# Where Are They Now?

### with Bethany Bray

### Bethany Bray & Michael Cleveland

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Host [Michael Cleveland](http://methodology.psu.edu/people/mcleveland) interviews [Bethany Bray](http://methodology.psu.edu/people/bbray), Assistant Professor of Psychology at Virginia Tech. Bethany was formerly the Assistant Director and a Research Associate at The Methodology Center. Michael talks with Bethany about her research interests, her experience as a pre-doctoral fellow in the Prevention and Methodology Training (PAMT) program here at Penn State, and her recently released article, "Modeling relations among discrete developmental processes: A general approach to associative latent transition analysis," in Structural Equation Modeling.

Speaker 1: Methodology Minutes is brought to you by the Methodology Center at Penn State, your source for cutting edge research methodology in the Social, Behavioral and Health Sciences.

Michael: Welcome to Methodology Minutes. I am Michael Cleveland. Today my guest is Dr. Bethany Bray. Bethany is assistant professor of Psychology at Virginia Tech. She received her PhD in Human Development and Family Studies at Penn State in 2007. Bethany is also the former assistant director and research associate here at the Methodology Center. In addition while a student at Penn State, Bethany was a pre-doctoral fellow in the PAMT, the Prevention and Methodology Training Programs. Welcome to you Bethany. Welcome back.

Bethany: Thank you Michael. I'm happy to be here.

Michael: Having you as a guest as a former trainee of PAMT and a former research associate in a "Where are they now?" feature I guess for our past scientists. We have a few questions I like to ask. You can hopefully expand upon and we'll take it from there. My first question is just to ask you to describe your research interest. I know what they are but I'm not sure everyone in our audience does.

Bethany: Sure, yes. Well, I kind of have two different lines of research, one that's sort of more methodologically oriented and one that's a bit more substantively oriented. Methodologically speaking, I'm interested in a variety of methodologies for discrete latent variables including latent class analysis and latent transition analysis but also their longitudinal extensions or extensions to multiple processes including associative latent transition analysis, which I think we'll probably talk about later. Specifically I'm interested in things like model interpretation in those models, issues of model estimation and identifiability, how to apply them in different research context particularly in prevention and treatment research.

Substantively speaking I am generally interested in longitudinal data analysis in prevention and treatment research, also in public health research. I focus on the development of substance use and gambling specifically during adolescence and emerging adulthood. I'm developing an interest in impulsivity and sexual behavior during those developmental periods as well.

Michael: Can we step back a little bit? I guess one step.

Bethany: Sure.

Michael: I guess one step and just have you describe your current position.

Bethany: Sure. Yes. Well, I'm an assistant professor in the psychology department at Virginia Tech as you mentioned. My position is a very traditional faculty member. It's split into the three traditional areas of research, teaching and service. My research program is very similar to the one that I had here and in all those areas that I just described. Teaching, I focus mostly on research methods and quantitative methodology. I teach graduate students and undergrads and then service of course reviewing, event reviewing, paper reviewing, and things like that.

Michael: Sure. Right. You as I mentioned were a PAMT trainee.

Bethany: I was. Yes.

Michael: When you were at Penn State.

Bethany: I was. I was a PAMT trainee from 2005 to 2007, my last 2 years of graduate school. I was in the pre-doctoral program and I worked with Linda Collins was my methodological mentor of course and Ed Smith and Ty Ridenour were my prevention mentors. I worked a little bit on some gambling and substance abuse with Ty and then the health-wise more risky sex and substance use with Ed.

Michael: How would say that the PAMT training has helped you transition now into a full-fledged faculty member?

Bethany: For me I was very fortunate because my PAMT training was very closely tied to my training here in the Methodology Center. When I think back to the way that my graduate training and my post-graduate time in the Methodology Center worked together to contribute to where I am now. I think of it all as a package deal but PAMT specifically was great because it gave me a lot of time to develop my own research program focusing on methods but also having these close ties to prevention and helping me bridge the gap and figure out how to make these long-term connections in the prevention field.

