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00:05 Sarah Crespi: Welcome to the Science Podcast for September 18th, 2020. I'm Sarah Crespi. Each week, we feature the most interesting news and research published in Science and the sister journals. First up, we have staff writer, Kelly Servick. We talk about a pandemic-inspired effort to shrink jail and prison populations in the United States. And I talk with Eli Garcia-Pelegrin about how performing magic for animals can give insight into how their minds work.

00:38 SC: The novel Coronavirus and prison is a dangerous combination. In the United States, 120,000 cases have been detected in prisons, and 1000 incarcerated people have died so far. These deaths and the danger of more have driven prison and jail reforms that have been long delayed. Staff writer Kelly Servick is here to talk about decarceration in the US. What is happening, how researchers are weighing in on the process, and how it's affecting public safety and health. Hi, Kelly.

01:10 Kelly Servick: Hi, Sarah.

01:11 SC: The US is unusual, not just in the large number of Coronavirus cases that we've had, but also in the size of its incarcerated population. How does the United States compare with other countries in this respect?

01:27 KS: So the US is sort of the leader in terms of mass incarceration, unfortunately. The US has the highest prison population of any country in the world, with over 2 million people in prisons right now. It was very clear from the beginning of the pandemic that the system of jails and prisons in this country was gonna be especially dangerous for the people living in them, because not only are they not designed structurally to allow for social distancing, but many of them are already extremely overcrowded.

01:58 SC: There's been calls for years to decarcerate or to cut down on the number of people in prison and jails. And now, there's been a big push to make this happen quickly. What's happened with the numbers so far? Have we seen a big decrease in incarcerated people?

02:15 KS: So some analysis have suggested a decrease pretty early in the pandemic, of about 25% of the population of jails in the US, which is pretty dramatic. That's something that a lot of jails have not been able to achieve in any other way. But jails and prisons are a bit different in this respect. Jails are often holding people who have not yet been convicted and are awaiting sentencing or are awaiting trial. Prisons meanwhile, hold people who are already convicted and serving sentences, have not budged nearly as much in terms of population, despite some efforts by states to reduce populations. I've seen figures of 8%, 13%, so still pretty modest reductions there.

02:56 SC: The numbers are going down. How is this happening, who's getting out, or are people just never going in in the first place?

03:05 KS: It's happening for all of those reasons. It's happening in a bunch of different ways, which was one of the interesting things in talking to corrections administrators about this. Some jail systems have focused on, for example, eliminating the bail requirement that was keeping people there if they couldn't pay to get out. Or eliminating the requirement of people still in jail on parole violations, sort of picking out specific populations of people that they felt didn't pose any public safety risk and were there sort of on technical violations of various kinds. Prisons, it's been a little bit more complicated in that they've had to select groups of people who they think don't pose any public safety risk and also are particularly high-risk for COVID. So some governors have commuted the sentences of people in prison, because they're medically vulnerable or older, for example, or if they have a short time to serve on their sentence.

03:55 KS: And then beyond all this, there's also the factor that a major reason that jails shrank is simply because arrests went down, particularly early in the pandemic, as police officers were making fewer arrests, there were fewer people out on the streets. But also likely, officers were seeking to avoid physical interactions where they could. So yeah, all these factors are complicated and some of them are a bit more locked in place and some of them are likely to fluctuate again as states reopen and things change with the pandemic. So it's really hard to sort of know what's gonna happen next.

04:29 SC: As the pandemic drags on, we might see a change in arrest policy, for example.

04:34 KS: I spoke to an administrator in Franklin County, Ohio. Who was saying that now some of the municipal courts have sort of put into law or into code, "We're not gonna arrest people for this XYZ misdemeanor. We're gonna issue a citation now." There are things that they can just say and change the policing around it. So at least on small scale, I've heard examples of that happening.

04:56 SC: Is there a relationship between whether or not a prison is overcrowded and how many people they're releasing?

05:03 KS: Yeah. So intuitively, you have to think, right? That if you're able to sort of de-densify a place, that you're also gonna reduce disease transmission. But sort of getting beyond that assumption and getting down to the numbers of like, "Okay, I'm a prison or jail with this many people and my beds are set up this way, what am I supposed to do or what would be a safe number of people to have?" That's something that researchers are trying to tackle now. And some of them are using particular facilities as a case study, and there's one group that looked at a very large urban jail and just said, "Okay, we know that over this period, this jail managed to reduce its population by a quarter and move people into their own cells." Here's an indicator that the actual spread of infection went down by this much. So we have these sort of anecdotal examples where the thing that changed was population, the facility saw a benefit. But it's gonna take a lot more time to sort of work out a threshold for a given facility even if they could manage to hit that target.

