Gilbert Gottlieb

- Born October 22, 1929; died July 13, 2006
- Spouse: Nora Lee Willis Gottlieb
- A.B. in Psychology (1955) University of Miami, M.S. in Psychology (1956) University of Miami, Ph.D. in Psychology (1960) Duke University

Major Employment

- Research Professor, Psychology Department and Center for Developmental Science, University of North Carolina at Chapel Hill: 1995-2006
- Excellence Foundation Professor, Psychology Department, University of North Carolina at Greensboro: 1982-1995
- Research Scientist, North Carolina Division of Mental Health: 1961-1982
- Adjunct Research Professor, Psychology Department, University of North Carolina at Chapel Hill: 1974-1982
- Adjunct Assistant Professor to Professor, Psychology Department, North Carolina State University at Raleigh: 1961-1972

Major Areas of Work

- Developmental behavioral genetics

SRCD Affiliation

- Distinguished Scientific Contributions to Child Development Award winner (1997)

SRCD ORAL HISTORY INTERVIEW

Gilbert Gottlieb

Interviewed by Robert Lickliter
University of North Carolina at Chapel Hill, Center for Developmental Science and
Florida International University in Miami via telephone
September 14, 2005

Lickliter: So we're going to start by you describing your family background and your experience as a child or an adolescent that would be of interest in terms of how they might've forged your educational or professional trajectory, and what your parents were like, where you were born, where you grew up. So why don't we start there? That would be good.

Gottlieb: Okay. Well, I was -- I came along rather late in my mother's life. I was the third born. I came along nine years after the second born, when my mother was in her late 30s, and I think I was not entirely unwelcome, but I was a little bit of a surprise. So what my mother did, since she was finished with child rearing as far as she was concerned -- we were well enough off -- I should say that I was born in Long Island, New York, and we had a home on Long Island and the home was a three story affair, and it was a very large house, so it could accommodate quite a few people. And my mother -- my father was a fairly successful businessman, so my mother had help. She had a cook and she had a lady that served sort of as maid or housecleaner or whatever, and then -- but the cook or the housecleaner was married to a guy, and he also served as a gardener and chauffer. My mother didn't drive, and so --

Lickliter: And all of these service help, did they live in the house with you?

Gottlieb: Exactly. They lived on the third floor of the house.

Lickliter: I see.

Gottlieb: Yes. And what my mother did was she hired a wet nurse and since we're doing this for history, and God knows when somebody will be listening to it, I'll describe that a wet nurse is a woman that's lactating, so she was able to breastfeed me.

Lickliter: Yes.

Gottlieb: And she lived in.

Lickliter: I see.

Gottlieb: She lived on the third floor --

Lickliter: As well, yes.

Gottlieb: -- as well. And the kitchen was a big hangout. The kitchen was huge. A kitchen and there was a pantry and there was a bathroom down there, and then there was a big dining room where my mother liked to entertain my father's business associates as well as her family. She had sisters and brothers that she would have over for dinner or lunch, and you know, with the cook and service and all of that business. I was usually excluded from that early on, because I wasn't grown up enough to be sitting in the dining room. So after we had the wet nurse -- after I was weaned she then hired a live-in nursemaid for me, a German woman by the name of Mary Lädl. And I think Mary must have spoken German to me, because when I lived in Austria, when I was with the U.S. Army in Austria, German came to me rather easy, even though we'd never spoke German in the family. We spoke a little Yiddish, but that was all. So I think she must have spoken German to me. She liked me very much and took good care of me, but she was a very strict person.

Lickliter: In her German tradition?

Gottlieb: German tradition, and what happened is, she was doing so well -- I was born in 1929, October 22, and here we're talking about the early '30s, because I had been weaned, and she's taking care of me, and she went back the early -- maybe '34, '35 -- she went back to Germany to visit her relatives and friends and so on, and Hitler had come to power then. And when she came back she notified my mother that Hitler had said that good Germans couldn't work for Jewish people. My mother was a little bit taken aback to say the least about that.

Lickliter: At the very least.

Gottlieb: Yes, she was really bothered by that. And she -- so Mary Lädl was quitting or being fired at the same time. I'm not sure which. I guess was, as I say, 1934 or '35, somewhere along in there, maybe '33. I started kindergarten probably in '34, first grade in '35 probably.

Lickliter: Did you attend public elementary school or private --

Gottlieb: Yes, public --

Lickliter: -- in Long Island.

Gottlieb: -- in Long Island. It was just two doors away. That was an important consideration, my mother buying that house in Long Island.

Lickliter: I see.

Gottlieb: Because she, as I say, she didn't drive, so she wanted the kids to be able to walk to school, take care of themselves as it were, and not have to have the chauffeur take them back and forth and things like that. So that was a public school. And let's see --

Lickliter: Were you a good student?

Gottlieb: -- yes, and that's -- I think early on I was a good student, and I was particularly good in mathematics or arithmetic, and what happened is my dad had financial reverses in the late '30s -- '38, '39 -- severe financial reverses, and he had been giving my mother cash over the years from his -- he had a business, he had a grocery business, a large, family-owned wholesale grocery business, but he also -- he liked to gamble quite a bit and he used to go to the horse races every afternoon. And in the early '30s before the pari-mutuel machines came in he had a way of making that a business, and I'll try to explain that, because I know it's -- they had bookmakers at the course, you know, before the pari-mutuel machines came in. and what you did, if you were going to bet on a horse you went to the bookmaker and the bookmaker gave you a chit for, you know, like, the horse was so and so, and then gave you a five-to-one or a six-to-one odds on it, and then that's what you were going to get, even though he might change his mind later, the bookmaker, when a whole bunch of people start betting on that horse and it might go all the way down to two-to-one, you had a chit for five- or six-to-one. And my dad used to do that, and then he would be able to be partners with somebody and get his money back, because he could, you know, have a chit that was on a hot horse and that the price was very good, and he could get his money back. And so he was doing it as kind of as an investment rather than strictly gambling, and that's why he gave my mother quite a bit of cash. He would come home and then she would put her apron on, and then -- and she would hold out her apron and then he would throw large bundles of cash into her apron. And she would say -- that's right, and that would go in her private savings account.

Lickliter: Right.