Although I didn't necessarily meet my collaborators at UTESCA through PAMT, it provided me the skills to be able to network with them and work in that area. In particular I think the best thing was that it gave me time to learn how to balance all of the different things that were going on in my life at that time - research and teaching and your personal life. I think it can be difficult for some people your first year as a professor to make that transition from a graduate student or post-doc where all you worry about is research into this faculty life where your life has ... I don't know, untold dimensions of things you have to balance.

I feel like I was very lucky to get that experience early both during PAMT because there were always so many opportunities for education and research and collaboration. It also allowed me to branch into the service area a little bit with reviewing and things like that and especially post-graduate work in the Methodology Center, being assistant director trying to figure out how to manage the administration with short courses with my research program, how to fit all that together.

My non-traditional training I guess is extremely beneficial because I experienced the struggles earlier I think than I otherwise would have. My first year has been mostly about how to transition to a new university not how to balance my whole new life in research portfolio with transitioning into a new university. I am extremely lucky and I can't imagine doing that any other way. It's been really great.

Michael: Bethany, I know that you've taken a more or less non-traditional academic path to your PhD and where you are now. Can you talk a little bit about that that academic background that you've taken?

Bethany: Sure. Well I guess in some ways it's been traditional and in other ways it's been non-traditional. People seem to find it funny that I have an undergraduate degree in Math. Now have a PhD in Human Development and Family Studies and how I bridge that gap. Then in other ways it's been very traditional because I did go right from undergraduate to graduate school and then I'm into research and now into a faculty position.

When I was an undergrad, I was at the University of Michigan-Dearborn in the Mathematics and Statistics department. That's when where my Bachelor of Science is in and I loved it. I knew what I wanted to do was statistics and specifically statistics in the social science but at that I didn't really understand what that meant. When I wanted to go to graduate school we had decided that I would pursue a graduate program in straight statistics department. I went to the University of Michigan-Ann Arbor.

At that time I worked with Susan Murphy who is of course part of the Methodology Center and it was great. I really liked the project but for me I was looking academically for something that was a little bit more applied. It's a very theoretical statistics department. It's a great department. It just it wasn't quite the right fit for me. When I decided to leave UFM, Susan suggested that I try to come work with Linda Collins here at Penn State in a more applied department, in Development and Family Studies. I came down here and it ended up being a perfect fit.

Methodologically during work I was doing exactly what I wanted to be doing. Also academically it was right what I wanted to be doing. I focused in both prevention and methodology within the HDFS department. It was the perfect blend. I started working on my Masters of Science in HDFS and I concurrently pursued a Masters of Applied Statistics in the Stat Department to get a little bit more of the theoretical underpinnings but also the more applied dimension in the HDFS Department - Spatial statistics, sampling, HLM, and things like that.

After I finished both of those masters then I continued working here in the center and got my PhD with Linda in Human Development and Family Studies. That was the transition. It makes a lot of sense to me because the theme was statistics for the behavioral sciences and more generally social sciences. Then when I was on job market last year ...

Michael: Right. Now you have PhD in HDFS and ...

Bethany: What do you do?

Michael: You landed a job in the Psychology Department. Where there unique challenges associated with that transition?

Bethany: Right now I'm very fortunate. Quantitative skills are in high demand. Having a degree that was essentially quantitative lifespan psychology if you had to classify it in the psychology world, I think it was very fortunate because lot of different people are interested in that and so I had a lot of options. I could have gone on the route that I did which was more traditional academics or I could have gone more of the research associate kind of non-profit research institutes like RTI or Mathematica or I could have maybe worked for some for-profit corporation or something like that but I was, I'm very interested in public health broadly speaking and prevention and treatment.

I felt very open to where I was applying. I knew that if you had to classify our HDFS Department into psychological terms, it would be lifespan psychology and then I had the quant back around. I was looking at quantitative psychology positions. I was also looking at quantitative positions potentially in a sociology department. I looked at public health departments and epidemiology of course because they're very into statistics. I did some looking in the statistical area but they're mostly looking for traditional PhD statisticians which was fine but not really my area.

It was interesting because I really applied to a whole slew of jobs in all different departments. I applied to medical schools. I applied to colleges of Liberal Arts and then I'm ultimately in the College of Science at Virginia Tech. It was all over the board. The way that I thought about myself in my head was a quantitative lifespan public health prevention scientist I guess kind of convoluted but I was very open.