06:01 SC: One question researchers are looking at is, "Does this work to reduce infections and deaths in prisons and jails?" And the other issue is that Coronavirus doesn't just stay in a prison, a prison is part of... Or a jail, it's part of the community. People work there, corrections officials or

their staff. And so, the virus can travel to and from the prison. Is that something that's also being looked at either by researchers or public health officials?

06:26 KS: Yeah. And that's something that was really stressed to me in a lot of these conversations is like, "You cannot think about prison as this closed system where people are just sort of bouncing around inside and spreading the infection amongst themselves." Because as you said, the staff are moving in and out, people are being transferred to different facilities. So one of the sort of strongest pieces of evidence we have so far was a study that looked at Chicago's Cook County Jail, and made this estimate that almost 16% of COVID cases that had been documented in the state by, I think mid-April were associated with people churning through that jail.

07:01 SC: Wow.

07:01 KS: So there is already evidence that, as one researcher put it, if we care about COVID-19 cases in the community we have to care about them in jails and prisons too.

07:11 SC: How concerned are people about releasing prisoners or not sending people to jail in terms of them committing more crimes or re-offending?

07:20 KS: As you can imagine, this is a big political talking point that has come up as governors have tried to make these decisions about early releases from prisons. Nationwide, most types of crime are down during the pandemic, although murders are up in many large cities, but sort of associating a change in population in a prison or jail with crime rates is a really complicated thing to do and it's not something that anyone has undertaken systematically for these sort of pandemic-inspired releases at this point. We don't have evidence that releasing incarcerated people has increased crime, and in fact, there's a lot of research in criminology to suggest that there's kind of an age curve to crime rates where a person's risk of committing a crime really peaks early in their life, early 18s or early 20s, I think. And so you might expect that many of the people most at risk of COVID-19 and who would most benefit from an early release, would also be the least likely to immediately get re-arrested on some new offense after release. But as I said, the political concerns about this, that even one person released early might go on to commit a crime, are very strong.

08:30 SC: You mentioned in your story that a lot of the policies being put into effect, for example, not sending people to jail to await trial, but rather monitoring them with an ankle bracelet or just letting them go out on bail, or what have you, or reducing bail, so they don't end up in jail. Those things have been recommended, they've been long-standing recommendations but there's been issues with implementing them. Do you see this as the start of a long-term trend for sending fewer people to jail or even to prison?

09:00 KS: It seems to me that people working within corrections that were very motivated to reduce populations now have another piece of ammo, right? And another piece of evidence that this can be done quickly, and I think some of them are very motivated to make it stick. The question is just sort of whether the policies can keep these populations down. That's gonna vary a lot.

09:22 SC: Thanks so much, Kelly.

09:23 KS: Thank you, Sarah.

09:25 SC: Kelly Servick is a staff writer for Science. You can find the link to her story and all of our Coronavirus coverage at sciencemag.org/podcast. Stay tuned for an interview with Eli Garcia-Pelegrin about what we can learn by performing magic tricks for orangutans and Macedonian crows.

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09:48 SC: A few years ago, I went to a birthday party for a 3-year-old, and there was a musician, but it did not go well. I couldn't tell if it was because these kids were not used to watching a wackily dressed teenager talk to them about something as a crowd, or they weren't used to magic, if the magic didn't click with them. What is magic if you don't have expectations about the way the world works? A ball goes into a tube, doesn't come out at the other end, that would surprise me but maybe not a little kid. These magic tricks or illusions are designed to fool us and rely on how our brains work and our expectations about the world. Eli Garcia-Pelegrin is here to talk about his piece in the insight section this week, on how magic can tell us not just about the human mind but also the minds of animals. Hi, Eli.

10:37 Eli Garcia-Pelegrin: Hi, Sarah.

10:38 SC: Now, I wanna send everyone else down the same rabbit hole that I followed this week and say there are a lot of videos out there of animals watching magic tricks being performed, and we get to see the reaction of the animal. Have you seen some of these, Eli? Do you have a favorite online video of an animal react?