Gottlieb: So that was good, because when my dad was having these financial reverses part of that was due to the fact that the pari-mutuel machines had come in, and when the pari-mutuel machines came in if you bet on a horse and it was six-to-one at some early stage, but a whole bunch of other people started betting on that horse, then the odds would go down to two-to-one and that's what you got, whatever, you know, the odds were. And so he couldn't do his business anymore, so he really was gambling and he was having reverses, be -- you can't beat that, because the taxes amount to about 18 or 19% out of every dollar, and so, you know, when you're going to the races every day the total of having almost 20% of your bet, you know, taken away right off the top is going to hurt you in the long run, especially, you know, if you go every day and you're betting on quite a few races. Okay? So she took her money -- she said, "Leo, I better go down to Florida where I have a sister -- a couple of sisters and buy a home down there, buy a lodge down there, and go into the rental business." And so she bought with her money, her cash, she went down and she bought Pinehurst Lodge, which consisted of two buildings, and she could rent rooms sort of like a hotel, a small hotel, in one building and then she had apartments in the other building. And so that way she could, you know, she could keep her head above water, so to speak.

Lickliter: A steady income, yes?

Gottlieb: Yes. And my dad, I always admired him, because he now had to really go to work, and he was left in Long Island, and we rented the home -- they rented the home out, the large home, and my dad took up, you know, lodging with some people that he knew. And what he used to do is every Friday night he would go to the post office and he would put $60 -- this is the late '30s, early '40s -- he'd put $60 in an envelope with a little short note to my mother and then have that be delivered air mail special delivery so she'd have it Saturday, and he did that all during this whole long period when he was "on his uppers," so to speak. And I'd always admired that and my mother really appreciated it too. We would go back in the summertime -- I was still going to public school down there, and I'll get

back to that in a moment, because that's a significant aspect. We'd go back and we'd all live together in the summertime. We'd rent some house or other in --

Lickliter: Long Island?

Gottlieb: -- Long Island, and that was good, because what happened is in Fort Lauderdale, as opposed to Miami or Miami Beach, Jews were very infrequent and there was an anti-Semitic climate, a very strong anti-Semitic climate. There were signs on people's lawns that said, "Jews and dogs keep off the grass."

Lickliter: Wow!

Gottlieb: Yes. And I had come from a Jew-friendly -- Jewish-friendly neighborhood, you know, up in Long Island, and this was all very new to me, and let's see, I was about nine or ten years old. And when I went to school there where -- the school was grade 1-12 and it was right across the street, and once again, that was my -- one of the reasons my mother bought that particular property, because I could then walk to school once again. But there were only five kids in the whole school of 1,200 that were Jewish.

Lickliter: Wow. And did your older sibs accompany you to Florida?

Gottlieb: Originally they did, but they were lazing around and then she wanted them to get out and get work, and, you know, and contribute and they weren't doing that, so she said, "I think you -- it would be good if you guys went back to New York," so after they were down there for six or eight months -- I forgot how long it was -- they left and went back to New York. And then they did, you know, they had to sort of cope for themselves, and naturally since -- as I mentioned, my second oldest brother was nine years older than me, so he was, like, 19 or 20, and my oldest brother was 13 years older than me, so he was in his early 20s at that time.

Lickliter: Uh-huh. That left you and your mother in Florida?

Gottlieb: Exactly, yes. I missed them very much and -- you know, because we played ping pong together and we were only a mile and a half from the beach and, you know, we could go swimming in the Atlantic Ocean together, and they had a car -- between them they had a car, so you know, we could drive around and all that business. You know? And I really did miss them very much. The anti-Semitic experience was very, very bad and I really appreciated going back to Long Island in the summertime, and also because we didn't have air conditioning back then, and you know what southern Florida is like in the summertime.

Lickliter: Yes, without air conditioning pretty much unlivable.

Gottlieb: That's right. So what happened with my schooling, I was -- as I mentioned, I was doing very well in Long Island, and particularly well in arithmetic and math, and I really liked that subject. But I happened to be a wise guy in class and that didn't go over very well with the teacher that I had in the fourth grade. And she -- they devised a plan -- she and the principal devised a plan that would make me go from one grade to the next -- I went from the fourth grade to the fifth grade -- and that would quiet me down, and they were right. It did quiet me down quite a bit, particularly in the arithmetic area. I never learned how to handle fractions because that was -- what was going on the fourth and early fifth grade were fractions, and I never could handle fractions after that. I eventually, you know, taught myself to add and subtract and so on, but my grades went down from there on out, and I was just an average student. I didn't flunk, but I was a C student from there on out.

Lickliter: Including through high school?

Gottlieb: Yes, even in high school. I flunked one course in high school. I made a 69 in algebra instead of 70 and the teacher gave me an F, and I tried to talk her out of that, but she gave me an F and I had to take that -- that was one course I had to take then when we went to Long Island that summer. I had to go into Brooklyn or New York City, don't remember which.

Lickliter: Brooklyn or New York City for summer school?

Gottlieb: Exactly, yes. So also, I was not -- Algebra was just too tough for me, and that's really too bad because I think it also affected my scientific career to a certain extent, because I've never been at home with mathematical models or anything like that. At least I think that's one of the reasons. So my --

Lickliter: At the end of your high school experience, given that it wasn't stellar academically, were you planning at that point to go to college, or had you other plans in mind?

Gottlieb: I didn't want to go to college, because I graduated -- I was graduating when I was 16, and I felt like I was too young to go to college, and plus, I wasn't confident, as you might imagine. But my parents bribed me to go to college. They gave me $50 a week. They said, "That's your job. You go to college." And they sent me off to college when I was 16 in New York, upstate New York was the first one I went to --

Lickliter: Where was that?

Gottlieb: -- and that was in Ithaca. It was a college -- so that would have been right at the end of World War II when the vets were coming back -- and it was a college that was trying to supply that need, so I was in with a bunch of older guys and that probably wasn't so good either, you know, as far as influencing me about drinking and other things --

Lickliter: Extracurricular activities?

Gottlieb: Right. And -- but of course, we could play poker, and I enjoyed poker very much. I quit after a couple of years. I just quit college. I couldn't really do it, and I decided, well, my father was a businessman. It looked like that was a good route for me to take, so I went down to Houston, Texas, to try to start my business career, because I had an uncle and an aunt down there that were successful, and he got me a job with the Sakowitz Department Store, and I did that for a while, and I wasn't very successful at that. And then I tried ladies' ready to wear -- see, since I had two years of college back then in the mid '40s they were always putting me in training programs and making me assistant manager of this or that --

Lickliter: -- management programs.