Michael: Now that you're there in this department, what kind of challenges do you face going forward from here?

Bethany: I think my department was a little surprised when I mentioned the other day I have actually ever taken one psychology class, Introduction to Psychology, as a freshman in college. For me it's been really fun to try to learn about psychology on the fly. I teach undergraduates and many of them are interested in areas of psychology that I am not familiar with - IO, Clinical, Cognition, and Emotion. I know very little about those areas because I obviously focus on risk behavior and that whole perspective.

It's been really fun to try learn from my colleagues and just learn in psychology enough to use examples beyond "Well, if you're interested and looking at adolescent substance use and gambling, what else could we apply these methods to?" It's been really fun to try to do that. For me I think having a math background and then jumping right into lifespan developmental psychology that I wasn't at all familiar with when I came to Penn State. That's been the interesting transition. I started identified as a mathematician and now I'm trying to learn about these classic psychology examples and what that means. My training in HDFS is much more lifespan focused with learning about people like Branford Brenner and things like that. I think that's been my biggest challenges.

My concluding thought about my job search overall is that my degree in HDFS combined with my training here at the Methodology Center and with PAMT really gave me the opportunity to look broadly at positions and find one that really fit my research interest and my career goals regardless of necessarily what name the department had which was it was great for me because it felt very open and that I could really find something that I felt really fit well with me. I found that in the psychology department at Virginia Tech but that could have very well happened in the department that had a different name that could have been Quantitative Psychology or Public Health even or Epidemiology.

In terms of my job search I felt like it was great. I was fortunate. I didn't really experience too much confusion about what I did because I went to a department that was familiar with developmental. Even though they didn't have necessarily a lifespan perspective, the idea of what developmental psychology is and how quantitative psychology plays a role in that and I just so happens to have this particular name that's different from the psychology department at Penn State. It was pretty open for me.

Michael: I'd like to turn next to finally discussing what we talked about at the very beginning of the podcast which is your upcoming article in Press Now in SEM, Structural Equation Modeling. The article is titled "Modeling Relations among Discreet Developmental Processes: A General Approach to Associative Latent Transition Analysis or ALTA." Can you give us the brief synopsis of what this article is about and then maybe we can talk a little bit about some of the details.

Bethany: I can. Yes, the idea generally is that in order to understand one developmental process say that we're interested in the development of risky sexual behavior overtime then often these phenomenon that we're interested in, they don't occur in a vacuum. They occur while all these other interesting developmental things are happening.

Possibly we are also interested in simultaneously modeling alcohol use over time. We want to know as people transition through different risk behavior sexually, are they also transitioning through different types of alcohol or other substance use overtime? How do we model both of these processes simultaneously and how do we understand how one process is affecting developmental transition in the other processes?

There are lots of different methods that you could potentially use to address questions like that. Recently there have been things about modeling reciprocal relations with GEE. You can of course do a latent growth curve modeling with time variant co-variates or you can associate multiple latent Growth processes. You can use group-based trajectory modeling where you're looking at groups at trajectories in more than one process overtime. Many of these models conceptualize behavior or characteristics as a uni-dimensional continuous latent variable, which is very interesting and very appropriate in a lot of applications but it's not appropriate for every application.

What I'm interested in is when we conceptualize development as occurring through these unique discreet multidimensional categories, how do you model transitions between those categories in multiple processes and relate those transitions to each other? The center of course has worked for a long time in latent class modeling and latent transition modeling where you model first that multidimensional behavior let's say and then you model transitions in that behavior overtime. Associative latent transition analysis, ALTA, takes those latent transition models and puts them together to model multiple behaviors simultaneously overtime.

Michael: Sure.

Bethany: The paper focuses mostly on different models that prevention scientists or a developmentalist might be interested in exploring. It does so in the context of risky sexual behavior and alcohol use. I present several models. I think there are 7 of them and each model directly corresponds to a particular hypothesis that one would make about how 2 processes are related to each other and how to translate that hypothesis into a statistical model and then how to take that statistical model, fit it and then compare it to other statistical models to determine which is best or optimal at balancing fit and parsimony in its description of its relations.

