Psychological Research: Crash Course Psychology #2

Can week-old pizza cause psychedelic hallucinations? Does coffee make you smarter? Or does it just make you do dumb stuff faster? Like a bunch of psychology itself, questions like this can seem pretty intuitive. I mean, people may not be the easiest organisms to understand, but you're a person, right? So, you must be qualified to draw, like, some conclusions about other people and what makes them tick. But it's important to realize that your intuition isn't always right. In fact, sometimes it is exactly wrong, and we tend to grossly underestimate the dangers of false intuition. If you have some idea about a person and their behavior that turns out to be right, that reinforces your trust in your intuition. Like if one of my buddies, Bob, begins eating that deep-dish pizza that's been in the fridge for the past week but he eats it anyway and soon starts to wig out, I'm gonna say "Dude, I told you so". But if I'm wrong and he's totally fine, I probably won't even think about it ever again. This is known as 'Hindsight Bias" or the "I-Knew-It-All-Along" phenomenon. This doesn't mean the common sense is wrong, it just means that our intuitive sense more easily describes what just happened, than what will happen in the future.

Another reason you can't blindly trust your intuition is your natural tendency toward overconfidence. Sometimes, you just really, really feel like you're right about people when actually you're really, really wrong. We've all been there. We also tend to perceive order in random events, which can lead to false assumptions. For example, if you flip a coin five times you have equal chances of getting all tails as you do getting alternating heads and tails. But we see the series of five tails as something unusual, as a streak, and thus giving that result some kind of meaning that it very definitely does not have. That is why we have the methods and safe-guards of psychological research and experimentation, and the glorious process of scientific inquiry. They help us to get around these problems and basically save the study of our minds from the stupidity of our minds. So, I hope that it won't be a spoiler if I tell you now that pizza won't make you trip, and coffee doesn't make you smart. Sorry. [Music].

In most ways psychological research is no different than any other scientific discipline, like step one is always figuring out how to ask general questions about your subject and turn them into measurable, testable propositions. This is called operationalizing your questions. So, you know how the scientific method works, it starts with a question and a theory, and I don't mean theory in the sense of like, a hunch that say, a quad-shot of espresso makes you think better. Instead, in science a theory is what explains and organizes lots of different observations and predicts outcomes. And when you come up with a testable prediction, that's your hypothesis. Once your theory and hypothesis are in place, you need a clear and common language to report them with, so for example, defining exactly what you mean by "thinking better" with your espresso hypothesis will allow other researchers to replicate the experiment. And replication is key. You can watch a person exhibit a certain behavior once, and it won't prove very much, but if you keep getting consistent results, even as you change subjects or situations, you're probably on to something.

This is a problem with one popular type of psychological research, case studies, which take an in-depth look at one individual. Case studies can sometimes be misleading because by their nature, they can't be replicated, so they run the risk of over-generalizing. Still, they're good at showing us what can happen, and end up framing questions for more extensive and generalizable studies. They're also often memorable and a great storytelling device psychologists use to observe and describe behavior. Like, say the smell of coffee makes Carl suddenly anxious and irritable, that obviously doesn't mean that it has that same effect on everyone. In fact, Carl has terrible memories associated with that smell, and so his case is actually quite rare. Poor Carl. But you would still have to look at lots of other cases to determine that conclusively. Another popular method of psychological research is naturalistic observation, where researchers simply watch behavior in a natural environment, whether that's chimps poking ant-hills in the jungle, kids clowning in a classroom or drunk dudes yelling at soccer games. The idea is to let the subjects just do their thing without trying to manipulate or control the situation. So yeah, basically just spying on people.

Like case studies, naturalistic observations are great at describing behavior, but they're very limited in explaining it. Psychologists can also collect behavioral data using surveys or interviews, asking people to report their opinions and behaviors. Sexuality researcher Alfred Kinsey famously used this technique when he surveyed thousands of men and women on their sexual history and published his findings in a pair of revolutionary texts, sexual behavior in the human male and female respectively. Surveys are a great way to access consciously held attitudes and beliefs, but how to ask the questions can be tricky; subtle word choices can influence results. For example, more forceful words like "ban" or "censor" may elicit different reactions than "limit" or "not allow". Asking "Do you believe in space aliens?" is a much different question than "Do you think that there is intelligent life somewhere else in the universe?" It's the same question, but in the first the subject might assume you mean aliens visiting earth, and making crop circles and abducting people and poking them. And if how you phrase surveys is important, so is who you ask. I could ask a room full of students at a pacifist club meeting what they think about arms control, but the result wouldn't be a representative measure of where students stand, because there's a pretty clear sampling bias at work here. To fairly represent a population, I'd need to get a random sample where all members of the target group, in this case students, had an equal chance of being selected to answer the question.