Gottlieb: -- yes, and I just -- I really figured out finally that I just -- I tried a whole bunch of things and I really just wasn't fit for business, and I didn't know what I was going to be doing. And what happened is the Korean War came along and I got drafted --

Lickliter: While you were living in Texas?

Gottlieb: No, I had come back now to New York.

Lickliter: I see.

Gottlieb: I had come back to New York because I had gotten a job as a merchandise manager in a Grayson and Robinson, which is like the Lerner's stores. It's nationwide and I had met a guy in Long Island who was a functionary, one of the heads of that company, and he took a liking to me. He got me that job, but I wasn't any good at that job either. I got drafted out of that job in February of 1951,

and I was one -- not only -- I didn't believe in the Korean War, you know, because it wasn't even called a war, it was called something else. They had another name for it back then. And the idea of being drafted and being in the Army and all of that was terrible. But what happened is I showed up pretty well in IQ testing, and instead of putting me in basic training in the northeast they sent me out to Missouri, Fort Leonard Wood, Missouri, and a call came down while I was in basic training, a call came down from the counterintelligence corps that they needed people to put in their counterintelligence corps school at Fort Holabird, Maryland, because they were now, you know, involved with the Korean conflict, and they were short of counterintelligence agents. And I qualified because I was out there in Missouri, you know, and I looked really good compared, I guess, to the kids from Missouri. I had a couple of years of college and I had a fair IQ, so they --

Lickliter: -- management background as well in there.

Gottlieb: -- there you go, right, exactly. I think that must have also played a role. What happened is when I -- after my 14 weeks of basic training I went to Fort Holabird, and they told you that you're the upper crust of the whole Army. You know, you're in the top one or two percent. I don't know the top one or two percent of exactly what, but anyway, we were in the top one or two percent. And that was also a 14-week training course. We were in school eight hours a day Monday through Friday. And I ate it up. I loved it. We were learning how to become intelligence agents, counterintelligence agents, and we got to do the history of communism, because we had to know that, you know, because of the Cold War, and we got to study things -- it was just wonderful and I really took to it, and I graduated in the class of 40, in which a bunch of people had flunked out, I graduated either second or third and it gave me confidence that, Hey, I'm not dumb, and I really can do the schoolwork if I'm interested. That was --

Lickliter: You actually enjoyed it.

Gottlieb: -- I enjoyed it, and it was a big turning point for me. It really was a big turning point in thinking about myself and my self-esteem, and I was lucky. Most of the people were being sent to Korea to help with that conflict. I got sent to Austria, one of four people that got sent to Austria and Germany out of the class of 40. And that was an eye opener, because what I was now running into in my counterintelligence duties, I was running into displaced persons, and I noticed the tremendous individual variation there was and how people reacting to becoming a displaced person, you know, having to leave Hungary or wherever, and now being in Austria and not having your own home and living in a DP camp and so on, and how different the people were. And that really -- that gave me the idea that what I'd like to do is I'd like to go back -- after I got out of the Army I'd like to go back to college and major in psychology, and maybe understand, you know, these individual differences. So that was a very big turning point for me. It - -not only I had the courage that, well, gee, I'm not so dumb as I thought, but also, I got this big interest in this individual variation in the face of severe difficulty. So that was very important I think for my intellectual development. I -- when I came back I made the Dean's List, even though I was taking 16-18 hours a semester, and I loved it, and I was reading outside a lot. I was sure that my teachers were not telling me everything that psychology was involved with, so I was reading Freud on my own, and I was reading philosophy and history on my own and so on.

Lickliter: And where were you after you got out of the Army in terms of where did you enroll, and did you use the GI Bill to do that?

Gottlieb: Yes, I used the GI Bill to enroll, and since I was a citizen of Florida even though I had bad grades before, I got into the University of Miami at Coral Gables right across the street from you, very close to you, I guess. Is it close by?

Lickliter: It's probably about eight miles from here or less, yes.

Gottlieb: Yes. You're at Florida International just for the record.

Lickliter: Right.

Gottlieb: -- benefit of the person that's doing this -- listening or typing or whatever they're going to be doing. And I -- so I finished up pretty promptly and I stayed there for a master's degree. They had a master's in clinical, and though I was doing both clinical and experimental, I wanted to get a master's in clinical. And they had a very good -- R.M. Allen was a very, very good Rorschach person, and I wanted to learn how to do the Rorschach test as well as do intelligence testing, so that worked out very well. And then I -- when I went to Duke -- I was lucky to be accepted at Duke. It was a year when they decided they hadn't been taking enough students in, and that was the year that they opened it up and they took about 15 students in, and I was among those they took in.

Lickliter: What year was that?

Gottlieb: Now, that would have been 1956. I got -- so I was in the Army from '51-'54, January of '54 -- yes, and then I finished my two years undergrad and one year master's between '54 and '56.

Lickliter: And when you were working on your undergraduate degree, and then right after that your master's degree, did the circumstances of the GI Bill make it so that you could devote yourself to your education entirely, or were you having to work on the side to support yourself?

Gottlieb: I had to work. I worked in -- at Christmas time I could make some money working at Christmas time at the -- one of the hotels down on Miami Beach, because they had people coming down from the north and they need somebody like me with a psych major who could take care of the kids and get them off the parents' back. And so I would make good tips, and I'd make enough money so that that was the only work I had to do, otherwise the GI Bill was sufficient back in those days.

Lickliter: So you moved to Durham, North Carolina?

Gottlieb: Right, and I was lucky, I got into both the clinical program and they let me also -- I wanted to be in the clinical program and I also wanted to do experimental psychology, and you know, the usual split between clinical and experimental existed there, but to a lesser degree than it does at some departments, so that the people from both departments kind of put up with me. So that was --

Lickliter: Did you start working with a particular faculty member or mentor, or did that come later?

