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Interview with Dr. James D. Higley

McKay Young

Dr. James D. Higley, a BYU professor of Psychology, graduated from BYU with a Bachelor of Science Psychology in 1980. He received both a Master's and Doctorate degree in child development and primate behavior at the University of Wisconsin-Madison shortly after. His research interests include primate behavior, development, and developmental psychopathology. He focuses on alcoholism, impulsivity, the effects of parents and genes on development and adolescent outcomes, brain neurotransmission and behavioral outcomes.

How did you get started in Psychology?

Well, I came here and I thought I was going to be an advertising major. Brigham Young was good to accept me many years ago and I took the general course in psychology and enjoyed that a lot. I figured if I was going to be an advertising major, taking a course in motivation would be helpful, so I took the course from a new faculty member, Hal Miller, who had just come from Harvard. I couldn't have been more than two or three classes into it when I decided that this is what I wanted to do. He has a real way of turning you on to psychology, as you already know. He continues to have that kind of motivating influence. He was tough, but he really motivated me; I've never looked back since.

What has led you to your current research topics? Where have you gained the ideas leading to your research?

One of the things that I became interested in early in psychology is what I call the "Bishop's Son Syndrome." Bishops' families generally have very good quality, but so many times young men and young women from these families tend to have problems and difficulties. And the flip-side of that, sometimes families that have all sorts of difficulties—broken homes, the parents are absent, having mental illness in the family—turn out to have wonderful outcomes. That sense of individual differences and

thinking about where those differences came from has started me on my current research path. There is a strong underpinning determining whether and what we become, and I've wanted to gain an understanding of how that works. So that's what made me interested in psychology in general and what's driven my interests over the years. Now, psychopathology has played a large part in my interest in looking at why people turn out unusual. But I think that it started with a desire to understand why individuals are different despite very homogeneous kinds of experiences that lead you to expect similar outcomes.

Why did you decide to work with primates?

Well, it's awfully hard to cut the brain out of a BYU student and still have them perform very well on their exams. I decided to go into animal research because it seemed like an alternative that allowed us to look at the internal workings of various animals. I started my research with Hal Miller looking at pigeons. Bird brains are notorious for not being very smart, but as it turned out, they use the same sort of self-control techniques that we do. They make a decision very far in advance and then become resistant to temptation and stay away from the tempting stimulus as well. But it didn't tell me a lot about what happened internally because bird brains are different from human brains. So I did some research with rats, but their societies and brains were still different enough that I couldn't gather enough information from them. It occurred to me somewhere along the way that if I'm going to look at the central nervous system developmentally in model individuals so I could look at the changes across time, monkeys were probably a reasonable in-between. Their brains are a lot like ours, their physiology is a lot like ours, and yet we can do some things with them that allow us to make marvelous medical advances. One of the things that we discovered very early on, which

right now is the most read article in the Proceedings of the National Academy of Science, was the discovery of a drug that blocks anxiety. Most people have a loved one or family member that suffers from severe anxiety. If we can discover the cause of a problem like that, then we have discovered something to help those people. Even though sometimes researching monkeys looks unpleasant, curing disease is something that is beneficial to everyone.

What is your main goal in studying primates?

One is to get students involved. I go up there for three months, and it's a long way from home. The main payoff is watching the students change, but the discoveries we make along the way can go on to help humankind. If we can eliminate any kind of pain and suffering as a result of the research, that is part of the larger goal, whether it be anxiety, alcoholism, or compulsive behavior. The world is loaded with compulsive people who continue to have problems despite our best efforts. I do lots of research with violence and aggression; in fact we probably publish more papers on violence than just about anything. Violence is intrinsic to every society and nothing is more harmful to the family than violence. Monkeys teach us a lot about good parenting and bad parenting. If we can learn about being better parents and if we can prevent violence with the things that we learn, that would have a great deal of importance.

How did you get involved in primate research in Oregon?

