It takes less than a second to tell humans from androids

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We can be fooled by androids like Maeve in the TV show Westworld, but not so much in real life, a new study suggests. Credit: University of California - Berkeley

It can be hard to tell the difference between humans and androids in such sci-fi TV shows as "Westworld." But in real life, beyond our screens, the human brain takes less than a second to tell between reality and fantasy, according to new research from the University of California, Berkeley.

The findings, published in the November issue of the journal *Nature Communications*, show that humans are visually wired to speedily take in information and make a snap judgment about what's real.

UC Berkeley scientists have discovered a visual mechanism they call "ensemble lifelikeness perception," which determines how we perceive groups of objects and people in real and virtual or artificial worlds.

"This unique visual mechanism allows us to perceive what's really alive and what's simulated in just 250 milliseconds," said study lead author Allison Yamanashi Leib, a postdoctoral scholar in psychology at UC Berkeley. "It also guides us to determine the overall level of activity in a scene."

Vision scientists have long assumed that humans need to carefully consider multiple details before they can judge if a person or object is lifelike.

"But our study shows that participants made animacy decisions without conscious deliberation, and that they agreed on what was lifelike and what was not," said study senior author David Whitney, a UC Berkeley psychology professor. "It is surprising that, even without talking about it or deliberating about it together, we immediately share in our impressions of lifelikeness."

Dolores Abernathy is another human-like android in the sci-fi show Westworld. Credit: University of California - Berkeley

Using ensemble perception, study participants could also make snap judgments about the liveliness of groups of objects or people or entire scenes, without focusing on all the individual details, Whitney said.

"In real life, tourists, shoppers and partiers all use visual cues processed through ensemble perception to gauge where the action is at," Yamanashi Leib said.

Moreover, if we did not possess the ability to speedily determine lifelikeness, our world would be very confusing, with every person, animal or object we see appearing to be equally alive, Whitney said.

For the study, researchers conducted 12 separate experiments on a total of 68 healthy adults with normal vision. In the majority of trials, participants viewed up to a dozen images of random people, animals and

objects including an ice cream sundae, a guinea pig wearing a shirt, a hockey player, a statue of a wooly mammoth, a toy car carrying toy passengers, a caterpillar and more.

Participants quickly viewed groups of images, then rated them on a scale of 1 to 10 according to their average lifelikeness. Participants accurately assessed the average lifelikeness of the groups, even those displayed for less than 250 milliseconds.

In another experiment to test participants' memory for details, researchers flashed images, then showed them ones that participants had seen as well as ones they had not. The results indicated that while participants had forgotten a lot of details, their "ensemble perception" of what had been lifelike remained sharp.

"This suggests that the visual system favors abstract global impressions such as lifelikeness at the expense of the fine details," Whitney said. "We perceive the forest, and how alive it is, but not the trees."

More information: Allison Yamanashi Leib et al, Fast ensemble representations for abstract visual impressions, *Nature Communications* (2016). DOI: 10.1038/ncomms13186

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