Gottlieb? -- yes. I started working with Zener, Karl Zener. He was a perception psychologist, and I didn't have -- I needed a little help by then, financial help, and I didn't have an assistantship, but he hired me as his assistant, and he had a small grant and so he was able to give me a little bit of money to tide me over. And later I did get assistantships and so on, but that first year I didn't have one officially. He was not a developmentalist at all. He was a classically trained -- he had gone to Princeton, I think, or Yale, and then did a postdoc with Wolfgang Köhler in Germany. Yes, a Gestalt psychologist. And that's very -- he was good; he was -- he let me do what I wanted to do, except I had to study human perception. That was what I had to do. And so I really served as his research assistant and did whatever work he wanted me to do for him. And one of the exciting things is that Wolfgang Köhler actually visited Duke to give a talk at Karl's invitation and he looked in my tachistoscope, and that was a very exciting time indeed. And you know, the Gestalt psychologists were always the great ones about talking about the influence of set on perception, and what you were supposed to do is get rid of that set and just do pure perception. And what happened is what Zener was interested in, and we were putting real live objects in the tachistoscope. Instead of two-dimensional objects we were putting three-dimensional objects in there, and with short exposure times it's very difficult to realize that that's a three-dimensional object that you're looking at, and particularly if you're very experienced, like Wolfgang Köhler would be, and looking at the tachistoscopes you'd expect to be seeing a two-dimensional object. And so we kept showing him this apple and asking for his

phenomenal experience and he was describing them, and Zener kept using his hand and going towards heaven, you know, "Make the exposure time longer, longer exposure time," you know? And Wolfgang never got the idea that that was a real live apple in there, and we had to go into the tachistoscope and get the apple out and show him, and so I thought that was very funny, because it really showed the influence of set on perception.

Lickliter: Indeed. And what was it about being at Duke in that environment and kind of, in a sense, bridging the experimental and clinical programs that got you going on an interest in development?

Gottlieb: I don't know, and that's a very good question. I don't know. I was always interested in prenatal development, even as an undergraduate, and thought that was the most important thing you could study, and I used to tell people that everything important happened prenatally. I used to -- I was just very arrogant about that. And there -- I didn't study with any developmentalists there, and Zener was not a developmentalist, and the guy who ended up being the nominal director of my dissertation, Donald K. Adams, also was not a developmentalist. He was a nativist, in fact. He did a senior postdoc with Konrad Lorenz while I was doing my dissertation at Duke. So I ran across Kuo's writings -- Zing Yang Kuo, K-U-O -- I ran across his writings, and I ran across Schneirla's writing, T.C. Schneirla, and so they influenced me from afar, because I found their writings congenial. You'll remember of course both of them emphasized the importance of prenatal experience for the adaptive behavior of the infant. And that was what, you know, that was just very congenial to me. And --

Lickliter: And you found them on your own. I assume they weren't --

Gottlieb: -- yes.

Lickliter: -- part of the curriculum there at Duke I don't imagine.

Gottlieb: No, they weren't, they weren't as a matter of fact. That's right. Schneirla was not taught and Kuo was not in any of the courses I took, even in the comparative psychology course that I took. We took up Lehrman and his critique, because Adams of course was a Lorenzian and a nativist. We took up Lehrman's critique in his comparative psychology course, and that played an important role, very important role for me in that course, because that introduced me to Lehrman's *Quarterly Review of Biology* article 1953. I was unaware of that article, and I said, you know, and Adams and I had very different understanding of what was going on in that paper. I thought the paper was all about development and he thought of it as more of an ideological paper, and that was sort of interesting.

Lickliter: And this would have been the late '50s, right?

Gottlieb: That's right. I finished my dissertation in November of '59 and that's when I went to Dorothea Dix Hospital to -- as a clinical psychologist with the promise that I could have one day a week to work in my duck lab, because we haven't mentioned that, but I did my dissertation on imprinting in ducklings, because that was an early experience phenomenon and I -- and that presumably had a critical period, and those were things that I thought were interesting about development, so that's why I chose that topic.

Lickliter: Given the kinds of people you were working with and their interests, and the kinds of resources they would have at hand, is it fair to say that you were more or less on your own in terms of getting the resources and the wherewithal to complete an imprinting dissertation?

Gottlieb: Exactly, yes, I was indeed. I had to find a source of eggs. I wanted to do ducklings. I had read Eckhard Hess's 1956 article that appeared in the *Scientific American* and I was much influenced by that, and so I wanted to use ducklings as he had done.

Lickliter: So how did you go about making that happen as a graduate student?

Gottlieb: They -- once again, Zener found money for me. He was on my committee. He found money for me so -- and the Department gave me some money, and you know, duck eggs are very expensive. He -- the Department then made that money available to me, and the Department allowed me to buy a Sears -- an inexpensive Sears incubator for $200. And then the Department carpenter guy, you know, the shop guy built me a brooder and he also built the imprinting apparatus for me. So they supported me very nicely in that sense. The Department was very good in supporting me in that sense. And Peter Klopfer had just joined the Zoology Department in 1958, and they put him on my committee because he had done an imprinting dissertation at Yale, and so they -- you know, there would be somebody who had some experience with that. And Peter was an assistant professor at that time, 1958, had just come from a postdoc with W.H. Thorpe at Cambridge and it was useful. I could bounce ideas off him and that's how I ended up doing my dissertation on the effects of domestication on imprinting, in which I used not only domestic birds, but I went up to Canada and took my imprinting apparatus up to Canada on top of my VW and I ran wild birds up in Canada at a waterfowl research station in Canada that Peter had put me in touch with. That was very helpful.

Lickliter: And you went right from graduate school obtaining your doctoral degree, you went right to work at Dorothea Dix (State Psychiatric Hospital)?

Gottlieb: Right. So four days a week I was a clinical psychologist and one day a week I was an animal behaviorist. And then after I was there for about a year, and I was publishing clinical papers as well as I had written my dissertation up for publication, a job became available, research scientist, first research scientist job, basic scientist in this case, at Dorothea Dix in the Research Division, which was a new division, and I qualified for that job, and that's how I eventually -- I stopped doing clinical work, because I just couldn't do the animal behavior work and the clinical work justice. So by 1965 I stopped doing clinical research, and by 1961 I had become a full-time research scientist with my duck lab.

Lickliter: And this was funded by the state of North Carolina through Dorothea Dix?

Gottlieb: Right, exactly, the State Department of Mental Health. And I did get a grant. I applied to NIMH and I got a grant, a three-year grant, and NICHD came into being and they took my grant over when they came into being, and then they funded me ad infinitim after that in the National Institute of Child Health and Human Development. So I was very lucky. But Dorothea Dix -- the Research Division paid my salary and they also paid the salary of two full-time research assistants.

Lickliter: Wow.

Gottlieb: I didn't have to have grant money for that. So I could use grant money for fancy equipment and consultations that I needed and so on.

Lickliter: Rather than salary?