Again, Hal Miller's influence was present in this. I was a member of the founding Psi Chi society here on campus. I was the treasurer at the time and became the second vice-president. I always felt so grateful to the people who participated and helped us out that I promised Hal that if I had an opportunity to come give back at some point, I would be happy to do so. The Chemistry department invited me to come give a talk, so I called up Hal and told him that I would be in town and that I would love to talk to the Psi Chi students here on campus. I had a wonderful evening talking to the Psi Chi students. After that we went out for dinner and he asked me, "What would it take to get you back here?" I said, "Well, there are no monkeys," and he responded, "Well, you can do your research off site." That evolved over time into an op-

portunity with a collaborator that I have up in Oregon. I talked with her and she said she would love to have us come up. So we made arrangements in June, the first year I was here, and since then it's been such a good experience that we've replicated it each year.

Can you describe what the Center is like and what you do there?

The primate center is one of nine funded research centers that our tax dollars pay for to study monkeys—non-human primates. A primate center has anywhere from 2,000 monkeys to 8,000 or 9,000 monkeys. Each one of them is funded by both the Federal Government and individual grants, with a specific mandate to study various things. It turns out that the people in Oregon are very interested in studying reproductive behavior. They were the first to find a gene in the primate and show that it would relate to their behavior. It was a cool study. They took the luciferin that you would see in fireflies as you see them at night and inserted that gene into monkeys (it didn't hurt them or anything). But if you looked at their fingernails, they turned a little bit of a green color from the gene that the scientists had inserted. From those kinds of studies we are now looking at taking a gene from the pancreas to make insulin and insert that back into a human. The primate center in Oregon studies infertility. They've found some wonderful things looking at why infertile women continue to be infertile over the years. They've discovered that stress, for example, makes a woman infertile. That's why you'll find that a woman who has been infertile for years will go on vacation and suddenly become fertile again and become pregnant. We never would have known that from rats, but looking at monkeys who are a lot like us and can be under stress like us, we are able to make those kinds of findings. We can also study things like the effects of nutrition and formulas. When our brains are made it is from a basic building block that is in our mother's milk. This is missing in Similac: we're the only civilized country in the world that doesn't put this in our Similac. Through some research we did at the NIH we were able to show that babies who don't get this particular nutrient that is in mother's milk can end up having slower development, cognitive difficulties, and ultimately developmental noise. As a consequence of that, you can buy formulas with a nutrient in it called DHA, the nutrient in mother's milk that is the building block of the brain. Those are the kinds

of things that you might see up there typically. The research that we do is looking at anxiety and alcoholism, often kissing cousins. There are a lot of qualities of alcohol that reduce anxiety. Alcohol is as effective as Valium at reducing anxiety; the only problem is that it has so many other side-effects, such as the addictive properties, gastritis, and other destructive influences. So, though it affects anxiety, it often leads to worse problems in anxiety itself and individuals who have anxiety. We don't know, yet, precisely what the genes are that produce anxiety, so the mission we have up there is to find them. Again, monkeys are a lot like us: many of the genes that we have are identical as far as location and function. So, if we find anxious monkeys we could go back and see if they have differences in their genes. When we find those genes that are present in anxious monkeys but are not present in outgoing monkeys, then we might have a clue that the gene is dysfunctional.

What are some of the difficulties and challenges you find when working with primates?

Well, monkeys are not furry little men with tails. As much as I would like them to tell me what's going on, I really have to interpret the setting. Asking them what is going on is something you cannot do, whereas in humans you can ask them and get a better sense of what is happening internally. That is probably the biggest challenge when you are working with any animal, and monkeys are no different. We are always looking at the setting to tell us what you might be invoking with that particular subject. Plus, there are certain ethics you have when working with monkeys. Regardless of what I'm learning from the monkey, there are things the monkeys might have to go through. Although we don't do things that are terribly intrusive, still you have a sense when you are standing in front of that cage that you are provoking some anxiety in that monkey. What you have to ask yourself at that point is, "Is what I am learning really worth what the monkey is going to go through?" And that is part of the decision process that goes into whether you are going to do that experiment or not. Most people would agree that standing in front of a cage and measuring what a monkey is going to do, if it gives us the potential of developing a drug that blocks anxiety or keeps people from becoming alcoholic, will probably be well worth the cost. Still, those are important ethical considerations that one must

make when doing this kind of research.