10:58 EG: Yeah, yes, absolutely. My favorite is called Monkey Sees Magic Trick. It's unfortunate because the animal itself, it's not a monkey, it's an orangutan from Borneo. It happens in Barcelona Zoo, I think. And this guy just makes a simple vanishing trick, I think it's a buried card, and puts it inside a little cup, and then he moves the cup around and the orangutan looks at him very intently and very attentively. And then he makes it disappear, and then it just looks like the orangutan has a massive laugh. [chuckle] Very entertaining to watch, to be honest.

11:33 SC: That is very cool. Are you a magic fan? Is this something that you were interested in? Did you do magic before you started looking into this work?

11:42 EG: Yeah, yeah, I did magic before I started looking into this. My fascination for magic comes from when I was doing my undergrad. I started practicing and performing for friends, and then I was able to earn some money thanks to magic.

11:57 SC: Wow. Have you performed magic tricks for animals at this point?

12:00 EG: I have, yes, more in an informal setting. And now I'm starting to develop techniques on how to experimentally, with the right controls, with the right trials perform magic tricks for

animals. But it's not a simple case of just grabbing a coin and making it disappear, that's it. We are communicating with subjects that cannot exemplify their surprise or their amazement with words in a similar manner that a friend might, a normal spectator might. We need to establish links of communication for us to be able to infer the right answers.

12:38 SC: Let's start back with people for a minute. Can you talk about some of the mechanisms that our brains, or our blind spots that are engaged when we're watching magic being performed? What does it rely on in our brains?

12:54 EG: Mainly, it's our mechanisms of attention and perception. Magic is very good at operating on those blind spots, where we're paying attention to something but we're not fully engaging our entire attentive mechanisms on that particular thing. Moreover, magicians have this technique called misdirection, in which they will redirect your attentive mechanisms towards particular events which are imperative for the well-functioning of the magic effect. Sometimes, it's not a case necessarily that you are seeing things happening but you're not seeing the right thing, it's just that you're missing that key event that otherwise would make you go, "Oh, okay. I see how this is done." So they are very, very clever in how they redirect your attention towards particular movements or particular events. And beyond that simple mechanisms such as attention and perception. Magicians also capitalize on our inabilities on how we encode and recreate memories. They use very interesting techniques on how they manipulate our memories and how we remember things in particular orders.

14:08 SC: Can you give an example of that?

14:10 EG: Yes, for example, if a magician does a particular trick which might have a minimal effect, let's say I pretend that I levitate, I say, "Look, I'm gonna levitate," and I levitate, I do five centimeters off the ground. Afterwards, I can reinforce over and over how I flew so high, so high. And yeah, over time your memory of that event will transform into something else. Those five centimeters will become a meter.

14:42 SC: Let's move this to animals now. Are we talking about primates mostly or pets? What species?

14:48 EG: Especially in this field, because it's very new. It's very important to cover basis. You were talking in your anecdote about how expectations are very important for magic to work and you're absolutely right. First, it's very important before we translate all of this thing to try and to trick animals. We need to make sure that they have feasible expectations of the world around them. As you said, what is magic if not violation of expectations, right? And for that, we need animals that we either already know that they have particular expectations on how the world works, or we need to first test about those expectations. Luckily for us there's good evidence that the Great Apes such as chimpanzees, orangutans and Corvids, members of the Corvid family which include crows, ravens, jays, magpies, nutcrackers, etcetera, that they have a good solid understanding on particular things on how the world works. And then the case would be to use that understanding and see how much can we stretch that understanding using magic.

16:02 SC: So, for example, if you hide something under a cup, and then you go pick up the cup, those kinds of animals would expect that object to still be there.

16:09 EG: Absolutely. So object permanence which is literally what you just said, the ability to envision things that are outside or far removed from our senses, it's an imperative skill, because majority of magic tricks inherently need you to understand that when something disappears from view, there's still exists, if that makes sense.

16:34 SC: What other kinds of pathways or mechanisms might you be able to tap into or look for in animals using magic?

16:42 EG: I would say the most fascinating one and the most important one is whether animals are able to pick up on our cues in order to divert their attention. So, how do we humans, use analogous techniques to misdirect animals in the same way that we would misdirect another fellow human being. Are their attention and perception properties parallel enough that using similar techniques, we would achieve the same result?

17:11 SC: Would you have to train them then to pay attention to hands or gestures?

17:16 EG: With everything in my field, everything in comparative cognition, there'll always be a basic level of training that any animal that we want to participate within laboratory conditions needs to undergo, 'cause we need to establish that method of communication. Whether that is sit on a perch and look what I'm doing with this piece of food and see whether you are able to know where that piece of food is in order to get to it, or another method of communication with the animal that's yet to be seen.