Gottlieb: Exactly, yes.

Lickliter: And were you on a 12-month appointment in that research position?

Gottlieb: Yes, I was.

Lickliter: So you didn't need summer funds from your grant as well?

Gottlieb: Right. And the other thing is, of course, I couldn't enrich myself with summer funds.

Lickliter: Right.

Gottlieb: I couldn't pay myself summer salary.

Lickliter: Did you at the time imagine that you would remain your entire career in North Carolina, or did you at the time think it was just a step along the way in terms of your career and professional development?

Gottlieb: Yes, I was -- originally when I took the clinical job I started applying for postdocs, and I didn't -- I needed postdoc money. I wanted to study with Thorpe, but that would have been a big mistake as it turns out, but I wanted to study with Thorpe, and he didn't have any money. So I had to get my own money for that and I didn't get the money, so I didn't go study with Thorpe. And I, you know, it's in November of '59 I started as a full-time clinical psychologist, and in January of '61 I was already hired as a full-time research scientist. So I -- and I certainly didn't expect (a) that job to come up, and secondly, I didn't expect, no, to be spending my whole career in North Carolina, not at all. So that was very lucky. Talk about falling into something indeed.

Lickliter: So you never really had to bother with the job market or trying to be recruited, because you found yourself a full-time research position?

Gottlieb: Exactly, and I had such good research support and -- not only with the two full-time research assistants, which allowed me to have one person doing prenatal work and the other postnatal testing, they also had -- I had a very spacious laboratory. I got the old X Ward at Dorothea Dix. The X Ward is the ward they would put the patients on when they were acting up. They had individual cells in them, and they were perfect. They had two-foot walls and so it was a very soundproof environment, very good for me. And they didn't need the X Ward when the psychotropic drugs came in in the early '50s. Psychotropic drugs took care of the misbehavior of the patients, so I was able to take over the old X Ward, which had about 2,000 square feet.

Lickliter: I'm interested in what I think would fall under question five in the general intellectual history of our protocol, and that is, given your early interests in prenatal development and your imprinting work in your dissertation, and then beyond when you moved into your research scientist position, do you feel that your ideas about development in general stayed on track or did they include some, as they say, "sharp turns" in either your research style or your theoretical views along the way? Do you see it as a kind of a straight linear progression or were there some turns and sharp shifts in trajectory along the way?

Gottlieb: I think the sharpest change was that originally I was studying imprinting and then when I discovered that we did some field work and recorded the mallard maternal call and wood duck maternal call and some other maternal calls in the field, and we discovered that wood ducks and mallard ducklings, even though they'd been incubated without mother, they could identify the maternal call of their species, that is, instinctive behavior. That's what really changed my complexion, because now it wasn't a question of imprinting, it was a question of, Ah, now I can study the prenatal roots of instinctive behavior, just what Kuo had always wanted to do, and which Schneirla, you know, his theory was about. And that was one -- that was the biggest twist. The other --

Lickliter: It provided you, in a sense, a vehicle for pursuing the conceptual problems that hadn't been empirically addressed?

Gottlieb: -- exactly, precisely. And my whole career, as you know well, has been addressed trying to overcome the dichotomy between nature/nurture. And this supplied -- this particular paradigm supplied a very good empirical way to go about that, and also allowed me to expand on the theoretical views and that's when I first developed in the early '60s, middle '60s, the idea of structure-function bidirectionality. It wasn't published until 1970, but I wrote that chapter for the Tobach book for Schneirla's Festschrift I wrote that chapter in 1965, but it wasn't published until 1970, and that was the first time I put forth the structure-function bidirectionality with predetermined epigenesis being unidirectional structure-function and probabilistic epigenesis being bidirectional structure-function.

And now I think what I've done is elaborated on that particular theoretical theme for my whole career. In that sense, it's been a linear expansion. Would you agree with that in your assessment?

Lickliter: Yes, I think that's a very good way of putting it, that the initial foundation was laid relatively early in your career, and then you stayed about the business of fleshing it out and extending it, and also promoting it to areas beyond simply animal behavior.

Gottlieb: Yes. That's what I felt. I felt like that's what happened, and it was important for me that in order to get my -- since I hadn't taken any biology really, to get my feet wet, you know, it was very important that Kuo agreed to come over for six months in 1963 from Hong Kong. I got an NSF grant to support his salary, and he held my hand while, you know, we opened up eggs, and looked at embryos, and made windows in eggshells and things like that. That was very important.

Lickliter: That -- may I ask a question there? And it has to do with the fact of you mentioned that your original ideas and the bidirectionality of the structure-function relationship were really crafted in the early to mid '60s, although they weren't published until the 1970 volume actually came out. You were working at Dix at the time, and while it wasn't an intellectual vacuum you certainly weren't in a university setting where there's a lot of intellectual stimulation and interdisciplinary opportunities. How did you craft and develop and extend your ideas on this topic? Do you think that it was primarily internally driven or were you relying on some important external sources, and in addition to that question -- and it's tied to it -- how did you manage to reach out to people like Kuo and Schneirla that you had read as an undergraduate, but really obviously didn't have direct contact with?

Gottlieb: Right, right. I just -- I wrote to Kuo. I found his address. He had left China when the Communists took over and moved to Hong Kong with his wife, and I found out his address, and so I invited him -- asked him whether he would come over and we would do -- make a film of the development of behavior in the duck embryo, we'd make a film of that, which then would become available in universities, and that would allow me to get the expertise in handling embryos, and looking at embryos, and keeping them in good shape, and he was agreeable to doing that. And then, you know, we would have very mild theoretical talks, very mild, because I knew his theoretical work, you know, backwards and forwards, and he was very sympathetic at the way I was approaching the problem of imprinting. At that time I was still working on imprinting -- '62, '63. It was in '63 that I finally said, "Oh no, this is not imprinting. I need to study, you know, the prenatal genesis of instinctive behavior," and he of course was very sympathetic to that. And what was important for me is that he decided to do his book, because he realized -- I had arranged for him to give talks at various places in that six-month period that he was there, and he realized that his ideas were still up front, you know, out in front. And so he wrote his book as a consequence of that experience, and I helped in the writing of that book, because I looked over every chapter, you know, several times. When he went back to Hong Kong he started writing that book. And that was very important for me to be able to work with him on that, and be a really --

Lickliter: -- of the ideas as it were with --

Gottlieb: Yes, that's right. And the other important contact was -- because once again, for encouragement Schneirla was writing his first A/W paper for that big first chapter he did for the *Advances in the Study of Behavior*. Do you remember that? And he was working on that when I met him and had him come down for a talk, and we hit it off very well, and particularly with Mrs. Schneirla, Leone Schneirla. And he -- I worked on that chapter for him, because he was -- he wanted to do the imprinting literature and reinterpret it in terms of A/W theory, and so that was very helpful to me. And these people were very enthusiastic about the tack I was taking, and Kuo in particular mentioned the structure-function bidirectionality in a nice way in his book, and I thought that was great, because some people thought that was his idea, and of course it was basic to his thinking, but you know, I just happened to verbalize it in that particular way. And he gave me credit for that in his book, in his '67 book.

