

BE SEEN

WEAR FLUORESCENTS IN DAYTIME

A 2004 meta-review of studies found drivers consistently recognized fluorescent colors faster, more consistently and from farther away than standard colors. Fluorescent material reflects non-visible ultraviolet light back in the visible spectrum, making it look about 200 percent brighter in daylight than conventional colors.

There's no research on which color creates the best contrast, but fluorescent orange is a good pick because it's commonly used on highway safety and construction signs (ie. drivers associate it with caution), and orange is rare in the natural environment.

Keep in mind that fluorescents simply don't work at night, when there's no natural sun for the fabric to reflect. Artificial light sources like car headlights and street lamps don't emit UV light either. At night your fluorescent yellow jacket is no brighter than anything else in your closet.

WEAR REFLECTIVES AT NIGHT

At night, your best bet for visibility shifts from bright colors to reflective material, which shines (literally and figuratively) in artificial light. Since reflectives can be expensive and often impair the breathability of the garment, it's important to be selective with placements—which brings us again to biomotion. A 2012 study by Dr. Tyrrell and other researchers found that drivers correctly identified a rider wearing a reflective vest 67 percent of the time; the rate jumped to 94 percent when ankle and knee reflectors were added.

“A jacket has no movement, so a driver could see it as a road sign,” says Trek Product Designer Kurt Heggland. “When you put the reflective material in places that move, you become more recognizable.” Also, reflective material higher up on the body may not capture and reflect as brightly from light sources such as car headlights, which are aimed low.

One thing to remember is to make sure you have enough reflective material. The reflective piping on lots of garments is simply too small to make a difference, says Dr. Tyrrell. To create contrast, the material must be large enough to draw attention and pop out of the background. For comparison, the minimum ANSI recommendation for reflective material on road workers' apparel is 155 square inches, equivalent to a 10x15 square patch.

And don't forget your wheels. “Reflective-sidewall tires are more effective than clothing in some cases,” says Trek's Michael Browne. They're so distinctly different from other reflective elements that, when drivers see them, they instantly recognize them as belonging to a bike.

USE LIGHTS ALWAYS

Because they convey both brightness and a sense of motion, flashing lights work well even during the day. A 2012 study in Denmark found riders with so-called “permanent running lights” had a 19 percent lower “multi-party” crash rate than a control group without running lights.

It sounds counterintuitive, but in the brighter ambient light of daytime, you actually need a more powerful light than at night. Rating brightness is sometimes problematic because light output is measured various ways and brightness also depends on reflector design, but 20 lumens is a good minimum output for a rear light in daytime use (more is better). Flashing front and rear patterns draw attention and set you apart from your environment during the day, but at night, it’s best to use a steady pattern for the headlight unless you’re in a brightly lit urban environment.

Also, take care to angle the beam correctly; many rear lights have reflectors angled for maximum brightness when mounted on a seatpost. “In some of our research with rear lights, if the angle is off even 10 percent, brightness is greatly reduced,” says Jon Quenzer, an electronics design engineer at Trek.

SEE INTO THE FUTURE

Improved batteries and technology like printable and flexible LED lights open up other possibilities for the future. For two years now, POC has shown a prototype wind vest and jacket with printed LED lights on the back, creating a flexible pattern of dots that creates a large total lit area out of very small light sources. Startup Lumenus is creating packs and apparel with built-in LED lighting on flexible strips.

But Dr. Tyrrell sounds a note of caution about going crazy with lights. “We don’t have enough data on how drivers process visual information,” he says. LED lighting, if not done well, could potentially confuse drivers who can’t quickly recognize what it is that they’re looking at. POC’s Huss says for that very reason, in developing the Light Vest, the company consciously decided to go with a gray/blue LED light color to mimic a reflective look.

The next step may not involve vision at all, but active safety systems similar to the emergency braking and lane-departure warnings that are already in place in many new cars. Garmin’s Varia radar system, for example, can warn riders of vehicles rapidly approaching from behind.

And even more sophisticated technology may be coming. POC is in the second year of a collaboration with fellow Swedish company Volvo. At the 2015 Computer Electronics Show in Las Vegas, the companies demonstrated a technology that paired warning systems in the car to a rider’s helmet. “The car is connected to the cyclist with a cloud service, and the driver and the rider are both alerted to the other one, even coming around a corner where they couldn’t see each other,” says Huss.

The product is still a prototype demo, but Huss says it uses existing technology. “Everything is there,” says Huss. “It’s just about deciding what we want to do, and convincing the customer that they should pay for it.”

Perhaps, one day, autonomous vehicles will return fluorescent colors to the province of second-division Italian pro teams. Until then, when it comes to safety, grabbing as much attention as we can, as early as we can, remains our best bet.



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