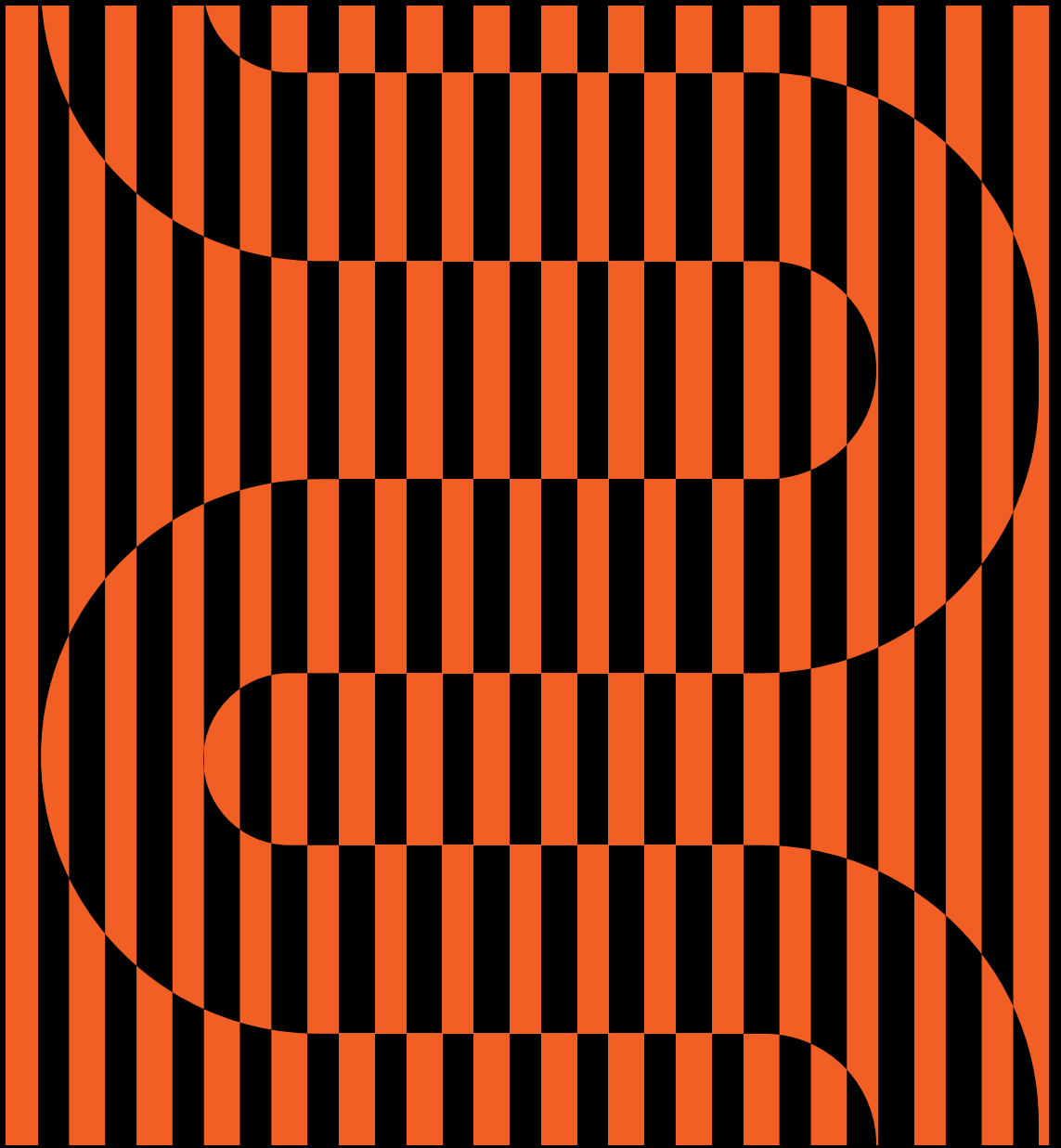


BAZEL



Roman Mars:

This is 99% Invisible. I'm Roman Mars.

Roy Behrens:

I think if you ask somebody on the street, "What is camouflage?" I believe the most common answer would be to say, "Well, it's a figure and it's being hidden by being blended with its background."

Roman Mars:

Scientists today call that "background matching."

Roy Behrens:

I call that "high similarity camouflage."

Roman Mars:

That's Roy Behrens.