Lickliter: So in a sense, even though you'd had a straight connection from graduate school to Dorothea Dix and ultimately to being a research scientist, so you bypassed the postdoctoral experience that many had taken, you in a sense afforded yourself a similar kind of opportunity by reaching out to Kuo and Schneirla and getting directly involved in projects that they were in the middle of that had to influence then how you went about your questions and your designs, and your empirical directions that followed from that?

Gottlieb: Exactly. It was a very encouraging experience, because they were taking me on not as a junior colleague, but really as a, you know, as a full-time partner in these -- I just -- and you know, and here I was, you know, I was just two or three years beyond my doctoral degree.

Lickliter: Right.

Gottlieb: It was a very -- and that was an important source of encouragement. And the other important source was I had met Ron Oppenheim through Viktor Hamburger, the behavioral embryologist, and Viktor was a nativist, and he was trying to say, as Preyer had said, that all of what was going on in the egg was sort of maturational. And that was a good stimulus for me, because he was a very good scientist, and he respected data and he respected clear thinking, and so he was good. And having Ron Oppenheim come and be another research scientist at Dorothea Dix, and having him with his different point of view be on tap there, as well as John Vandenberg, a traditionally trained, biologically trained animal behaviorist as the other research scientist. Our chief was a -- the head -- the administrative head of the unit was a person that worked with spiders, Peter Witt worked with spiders, and he was an MD trained -- European MD trained. And we had one psychiatrist who worked in -- at Dorothea Dix on the wards that I had -- Ian Wilson -- that I had worked with earlier, so having Vandenberg there, who had a traditional animal behavior background, and having Ron Oppenheim there, who had a different theoretical tack at that time -- he's moved quite a bit in his thinking since then, as you probably realize if you've read any of his recent reviews -- but that was very helpful. To answer your question about not being in an academic setting, you know, how did I keep myself going so to speak, it was very useful to have colleagues who were appreciative of my ideas, but who were very critical of them. They would come to my talks, both Vandenberg and Oppenheim, and then -- you know, and try to talk me out of things.

Lickliter: So it was actually quite a rich intellectual environment?

Gottlieb: Yes, I felt that way. I felt that way. And I was doing some teaching at NC State University in Raleigh. I was doing some teaching. I was teaching in the introductory course. I was teaching the part that dealt with animal behavior. I gave five lectures on that every year, every semester. And then, when Bob Cairns came in 1973 -- '72 or '73 -- to UNC at Chapel Hill, then I became more actively involved with Bob Cairns and Harriet Rheingold in teaching a graduate developmental course at Chapel Hill, and that was very helpful. And Bob was becoming more and more interested in the biological aspects of development at that time, and so that was very interesting, because he had his own point of view, but it was a very nice, you know, it was different from mine, but we shared the love of Schneirla's work and the admiration of Kuo's work.

Lickliter: And in addition to that, you remained active -- am I correct that you remained active in bringing in speakers so that you stayed, in a sense, connected to the larger scientific community in addition, of course, to attending conferences and meetings and those sorts of things?

Gottlieb: Exactly. We had a very nice budget for invited speakers from 1961-1982 -- the time that I left -- that 21 years we were very richly endowed, and it was very nice, and that's how we could bring -- everybody could bring speakers in from all over the place. And you know, that way we were completely interdisciplinary, naturally --

Lickliter: Yes.

Gottlieb: -- and so that was very, very, very helpful, and I think I learned a lot more biology, you know, during that period especially with Ron, and Ron's work on the chick nervous system and so on. I think that helped me a lot, because I was -- you know, I'm just a self-taught biologist, and that can be very dangerous.

Lickliter: I have a question that's related to that, and that is given the nature of the research institute and its kind of unusual characteristics in design at -- am I right in assuming that in the general sense you had limited access to graduate students during this 21 years, and as a result of that, had a slightly different experience than most scientists and faculty who were involved in mentoring graduate students?

Gottlieb: Exactly.

Lickliter: What do you think the significance, or consequences, of that was for you?

Gottlieb: I think on the one hand it helped me rather -- I was very stuffy about not wanting to take on graduate students, because after all, I already had my two full-time research assistants. And the students I took on were very, very good. You know? They were outstanding and they really wanted to work with me. Marieta Heaton was one, and Richard Scoville was another. Those are the two graduate students that I remember from that period, and they were both very helpful because they took up problems for their doctoral dissertations that I had left hanging, and so they provided really good -- I mean, Scoville's dissertation on the prenatal development of vocal behavior in the embryo was really classic, and I'm really sorry that it never got published. I have cited it and I have, you know, reproduced his figures and everything in my writings, but I'm -- it was really a great piece of work. He had devocalized -- no, he had deafened duck embryos and studied these deaf birds, studied vocal development in these deaf birds, and he had found this sort of -- he was able to get a hold of really good acoustical analyses in the Speech and Hearing Department at Chapel Hill, and he was able to show these very small deficits that they showed even in just their very primitive vocal behavior that was later shown by others, Kroodsma and others for songbirds, that there were these small deficits in the deaf birds when you really just didn't use a Sonogram, you know, or a Sonograph to analyze the vocalizations, but you really used much, much finer tuned techniques that you could find deficits in fact when they didn't have auditory feedback. Yes, so that was very helpful, extremely helpful. So I don't know -- does that answer that question do you think?

