Ornilux

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# Audio Transcript

Video link (YouTube): https://youtu.be/nS5KDLo4Eoc

Audio Transcript

Let me start with a mildly interesting story that happened to me. I was walking near the new Campus Instructional Facility at the beginning of the semester when I saw a bird on the ground. I prodded it with my foot, and it was dead. I rounded the corner and saw *another* dead bird on the other side of the building. Hm. How weird. Thinking about it later, I remembered the huge clear windows overhead and thought I had a rough idea of what had happened.

There were 489 birds injured or killed by windows at UIUC in Fall of 2019-2020. Each year, 356-988 million birds die from window crashes in the U.S. Windows are the second largest human-related cause of bird deaths in the country, right after cats.

Birds sometimes fly into windows because they don't see the glass, but a second, more pernicious reason is that they see the outdoors reflected in the glass. The trees, the clouds, the sky make an illusion that the world beyond the window is continuous and open and free. They then bonk into them and die, either from the collision or injuries or scavengers.

But why should humans care? Besides being cute and a lot easier to care about than, say, something like mosquitos, birds perform many useful functions. They disperse seeds by eating them, flying away, and pooping them out somewhere else with a generous dump of fertilizer. They also control weeds, eat pests, and pollinate plants useful to humans. On a more petty note, birds hitting windows and dying is generally also not a pleasant experience for the human occupants inside, and neither is the day of the human who finds the dead bird on the ground later improved.

To protect birds, some people screen their windows or decorate them with stickers or have grids of opaque dots or lines spaced out across the glass to increase visibility. That's kind of nice that they stop the birds from killing themselves, but even though the huge, clear windows of the Campus Instructional Facility kill birds, they do actually look really awesome. Humans like clear windows.

But what if there was a way to have our cake and eat it too—or in other words, have our birds not dead and clear windows as well? There is one creature in nature who may have a solution.

Imagine you're a little orb weaving spider living your life, putting in your nine-to-five spinning your little spidey web with time that could be spent watching Netflix and using your precious silk. In an hour, you finish and step back to admire your work and a bird barrels into it and completely destroys it. Enraged, you pull out your spider cell phone and threaten the bird with your lawyer. Your bird neighbor apologizes. It had run into your web simply because it was too clear. There was no way it could see it.

So, you're laying awake in bed that night thinking this over when the perfect idea hits you—what if you weave a special pattern into your web that looks extra shiny to the bird so they can avoid it in the future? And this is exactly what you do.

Many orb weaving spiders decorate their webs with patterns called "stablimenta"—if that's indeed how you pronounce it: no one on Google seems to know—made of UV-reflecting threads. This is thought to attract insects, to which the UV patches look like the open sky. It is also thought to alert birds, who can see in both the visible and UV spectrum, to the location of the webs so they can avoid flying into them and rudely destroying the spiders' hard work.

In the 1990's, German manufacturing company Arnold Glass had an idea. Humans like clear windows. Birds like being alive. So, what if there was a transparent, bird-friendly glass that could satisfy everyone? They started on a mission that resulted in Ornilux, a transparent glass with a coating of crisscrossing UV-reflecting lines that are invisible to humans but visible to birds.

Ornilux was tested in flight tunnels by the American Bird Conservancy, who captured wild birds and released them to fly down a dark tunnel toward two pieces of glass—a regular control piece and a pane of Ornilux. Researchers recorded which piece they choose to attempt to exit the tunnel through. Around 70% chose the plain glass over Ornilux glass. This is comparable to the scores of other, less transparent bird-friendly windows. Also, no need to worry, there was a net to catch the birds before they hit actually the glass. Ornilux was finally launched in North America in 2010, and research into the product is still ongoing.

Pretty neat, huh? Ornilux's performance may vary with the weather and the species of bird, and it tends to work better when the interior of the room is dark. There are more collisions on Ornilux windows with trees nearby, which still reflect in the glass and can create the illusion of the outdoors.

Ornilux is an example of bioinspiration, using biology as an inspiration for human technology. The orb weaving spider's stablimenta directly inspired the UV-reflecting crisscrosses on Ornilux. Ornilux copied the mutually beneficial arrangement between birds and spiders and transplanted it to be between birds and humans, improving the world in a perhaps small, but meaningful way.

# Proposal, Outline, and Sources

## Proposal

Proposal summary: I propose to create a video that explains how Ornilux glass uses bioinspiration to stop birds from crashing into windows.

Objectives:

- Inform viewer about the problem of bird-window collisions
- Teach viewer about how spider webs use UV light to alert birds to their presence
- Teach viewer about how UV-reflecting spider webs inspired the creation of Ornilux
- Discuss whether Ornilux is a trustworthy product

## Outline

Introduction (.5 min)

- A personal experience that inspired my topic choice and demonstrates the problem here at UIUC:
    - I was walking near the new Campus Instructional Facility at the beginning of the semester when I saw a bird on the ground. I prodded it with my foot, and it was dead. I rounded the corner and saw ANOTHER dead bird on the other side of the building. It was so weird. Thinking about it later, I remembered the huge clear windows overhead and thought I had a rough idea of what had happened.