Roy Behrens:

I'm Roy Behrens and I teach in the Department of Art at the University of Northern Iowa. I teach graphic design and the history of design.

Roman Mars:

Behrens is also one of the foremost camouflage experts.

Roy Behrens:

Well, I wouldn't go that far.

Roman Mars:

I would, I do. "High similarity" or "blending" is just one type of camouflage. It's kind of the boring one. But another type of camouflage that you can find both in nature and in military use is disruptive camouflage.

Roy Behrens:

I call it "figure disruption" because it breaks up the figure.

Roman Mars:

It's the opposite of the high similarity camouflage. It's a high difference.



Roy Behrens:

So, you're making it very difficult for us to look at the figure and to see it as only a single continuous thing.

Roman Mars:

Zebra stripes have long been thought to be a form of disruptive camouflage. The stripes make it hard for a predator to distinguish one zebra from another when the zebras are in a large herd. The stripes might also make zebras less attractive to blood-sucking horseflies. But when it comes to humans, the greatest, most jaw-droppingly, spectacular application of disruptive camouflage by the military, is "Razzle Dazzle."



Roy Behrens:

Dazzle camouflage strictly applies to ship camouflage, and even more strictly it applies to World War I ship camouflage. And it came about because it was discovered that it's almost impossible to make a ship invisible on the ocean. The horizon is changing in color. It's changing in amount of light.

Roman Mars:

So there are all kinds of conditions that make it so a constantly moving ship can't blend into the background of the sea. And even if you could make a ship invisible-

Roy Behrens:

You still have smoke coming out of the smokestack. So it's not as if you're hiding the ship at all.

WWI SHIP CAMO

Roman Mars:

So the less heavily armored ships were sitting ducks.

Roy Behrens:

The crisis came about at the time that the US had not yet entered the war.

Roman Mars:

Remember, this is World War I.

Roy Behrens:

It was the British ships that were being sunk. And the German submarines were sinking as many as 50 ships a week. Many of those ships were merchant ships and they were bringing supplies to England which is an island, of course, and it really depended on those and then also there was armaments and other things that were being secretly taken there too.



ERRATIC, CRAZY, QUILT PATTERNS



Roman Mars:

So the design solution was not about invisibility. It was about disruption.

Roy Behrens:

A number of artists decided that the best way to avoid getting torpedoed was not to make the ship invisible but to make it hard to hit. That's why these kinds of erratic, crazy, quilt patterns came about and that's why they were used in that war.

Roman Mars:

It's gonna be hard to picture this but I want it to try. There once was a time when military ships, even US ships by this point, were painted with and I quote, this is

from an anonymous article in New York Times from 1918, "Any New Yorker will see at anchor or coming in or going out, numerous ships who's painted sides reveal such wild extravagances of form and color, as make the Landsman open his eyes with amazement and mystification."