Lickliter: I think so. And it brings me -- kind of moving to our protocol to -- I think we've actually covered a good deal of the general intellectual history, and even some of personal research contributions. One of the questions that seems to pop out of that for me, and we've kind of skirted around it to this point, is your reflections on the strengths and the weaknesses of your research and theoretical contributions. That's obviously a very large question, but maybe we could at least start heading down that road and have you speak first perhaps -- and this is probably something we've already said a little bit about, but I think we could say a lot more about -- given where you came from, the background and what was in the literature at the time, and now we're talking about the early and mid '60s and then moving through into the '70s and beyond, how would you place your empirical and theoretical contributions, and in terms of strengths, what were their primary contributions to the literature?

Gottlieb: Well, I think what I've done -- what I've done is I've looked at *Synthesizing Nature/Nurture*, which is a book that I published in 1997 with the Erlbaum Press, and the subtitle is *Prenatal Roots of Instinctive Behavior*. And what I think I found on page 126 that -- and 125 -- that what I had done is really added to the -- what the -- Kuo was stressing as developmental analysis. His lifelong conviction was that an explanation of an animal's behavior could be derived entirely from (a) its anatomy and physiology, (b) its current environmental setting, and (c) its individual developmental history. His own research and critical writings can be comprehended only in light of his belief that any analysis of behavior is incomplete if it relies mainly or exclusively on only one of these factors. All three must be

taken into consideration in a comprehensive account of the development of animal and human behavior. Building on Kuo's wholly original insights I have added five items to the developmental analysis of instinctive behavior. On the theoretical side, (a) I have made explicit the bidirectionality of influences across the various levels of functioning, and now we're talking about genes, nervous system, behavior, and environment, the four levels, and I've also added the genetic level -- added the genetic activity to the levels of analysis. That's the second thing, because Kuo had left that out. On the empirical side I've shown that normal development of brain physiology and species-specific perception is dependent on normally occurring embryonic experience, which he wanted to do and wanted to show, but he was unable, you know, to do the experiments at that time that he was working. And I have demonstrated that the canalization of instinctive behavior can be influenced by the organism-environment experiential level in addition to the genetic level. And finally, I've elucidated the two alternative developmental pathways to malleability in ducklings. So I think that's sort of the theoretical and the specific contributions that I've made. And I think the failure, the weakness is we tried to get to the genetic level, but we failed. For some reason we couldn't -- we sent the material -- the brain material for the deprived and the enhanced experience duck embryos -- we sent the brain material to a genetics lab, but for some reason he wasn't able to find out anything about enhanced genetic activity. And he should have been able to, because it had already been discovered, you know, that if you had enhanced experience your brain got bigger and you had more genetic expression and so on. Based on the work of others, we have good reason to believe there would be a difference in gene expression in Field L of the avian brain, the homolog of the mammalian auditory cortex. And so that I think is a weakness. I managed to cover the three or the four levels, but I didn't get to the genetic level in my own research. I think we probably did not prepare the brains appropriately for the genetics lab's analysis.

Lickliter: And we'll maybe dovetail back to this in a moment, but it's probably worthwhile to add now that yet you've managed now, at the current stage of your career, to be working at that level.

Gottlieb: Yes, I did forget to mention that. For the last five years I have been preparing myself to work on human developmental behavioral genetics. And we have just submitted our first empirical paper on human developmental behavior genetics. We've just submitted it a month ago --

Lickliter: Congratulations.

Gottlieb: -- and I feel very good about that, and I've got excellent colleagues, Carolyn Halpern and Cathi Propper. Carolyn is a faculty member, and Cathi Propper is a student at Duke, a graduate student at Duke, who works in the UNC Center for Developmental Science, and I'm working with an internationally-known geneticist, whose name is Trudy Mackay. I'm working with her lab on the genetic side. She's at NC State University. So I'm really very pleased. And we've got two other projects underway. We're going to do genetic analyses and experiential analyses in the Ad Health longitudinal study, which is a study of 20,000 people, a longitudinal study of 20,000 people, which has been going on for quite some while that Carolyn has been involved with. And we have here at the Center -- we started a longitudinal study of infancy, and I'll be able to also do the genetic and experiential analyses there. What I've been stressing is, because of the non-replications of the pure genetic-phenotype associations, and then as you know the literature's replete with non-replications, so what I'm stressing in this approach is to use multiple genes and multiple life experiences, so that maybe we can start to get replicable results, and that's what this first paper is about. Even with a small N -- and that's been the problem -- even with a small N we were able to get statistically significant results when we used multiple genes and multiple life experiences. So I'm really tickled about that. And we're getting ready to replicate that work with the Ad Health sample.

Lickliter: I see. Very nice. I have a related question to that, which actually doesn't appear explicitly on our protocol, and it's this -- if I'm not mistaken next month you'll be turning 76.

Gottlieb: Correct.

Lickliter: Right?

Gottlieb: Yes.

Lickliter: So my question is this. What do you say to this question? What has kept you going well beyond the traditional retirement age? One could argue that you're as active, and as intellectually engaged, and as hard working as you've ever been over the course of your career. What gets you up in the morning and going and working so hard on the study of development so late in your career?

Gottlieb: Well, it's because I'm such a single-minded person. Outside of my family I have no other interests other than solving the nature/nurture -- resolving the nature/nurture debate. And I realize, as you do, too, from looking in the literature, that we've been only partly successful in getting that message across, and so that's what gets me up every day and that's what gets me so excited about actually being able to do the human developmental behavioral genetics, because I think now that we can actually put the ideas into practice. And that really -- and having good colleagues and such helpful colleagues just makes me feel very good, and of course, my wife, Nora, is so supportive, you know, and has been such a support through my whole career, and accepting the fact that I am very single-minded, and accepting the importance of my research and so on. So I just -- as you say, I do feel like I just -- I don't feel like I'm 76. I don't know what that would feel like exactly, but I feel like, you know, I'm just still in the prime of my career very much.

Lickliter: In your view, which of your published works best represents your thinking about child development? Which of your studies seem most significant, and -- in terms of how your empirical and conceptual work addresses child development?

Gottlieb: I might need your help there. I don't -- I really don't know. I don't know which ones are the best representatives in that --

Lickliter: Well, it seems to me -- maybe this will be helpful -- that certainly some of the most cited of your work in the child development literature would be the '91 canalization paper that appeared in *Developmental Psychology*, and probably more recently your several pieces in *Psychological Review* on gene activity and its relationship to development.

Gottlieb: Yes, yes. I think those are probably the best examples, I agree. And I'm pleased that the -- that developmental behavioral initiation of evolution -- the developmental and behavioral initiation of evolutionary change. That *Psych Review* article is getting picked up in the biological literature as well, and it's also being picked in the child development literature, which is very gratifying.

