

## How Your Dog's View of the World Differs From Yours

Does your dog see the world like you do? Does she hone into the same things you notice? Researchers have come one step closer to answering those questions by training dogs to lie still and watch videos, all while being studied with fMRI, or functional magnetic resonance imaging.

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### STORY AT-A-GLANCE

- Researchers with Emory University in Georgia have come one step closer to uncovering how dogs view the world
- While humans may hone in on who or what is occurring, dogs, it seems, are most interested in the action itself
- The effort to essentially read dogs' minds involved fMRI (functional magnetic resonance imaging)
- By training dogs to lie still, without using any restraint or sedation, researchers were able to scan dogs' brains and decode what they saw using a machine learning tool
- The tool revealed 99% accuracy in mapping brain data for object- and action-based classifiers when it came to human subjects
- For the dogs, the tool did not get results for the object classifiers, while it revealed 75% to 88% accuracy in mapping data for action classifiers; this suggests dogs were focused on action — not objects

Have you ever wondered how your dog sees the world? Researchers with Emory University in Georgia have come close to answering this long-standing question — and suggest dogs are most in tune with actions around them.<sup>1</sup>

While humans may hone in on who or what is occurring, dogs, it seems, are most interested in the action itself. The effort to essentially read dogs' minds involved fMRI (functional magnetic resonance imaging). By training dogs to lie still, without using any restraint or sedation, researchers were able to scan dogs' brains and decode what they saw using a machine learning tool.

### A Glimpse Into a Dog's View of the World

While a number of dogs were trained to lie in an fMRI for the study, only two ultimately made the cut. Daisy, an 11-year-old Boston terrier-mix, and Bhubo, a 4-year-old Boxer mix, viewed three 30-minute videos showing scenes that dogs may appreciate.

There were videos of dogs sniffing, playing and eating, along with activity scenes showing cars on a road, a cat walking, people offering a ball and people eating. The dogs successfully viewed the videos, while researchers monitored the sessions and watched their eyes track the screens.

"They didn't even need treats," study author Erin Phillips explained. "It was amusing because it's serious science, and a lot of time and effort went into it, but it came down to these dogs watching videos of other dogs and humans acting kind of silly."<sup>2</sup> Two humans also watched the three videos while undergoing fMRI.

The data from the fMRI was then fed to a machine learning tool known as Ivis, which detected patterns in the brain data and associated it with what was playing on the screen.<sup>3</sup>

"We showed that we can monitor the activity in a dog's brain while it is watching a video and, to at least a limited degree, reconstruct what it is looking at," study author Gregory Berns, Emory professor of psychology, said in a news release. "The fact that we are able to do that is remarkable."<sup>4</sup>

## Humans Focused on Objects, Dogs on Actions

The machine-learning algorithm was tasked with classifying the brain-data content. The tool revealed 99% accuracy in mapping brain data for object- and action-based classifiers when it came to the human subjects.

However, for the dogs, the tool did not get results for the object classifiers, while it revealed 75% to 88% accuracy in mapping data for action classifiers. This suggests dogs were focused on action — not objects. Berns explained:<sup>5</sup>

*"We humans are very object oriented. There are 10 times as many nouns as there are verbs in the English language because we have a particular obsession with naming objects. Dogs appear to be less concerned with who or what they are seeing and more concerned with the action itself."*

He compared the brain differences in dogs and humans to those found in vision. While most humans have three color receptors, or cones, in their eyes, dogs only have two. These two color receptors perceive wavelengths of light that correspond to blue and yellow, which means dogs can see color in combinations of blue and yellow.

However, dogs' vision complements their traditional nocturnal hunting habits and helps them sense fast-moving prey. As such, your dog's eyes are uniquely suited to see well in the dark — much more so than yours are. This includes more rods, which are extremely sensitive to shape, movement and light, in their retina, such that your dog has up to 20 times greater motion sensitivity than you do.<sup>6</sup> Dogs' brains, too, appear to be wired for this purpose.

"It makes perfect sense that dogs' brains are going to be highly attuned to actions first and foremost," Berns said. "Animals have to be very concerned with things happening in their environment to avoid being eaten or to monitor animals they might want to hunt. Action and movement are paramount."<sup>7</sup>

## More Insights Into How Dogs Perceive Their Environment

Much more research is needed to uncover how dogs perceive the world around them. For starters, it's possible that size cues used by dogs to discriminate objects in the real-world were lost on the video screens, "with everything appearing to be a toy version of the real world," the researchers explained.<sup>8</sup>

Further, it's been suggested that dogs may categorize objects based on size and texture first, then move on to shape. Humans do close to the opposite, which may account for some of the differences uncovered. Scent was also not part of the study, which puts the dogs at a distinct disadvantage, given how important this sense is to their daily lives.

“Scent, not considered here, is likely an important source of information for object discrimination in dogs, particularly in the identification of conspecifics or humans,” the study reasoned,<sup>9</sup> which again could account for the apparent dismissal of objects in the videos.

It’s likely that as machine learning advances, it may be possible to get an increasingly clear picture of the world through our dogs’ eyes. As the researchers noted, “These results open up a new way of examining how dogs perceive the environments they share with humans, including video screens, and suggest rich avenues for future exploration of how they and other non-primate animals ‘see’ the world.”<sup>10</sup>

## Sources and References

<sup>1, 8, 9, 10</sup> [Neuroscience September 13, 2022](#)

<sup>2, 4, 5, 7</sup> [Science Daily September 15, 2022](#)

<sup>3</sup> [Cosmos September 24, 2022](#)

<sup>6</sup> [PetMD October 29, 2021](#)

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