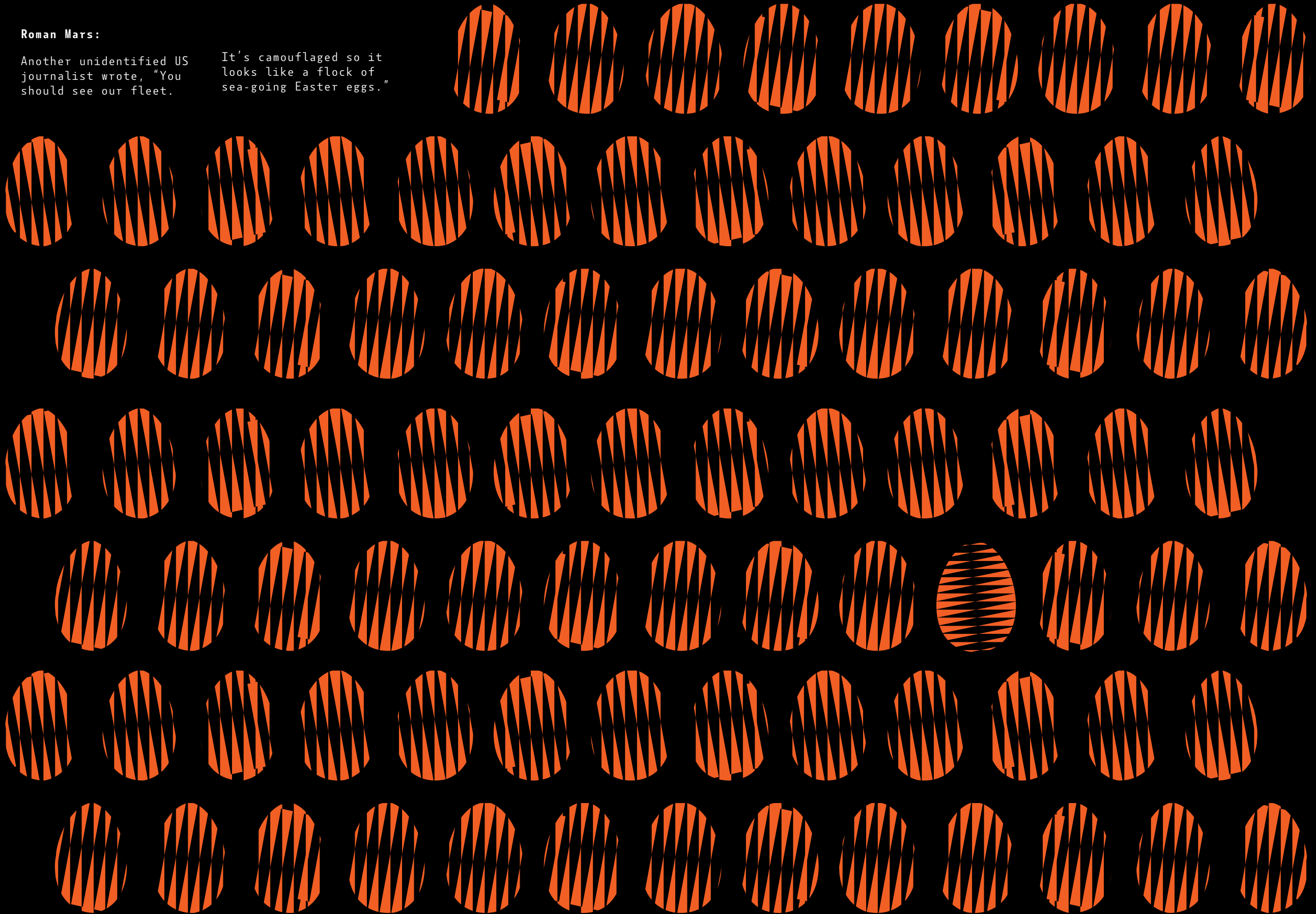
Roy Behrens:

Black and white was very common. They consist of stripes and swirls and arabesque, almost art nouveau shapes. Blue was used predominantly especially in the British versions, but I think you'd be surprised at the range of colors. There were reds that were sometimes used, greens, and really quite intense oranges.

Roman Mars:

Another unidentified US journalist wrote, "You should see our fleet.

It's camouflaged so it looks like a flock of sea-going Easter eggs."

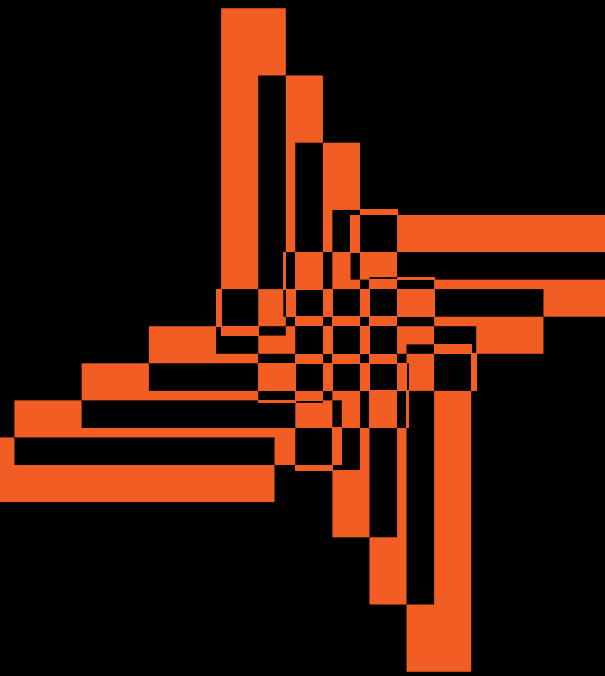


Roy Behrens:

During World War I, Dazzle ship camouflage was absolutely fascinating to the public. You have to remember that this is happening just a few years after the, what's called the "Armory Show" in New York.

It's the first international show of modern art in this country. And it was the introductory show of cubism, futurism, all of those things that people made fun of and they thought that these were really crazy directions for artists to be going in. So that when this happened, people looked at those ships and they said, "Oh, it's a cubist nightmare. It's futurists, they've taken over the world!"