So once you've described behavior with surveys, case studies, or naturalistic observation, you can start making sense out of it, and even predict future behavior. One way to do that is to look at how one trait or behavior is related to another, or how they correlate. So, let's get back to my buddy Bob who seems to think that his refrigerator is actually some kind of time machine that can preserve food indefinitely. Let's say that Bob has just tucked into a lunch of questionable leftovers, pizza that may very well have had a little bit of fungus on it. But he was hungry, and lazy, and so he doused it in Sriracha. Suddenly, he starts seeing things: green armadillos with laser beam eyes. From here we could deduce that eating unknown fungus predicts hallucination, that's a correlation. But correlation is not causation. Yes, it makes sense that eating questionable fungus would cause hallucinations, but it's possible that Bob was already on the verge of a psychotic episode, and those fuzzy leftovers were actually benign. Or there could be an entirely different factor involved, like maybe he hadn't slept in 72 hours or had an intense migraine coming on, and one of those factors caused his hallucinations. It's tempting to draw conclusions from correlations, but it's super-important to remember that correlations predict the possibility of cause-and-effect relationships, they cannot prove them.

So we've talked about how to describe behavior without manipulating it and how to make connections and predictions from those findings. But that can only take you so far, to really get to the bottom of cause-and-effect behaviors, you're gonna have to start experimenting. Experiments allow investigators to isolate different effects by manipulating an independent variable and keeping all other variables constant, or as constant as you can. This means that they need at least two groups: the experimental group, which is gonna get messed with, and the control group, which is not gonna get messed with. Just as surveys use random samples, experimental researchers need to randomly assign participants to each group to minimize potential confounding variables, or outside factors that may skew the results. You don't want all grumpy teenagers in one group and all wealthy Japanese surfers in the other; they gotta mingle. Now sometimes one or both groups are not informed about what's actually being tested. For example, researchers can test how substances effect people by comparing their effects to placebos, or inert substances. And often, the researchers themselves don't know which group is experimental and which is control, so they don't unintentionally influence the results through their own behavior, in which case it's called, you guessed it, a double-blind procedure.

So, let's put these ideas into practice in our own little experiment. Like all good work, it starts with a question. So, the other day my friend Bernice and I were debating. We were debating caffeine's effect on the brain. Personally, she’s convinced that coffee helps her focus and think better, but I get all jittery like a caged meerkat and can't focus on anything. And because we know that overconfidence can lead you to believe things that are not true, we decided to use some critical thinking. So, let's figure out our question: "Do humans solve problems faster when given caffeine?" Now we gotta boil that down into a testable prediction. Remember, keep it clear, simple, and eloquent so that it can be replicated. "Caffeine makes me smarter" is not a great hypothesis. A better one would be, say, "Adult humans given caffeine will navigate a maze faster than humans not given caffeine." The caffeine dosage is your independent variable, the thing that you can change. So, you'll [need] some coffee. Your result or dependent variable, the thing that depends on the thing that you can change is going to be the speed at which the subject navigates this giant corn maze. Go out on the street, wrangle up a bunch of different kinds of people and randomly assign them into three different groups.

Also at this point, the American Psychological Association suggests that you acquire everyone's informed consent to participate. You don't want to force anyone to be in your experiment, no matter how cool you think it is. So, the control group gets a placebo, in this case, decaf. Experimental group one gets a low dose of caffeine, which we'll define at a 100 milligrams, just an eye opener, like a cup of coffee's worth. Experimental group two gets 500 milligrams, more than a quad shot of espresso dunked in a Red Bull. Once you dose everyone, turn them loose in the maze and wait at the other end with a stopwatch. All that's left is to measure your results from the three different groups and compare them to see if there were any conclusive results. If the highly dosed folks got through it twice as fast as the low dose and the placebo groups, then Bernice's hypothesis was correct, and she can rub my face in it saying she was right all along, but really that would just be the warm flush of hindsight bias telling her something she didn't really know until we tested it. Then, because we've used clear language and defined our parameters, other curious minds can easily replicate this experiment, and we can eventually pool all the data together and have something solid to say about what that macchiato was doing to your cognition or at least the speed at which you can run through a maze. Science, probably the best tool that you have for understanding other people.

Thanks for watching this episode of Crash Course Psychology. If you paid attention you learned how to apply the scientific method to psychological research through case studies, naturalistic observation, surveys, and interviews, and experimentation. You also learned about different kinds of bias in experimentation and how research practices help us avoid them. Thanks especially to our Subbable subscribers who make this and all of Crash Course possible. If you'd like to contribute to help us keep Crash Course going, and also get awesome perks like an autographed science poster, or even be animated into an upcoming episode, go to Subbable.com/CrashCourse to find out how. Our script was written by Kathleen Yale and edited by Blake de Pastino and myself. Our consultant is Dr. Ranjit Bhagwat. Our director and editor is Nicholas Jenkins, our script supervisor is Michael Aranda, who is also our sound designer, and our graphics team is Thought Cafe.