Why do you choose to use undergraduate students during your research?

Well, I was at the NIH for years; they have esteemed scientists and post-docs who help you out. You have technicians, graduated and graduate students. They can probably do more, but it is the learning process that brought me here – the idea that you can take a young undergraduate and get them excited about monkeys and about thinking things – that will have a much greater effect in the long-run than what I'm going to do with a post-doc on one study. Publication is the currency that determines how much money you are going to get in the research world; the payoff there is that the more you publish the more money and funding you get to do more research and make more discoveries. Yet the payoff of seeing people grow and develop is not quite as rich as you get in a place like this, where you see an undergraduate who has a little bit of interest, makes some discoveries, learns some things, and then begins to change their way of looking at things. That's the real payoff, getting to see people learn and grow and develop. It is what really brought me here.

What do you think is the most important finding you have made from your research?

That mothers matter. Right from the beginning, that's what sent me to graduate school. BYU at the time did not have monkeys (we still don't have monkeys here on the campus – lots of primates but no monkeys). But we did have wonderful books by a person named Harry Harlow who did the original studies looking at mothering, with the wire mother who gave milk but was not soft, and the soft mother that did not give milk. That had a huge influence on my research, and at the time they were just starting to do studies with monkeys without adults around. We knew that deprivation was not good for a monkey, but we did not know if the results we were seeing were because of the deprivation or because of the lack of mothering. So, most of my research over the years has been focused on issues of the Family Proclamation, such as, "Why is mothering important? What is it about mothering that leads an infant to develop normally? Why did God decide that mothers were the best way to shape the brain (which I firmly believe is what mothers are there

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for--to change and shape the brain, to make sure the right input gets in at the right time)?” Whether you are a strict evolutionist or God-centered every step along the way, it is clear that mothers are there because when the brain is being developed, the anxiety part of the brain is getting the right kinds of neurons and synapses. Mothers are there to make sure that they grow the right way, that they stay that way, and that they practice, and after a while the baby’s brain is developed enough that they begin to say, “the world’s not such a bad place, I can reduce my own anxiety.” They begin to become efficacious in how they interact with the world. Mothers are also wonderful at punishing inappropriate behavior and building our wonderful frontal cortex. No other animal has one nearly as well developed. We often talk about the natural man, the enemy of behaviorism, and how the natural man is the enemy to God. Well, the natural man is acting on your urges. What the frontal cortex does is say, “Stop! Think about this, and think about what the consequences will be.” Because of that ability we can go on missions, and there we don’t hold hands with young men or young women. We can inhibit our behavior despite our inclinations. Mothers are very good at the early stages of learning to inhibit our behavior, making sure there is practice in the brain so that the neurons survive and go from the frontal cortex and say, “Stop, wait, think this through and what the consequences are.” Mothers are critical because they tend to practice the brain again and again and again. Those synapses tend to become stronger and stronger over time and they see us into adulthood. When we say we hear the echoes of our parents in our head, what we are really hearing is the echo of the neurons we formed over a period of time and the synapses that allow us to stop and think things through before we engage in a behavior.

What is the best way for students to get involved in research with you and in general?

In general, BYU is elite. There is nowhere else, I think in the world, that gives students the opportunities to be first-hand mentored in these kinds of research projects that go on to such esteemed places as the National Institutes of Health or Harvard. I would love to have students get interested in the kinds of research projects I’ve done here and at the NIH. If they would like to learn more, they could take my primate behavior course, and then enter into the database as well as the internship, where <https://scholarsarchive.byu.edu/intuition/vol4/iss1/2>

they can take that opportunity to go up and see firsthand the research we do. We have a database that the NIH was very kind to allow me to bring here. It represents about 20 years of collecting data from monkeys from when they were babies, juveniles, adolescents, and ultimately when they were adults. We know what their genes are; we know what their pedigrees are. So, now we can go back and say, “You have these types of qualities as an infant, what will you become later on?” With a database of 600 subjects, the questions you can ask are really endless. As students take statistics and are interested in getting involved in a project with analysis and data that could eventually lead to a publication, that’s another way to get involved.

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