Michael: That was one of the more interesting aspects of the article that I picked up on was that you frame it in this high-article model perspective which a lot of listeners are probably familiar with when they use SCM, constraining pass or testing fit and comparing models within that framework. I really liked the way that you approached it. Talk about how you can compare one model versus another model and compare the fit and decease that you've done in your analysis to arrive at a question driven by your hypothesis and answer that hypothesis in a statistical way to determine what is the best model.

Bethany: Thank you. Yeah, I like the paper. Yes, the paper is interesting. There's been some on ALTA for several years now actually. Brian Flarity at the University of Washington who of course also worked here in the center has been working in this area. Katie Wicawits also at the University of Washington has been working in this area. There are some other folks and this paper is a little bit different than what's been presented before. This paper really takes that I think of as the log-linear modeling approach to latent class models.

Latent class models can be parameterized or thought of in two different ways. One is how we traditionally think of them based on the probabilities. Listeners familiar with the method they probably have heard of these item response probabilities and latent class probabilities. That's one way to think of the models. Those same models can also be thought of in log-linear terms if you think of multinomial logistic regression. You're modeling categorical outcome.

Previously this work has taken what I think of as a probability approach which is great but there are some limitations to it. If you think of it in a log-linear format which is what the paper does, it opens up a few more models that maybe more applicable in certain circumstances that readers would find interesting. As you discuss, they compares them hierarchically as you add effects and interaction effects overtime to make the processes more related in how that works and how you would compare them.

Michael: I also appreciate at the end of the article you do include an appendix with some actual software code using LEM I believe. How important is it for someone wanting to test models like this that they understand log-linear modeling in general and maybe specifically LEM software? In other words how generalizeable are these methods do you think?

Bethany: Yeah, that's a great question. Well the method itself I think is highly generalizeable. Taking a log-linear modeling approach to these complex models in particular is extremely flexible. It's easy to add interactive effects and it's fairly straightforward to think about how you would add say group-in variable if you wanted to compare men and women or add a co-variate if you wanted to say predict the relation between risky sexual behavior and alcohol use from number of peers who are engaged in the behaviors. Maybe it's a very flexible approach that let's you enter and remove effects in a rather straightforward way to change the hypothesis that you want to test.

To get at your question of how important is it to understand log-linear model in general, I'm a big advocate of categorical data analysis anyway. That's the area that I work in. I think it's important but not all research questions are addressable in a categorical way of course. Questions that are better addressed using a continuous method then I wouldn't advocate for a categorical approach but for certain questions that really have to do with these very inherently multidimensional phenomenon or phenomena.

If you're interested in models like ALTA I think it's beneficial to understand both approaches in how they're similar and how they're different because there are limitations in log-linear models. You of course have probabilities but you also have odds ratios. Constraint in probabilities is not exactly the same thing as constrain in odds ratios. You are afforded more flexibility if you understand how to move in the log-linear world because you can start thinking about odds ratios rather than just probabilities.

Now for LCA and LTA most models you don't have to worry about the log-linear approach as much because most of those models you can fit easily, totally working in the probability world. As we've seen from earlier ALTA publications, many several of the models, I think 3 of the 7 that I discussed in the paper can be conceptualized completely in the probability realm. It's just you're a little bit more restricted. I think it's important but ...

Michael: Well, I can say that I thought you did a very good job in explaining to someone ...

Bethany: Thank you.

Michael: Like myself who is relatively uninitiated in the log-linear world of walking the reader through those steps and the notation that you used throughout is fairly approachable. I think it's a good place for people to start if they're unfamiliar with it if they want to fit this kind of models and this method. I think it's very approachable.

Bethany: Thank you, thank you. For listeners who may not be aware of course logistic regression is your very basic log-linear model. If you're interested and you know a little something about logistic regression you're already there ...

Michael: You're already there.

Bethany: Half-way there, that's right.

Michael: Well I'm looking very much forward to the publication, the actual publication and seeing the article in press. Congratulations on that. With that I think I'll wrap it up today. We want to thank once again Bethany Bray, assistant professor of Psychology at Virginia Tech for joining us today. This has been Methodology Minutes.

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