**"OH, IT'S A CUBIST
NIGHTMARE."**



**IT'S FUTURISTS,
THEY'VE TAKEN OVER THE WORLD!"**

Roman Mars:

As you can probably guess, there were plenty of people who hated Dazzle camouflage; traditional Navy men, mostly.

Roy Behrens:

They compared it to the clothing a prostitute would wear and they made fun of it.

Roman Mars:

Here's how it worked.

[SONAR BLIP]

Roy Behrens:

I can lead you through the steps.

Roman Mars:

At the time, torpedoes fired from U-boats were quite slow, maybe taking a couple minutes to reach

their target. So, the person firing the torpedo had to lead the target. He had to anticipate where the target ship was going to be when the torpedo arrived.

Roy Behrens:

So, he had to calculate how to do that. And that very much depended on knowing the exact angle it's headed toward. That's terribly, terribly

important. And the other thing is that you have to figure out the speed of the ship because then you'll know how far it can go by the time the torpedo gets there.

Roman Mars:

The Dazzle camouflage certainly made the ship stand out but the bulging shapes and vivid hues also made it difficult to determine the speed and direction of the moving ship.

[SONAR BLIP]

Roy Behrens:

It's preying on our assumptions about things looking smaller as they are more distant. So, you could paint perspective patterns on a ship that would make it look like it was turning in a different direction, when in fact, when you're actually seeing them frontly and they're absolutely flat.

ABSOLUTELY

FLAT



FAKE BOW WAVES



Roman Mars:

The Dazzle patterns broke up the figure so that it could look shorter than it really was, or it could make it hard to tell if there was one ship or multiple ships.

Roy Behrens:

They even painted fake bow waves on them, and they would paint the fake bow wave either on the front to make it look like the ship was going faster than it was

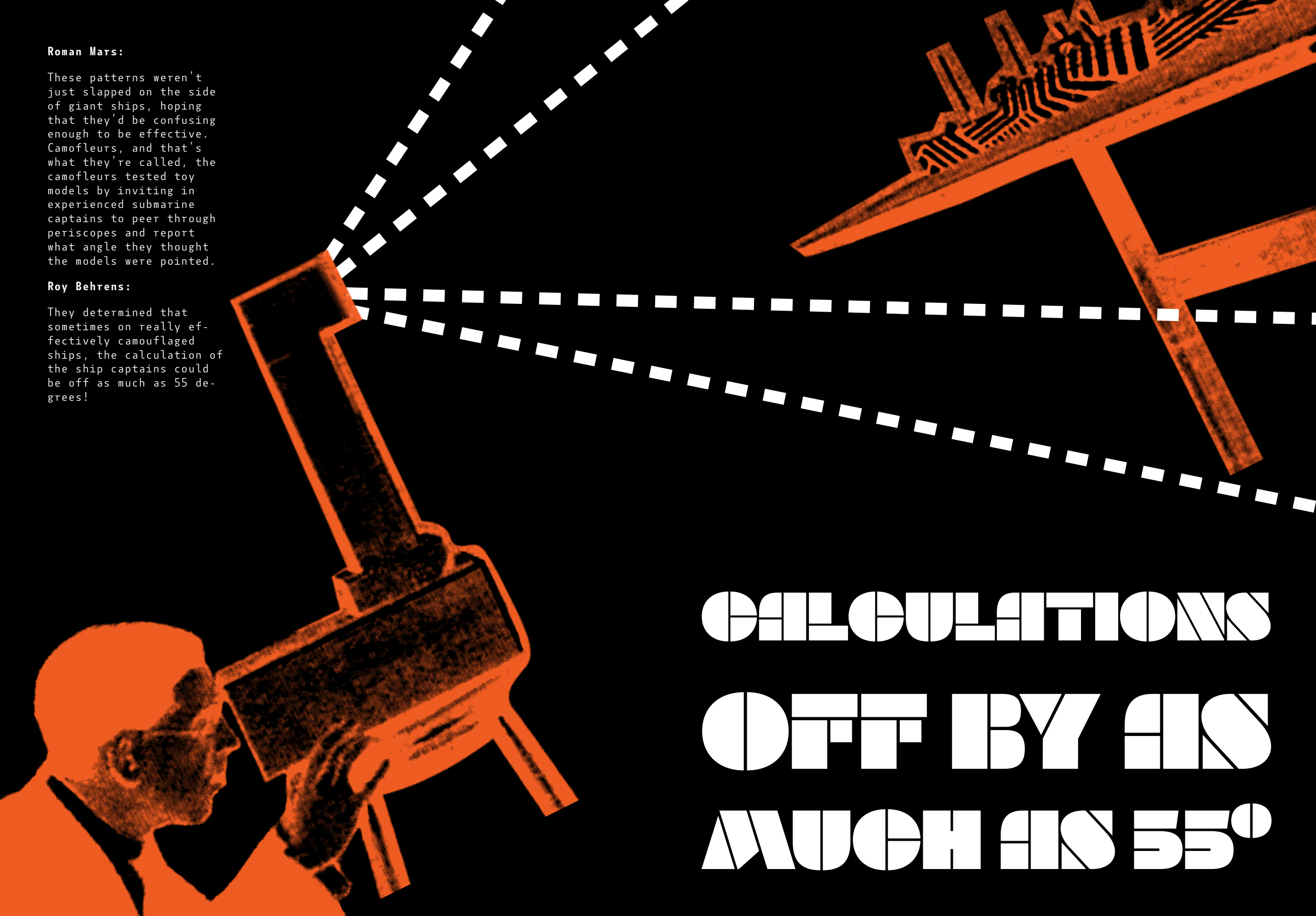
actually going because that was one way of calculating that. Or they would paint the bow wave on the back! And so you would glance at while you're looking through the periscope. You might conclude that "Oh, it's going in that direction, not in the other direction." So, then you surface again to calculate where you're going to shoot and the thing is gone. It's an entirely different direction and location than you imagined.