17:45 SC: Can you talk about this example that's illustrated in the article. It's a magpie reacting to different hand gestures it looks like. What's going on here? What are these different conditions?

17:56 EG: The idea for this experiment is that the subject, the magpie, in this case, we want to see whether they are able to inadvertently pickup our cues, and use those cues in order to influence their next choice. So if, for example, we reward any choice that the magpie does, then we're not influencing any particular choice. We're not teaching the magpie that picking a square object will grant a different reward than picking a heart-shape object. Thus, if we make a heart-shape gesture and the magpie is basically significantly picking the heart-shape more often, then this is telling us something about our body language and how animals are able to perceive that. We know this works with humans. So it's a question of grabbing the scientific literature that we have now on magic and humans and translating it to an animal audience.

18:57 SC: What do you like about magic?

18:58 EG: A lot of things. I think the most important thing is that in comparison with most of the other art forms, magic really relies on this bi-directionality between performer and a spectator. In realizing that rapport, the magician needs to fully engage the attention of mechanisms of the spectator and I think that's very powerful that we don't find in most art forms. I could go and see a

theater play if I go to the Globe Theater in London and I see Hamlet, I don't need to be fully engaged to enjoy the experience. But if I'm just fully engaged in magic, then it won't work, I won't get full.

19:37 SC: Yeah. Reminds me of comedy then, for me anyway, what makes something funny is that it belies your expectations, it surprises you and you have to really be paying attention in order to catch what's going on.

19:49 EG: That is a beautiful comparison. Yeah, absolutely, absolutely. Comedy is vastly used in magic, not only as a form of entertainment, but as a form of misdirection, right? You might be busy laughing at the joke that I just made, and while you do that I'm preparing the next effect. Unfortunately, we cannot make animals laugh. That would be very interesting.

20:09 SC: But it does sound like you can surprise them, and that seems to be something you're gonna wanna focus in on?

20:16 EG: Yes, because that will be just not only about magic or about their expectations, but it will teach us about whether we can transmit things to other animals in a similar manner that we transmit things when our body language sends the right information to animals that might not have the same body than us.

20:36 SC: Why did you decide to write this piece?

20:39 EG: Well, I think our team is very qualified for such an endeavor, the science of magic, because we all come from this background. My supervisor, Professor Nicola Clayton, she has been working for 10 years with Clive Wilkins, the third author on this paper, who is a professional magician. And Alex Schnell, Dr. Alex Schnell, she is a biologist and she's been working a lot with animals. We decided to write this as a way to say, "Well, besides science, what do we find inspiration in that we normally wouldn't find inspiration in? And magic was something that we had in common, and it made a lot of sense to us, especially because we still don't know whether animals get fooled by magic.

21:20 SC: Okay. What do you think should happen next in the field of presenting magic to animals?

21:28 EG: I think it will be good for other researchers besides our team, to just have a look at this framework and have a look whether they already have experiments in mind that are designed to violate the expectations of other animals and to where that they can... With those experiments, they can actually afford something to this conversation. Comparative psychologists, we've been using violation of expectation paradigms for a long time now, right? It all started with developmental psychologists, but we took over with these paradigms. So I think it's just the case of saying, "Well, if you've already done it in a similar manner, it might be just a simple case to reframing how you do the thing and listing new questions.

22:14 SC: Thank you so much, Eli.

22:15 EG: Thank you very much for having me. It was great.

22:17 SC: Eli Garcia-Pelegrin is a PhD student at the University of Cambridge. You can find a link to his article at sciencemag.org/podcast.

22:26 SC: And that concludes this edition of the Science Podcast. If you have any comments or suggestions for the show, write to us at sciencepodcast@aaas.org. You can listen to the show on the Science website at sciencemag.org/podcast. On the site, you can find links to the research and news discussed in the episode. And of course, you can subscribe anywhere you get your podcasts. This show was edited and produced by Sarah Crespi with production help from Podigy, Meagan Cantwell and Joel Goldberg. Jeffrey Cook composed the music. On behalf of Science Magazine and its publisher, AAAS, thanks for joining us.

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23:29 SC: Welcome to the Science Podcast for September 18th, 2020. I'm Sarah Crespi. First up, we have staff writer Kelly Servick. We talk about a pandemic-inspired effort to shrink jail and prison populations in the United States, and I talk with Eli Garcia-Pelegrin about how performing magic for animals can give insight into how their minds work.