The Problem (1 min)

- How windows cause bird deaths and statistics:

- Problem: Birds fly into windows because they don't see the glass or they see the outdoors reflected in the glass. They die from the collision, injuries, or scavengers (1).
- Statistics: 365-988 million birds a year die from window crashes in the U.S. (6). It is the largest human cause of bird deaths second only to cats (8). There were 489 birds injured/killed by windows at UIUC in Fall 2019-2020 (7).
- Why we should care:
  - Birds pollinate
  - Birds spread seeds
  - Birds eat pests like mosquitos (10)

The Inspiration (1 min)

- Explain the phenomenon of UV-reflecting spider webs:
  - Many spiders, including orb weaving spiders, decorate their webs with decorations made of UV-reflecting threads called "stablimenta". This is believed to be done to attract insects, to which the UV patches look like the open sky (11, 4).
  - It is also thought to alert birds (who can see in both the visible and UV spectrum) to the location of the webs so that they can avoid flying into them and rudely destroying the spiders' hard work (11).

The Product (1 min)

- Explain how the natural phenomenon inspired Ornilux:
  - Creation

        - German manufacturer Arnold Glass, a small-ish company (currently with about 1000 employees and 7 production locations in Austria and Germany) saw this as an opportunity (9). Endangered migratory songbirds that cross through Germany are often killed by windows. On a selfish note, “bird strikes also disrupt building occupants” (5).
        - They created Ornilux, a transparent glass with a coating of crisscrossing UV-reflecting lines that are invisible to humans but that birds can see.
    - Testing
        - Ornilux was tested in flight tunnels in Pennsylvania and Russia by the American Bird Conservancy. Captured wild birds flew down a dark tunnel toward two pieces of glass (a plain control piece and Ornilux). Researchers recorded which piece they choose to attempt to exit the tunnel through. There was a net to catch them before they hit the glass. A bird-safe glass’s ABC Tunnel Score reflects the percentage of birds that chose the plain glass over the bird-safe glass (9). Ornilux satisfied ABC standards with a score of around 70%.
        - Ornilux launched in North America in 2010. Research is still ongoing to improve Ornilux (5).

Wrap-up (1 min)

- Is Ornilux a scam? This sounds too good to be true. Also, why is only one company making something like this?
    - Arnold Glass is not a huge company, which explains why Ornilux is not well-known

    - Their claims that Ornilux was approved by the ABC is backed up on the ABC's website (2)
    - A paper outlines peer-reviewed findings on the effectiveness of Ornilux:
        - Performance may vary with weather and species of bird
        - Worked better when interior was dark
        - More collisions with trees nearby (windows still reflect the trees, making it seem like the window is part of the outside world). Specifically, pear trees in the vicinity of windows increased collision rate by 40 times.
        - Showed performance comparable to other, less transparent bird-friendly windows (with grids of dots or lines visible to humans and birds) (3).
    - Conclusion: It's probably alright.
- Its transparency is a step above other bird-deterrent methods that simply cover the problem up:
    - Decal (stickers, tape, sticky notes, window ornaments)
    - Grids of dots or lines spaced out across the windows
    - Netting
    - Mosquito screens
    - One-way windows (1)
- Ornilux is an example of bioinspiration, using biology as an inspiration for human technology. Inspired by bird-repelling patterns on a spider's web, the UV-reflecting crisscrosses on Ornilux glass make windows invisible to humans but collision-safe for birds.

# Sources

(*Peer-reviewed)

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# Logistics and Materials

## Logistics and Materials

This project will be a screen capture video of PowerPoint with an audio voiceover. I will record my screen while moving things around and going through images and simple “animations” in PowerPoint. I’ll edit the video to fit the audio of me talking about the topics on screen. I might add some music. These are some ideas for graphics that I have right now.

- Introduction: PowerPoint graphics of a building with windows and simple animation of me finding the two birds
- The Problem: animation of lots of birds crashing into windows and graphics of helpful bird activities such as pollination and eating insects
- The Inspiration: graphics of stablimenta and spiders
- The Product: graphics of Arnold Glass and the crisscross pattern on Ornilux glass
- Wrap-up: back to the animation of lots of birds crashing into windows

Pictures will be created by me or in the public domain (Wikimedia commons). Any music would be non-copyrighted.

Anticipated Roadblocks:

- I had trouble finding non-copyrighted images of Ornilux and stablimenta. I would rather not use copyrighted images, so I think I might get around this problem by looking at lots of photos and then coming up with my own (attempted) artistic renditions.
- The “animations” I plan to use will probably just be me drawing and dragging things around by hand in PowerPoint. I don’t actually know how to animate. It will look wacky, but I plan to make this a feature and not a flaw. The video will have a very casual vibe.