Roman Mars:

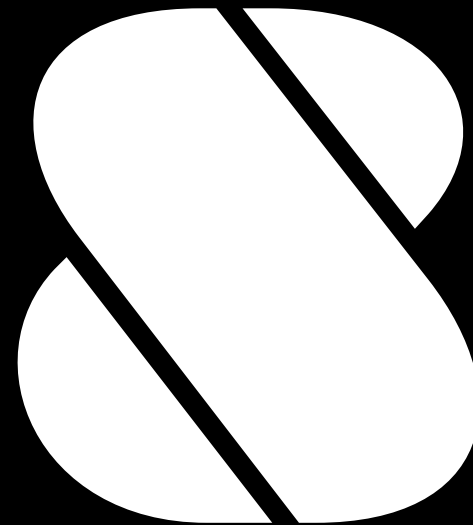
These patterns weren't just slapped on the side of giant ships, hoping that they'd be confusing enough to be effective. Camofleurs, and that's what they're called, the camofleurs tested toy models by inviting in experienced submarine captains to peer through periscopes and report what angle they thought the models were pointed.

Roy Behrens:

They determined that sometimes on really effectively camouflaged ships, the calculation of the ship captains could be off as much as 55 degrees!



CALCULATIONS
OFF BY AS
MUCH AS 55°



Roman Mars:

Dazzle only had to screw up that torpedo gunners estimate by 8 degrees for the target ship to effectively avoid a torpedo.

DEGREES



**TO AVOID
A TORPEDO**

The theater of war has changed, so camouflage has changed with it but there is still dazzle to be found.

Roy Behrens:

Actually, if you look at military craft today there is still dazzle being practiced. But of course, the conditions have changed just as in World War I, this came out of those particular set of conditions. We have to say, "Well, those aren't the conditions that we have now so what would be most effective today?" If you look at aircraft, it's broken up very often. If you look at ships, some

of them are broken up through these geometric patterns. If you look at some camouflage uniforms, infantry uniforms around the world, you'll find all kinds of break up with Dazzle and so forth or tanks or trucks or and so forth.

Roman Mars:

But I'm sad to report that there are no longer flocks of sea-going Easter eggs.

THERE IS STILL
DAZZLE TO BE
FOUND

Roman Mars:

99% Invisible is produced by me, Roman Mars and Sam Greenspan. We are a project of 91.7 local public radio KALW in San Francisco and the American Institute of Architects in San Francisco. You can find the show and "like" the show on Facebook. I tweet @romanmars but this week you absolutely must go to 99percentinvisible.org and look at pictures of Dazzle ships. They are just that amazing. You will not believe it. All you will do this week is talk about Dazzle ship. I almost guarantee it. 99percentinvisible.org.