Lickliter: I'm going to follow up a little bit more on that angle of child development since we're doing this, of course, for the Society for Research in Child Development. You had mentioned to me earlier when we were discussing this interview that you weren't a member of SRCD, but you certainly had a lot of contact with the Society, meaning you've attended some of their scientific meetings and you've certainly received some awards from them as well. What do you see in terms of how your work and your career interface the concerns of what we might call mainstream child developmental?

Gottlieb: Well, I think what's gotten over is the idea of experience affecting gene expression. I do think that idea has gotten over, and the model -- the four-level model with the arrows going in both directions from environment, behavior, nervous system, and genetic activity that is -- that's gotten, I think, a good play in the child development literature. What I think has not gotten over, and I don't think it ever will get over as I realize the difficulties of doing truly developmental work with humans, is truly developmental analysis as opposed to developmental description or the idea of prediction from early stages to late stages, to really get at the guts of what's going on in these developmental processes as you're trying to do in your work, you know, with infants. That idea I think has not gotten

over, and has not been popular, and has not been understood. I think, as I say, partly because, or maybe entirely because, it's so difficult to do true experiments with human development.

Lickliter: Right. Right, indeed it is. What are the most important changes in your mind that's taken place in mainstream developmental psychology since you've been working on development? And so that would take us back roughly to the early '60s up to the present. What have been the major shifts in developmental psychology and child development to your mind during that time?

Gottlieb: Well, I think once again the role of experience has been appreciated, but yet you have books by Pinker and others, which talk about nativism and Spelke's writing on nativism, then that hasn't changed much. So I think there still is division, persisting division in the field between people who have a truly developmental outlook and those that still are going to adhere to the dichotomy of nature/nurture or innate and learned or however we want to express that. The idea that there's an innate component or genetic component to development, you know, we never dispute that, that the genes are absolutely essential to development. You can't have development without genes, but that's just, you know, the other folks having them operate outside or at a much higher level than they operate in the developing system, and that continues to give me -- to make me feel somehow less successful, because of the fact that Pinker and others are so successful and their books sell like hotcakes and their ideas are mentioned every week here and there, it just --

Lickliter: And the amount of media attention in terms of the popular press that that view receives as opposed to alternative views like our own is also very disconcerting.

Gottlieb: -- that's right. And you know, it's very difficult, as you know, because you've tried this yourself, to tell people in a truly accessible way, you know, what it is to have a truly developmental point of view. It's just very, very difficult, and of course -- and that's why I say I don't have a lot of hope, because I think that's not going to change, that part is not going to change, and it's much easier to understand the Pinker point of view than it is the developmental point of view.

Lickliter: I want to turn the corner just a little bit and get back to your own professional development and trajectory, and we had talked about your research scientist position at Dorothea Dix and the kind of intellectual environment it afforded and the resources that it gave you to work with, but in 1982 that facility was closed by the state of North Carolina and that required you to find another employment. And you went on to the University of North Carolina at Greensboro at that time and took -- correct me if I'm wrong -- your first faculty position of your career to that point. And how was that transition for you? What were the plusses and minuses of going from a research institute to a university and a departmental framework? And how has retiring from that -- that's the second part of the question -- changed you yet again?

Gottlieb: Yes, that was a very good learning experience having my first full-time faculty appointment, and also at the same time being head of a department. That -- you know, of course, I was really not well prepared for certain aspects of that. I think I was very well prepared in terms of faculty development and being able to help people with their grants and help them with their careers, planning and professional work and so on. But I -- knowing one's way around the university, I was very poor at that, and I never did really learn that very well. I somehow managed to stay on as head for four years and then I was able to step down in my fifth year and I liked the idea -- teaching I enjoy very much. And this now, you know, I had never had a so-called full-time teaching job before, and I really did enjoy that very much, both undergraduate and the graduate teaching.

Lickliter: And did you find that the opportunity for regular teaching, did it have some intellectual dividends for you? In other words, was your own personal work in any way affected by the regular teaching regime?

Gottlieb: Yes, yes, in a very important way. I would not have written *Individual Development and Evolution* unless I had been giving those lectures. They grew out of the lectures that I was giving to undergraduates and advanced undergraduates. That whole book was fashioned that way.

Lickliter: Interesting.

Gottlieb: Yes, and so that was very important, because I think that's my most important general book. *Synthesizing Nature/Nurture* is really much more of a personal, you know, autobiographical work that has to do with my own research career.

Lickliter: So that book on *Individual Development and Evolution* really sprang forth out of your opportunity for regular teaching?

Gottlieb: Exactly.

Lickliter: Very interesting.

Gottlieb: And I'm so glad that Erlbaum -- you know, it's still selling and Oxford lost interest in it, but Erlbaum republished it in 2002 and it's still selling a couple hundred copies a year.

Lickliter: Right. There is for many people -- and this is actually one of the questions in our protocol, and I certainly am aware that it's probably most of the people who hear this ultimately will be -- there is a tension between research and teaching, that there's only so many hours in the day one can devote to work and teaching -- at least teaching well -- requires a great deal of investment, as does doing research well. How did you handle having to balance those two after having such a long career at Dorothea Dix where you could focus on research full-time?

Gottlieb: Yes, I had to become very disciplined, and what I did was I took Mondays for myself, so I had Saturday, Sunday, Monday to myself at home in Raleigh, because my family did not want to move to Greensboro and I realized it was probably in the best interest of my teenage children for them to remain where they were. And so I got a condominium and lived in Greensboro Tuesday through Friday, came home Friday nights, and therefore I was able to be with my family and also work Saturday, Sunday, and Monday. And then Tuesday through Friday I could give my full attention to the lab that was being run by very competent graduate students and hired help at that time, as well as helpful postdocs such as yourself. Does that -- did that answer that?

Lickliter: Yes, it took some finding a schedule and strategy to make it work obviously.

Gottlieb: I had to be very disciplined about that, especially about, you know, not doing anything but write and analyze and read and so on on Monday. And I became -- somebody did an analysis, some dean did an analysis of my publications and said that I became more prolific in terms of number of publications after 1982.

Lickliter: That's interesting.

Gottlieb: I hadn't noticed it.

Lickliter: One of the questions that we really haven't touched base on, but certainly will be of interest I think to many who will hear this, is what is your experience in applied aspects of research? In other words, all of your career has been primarily, both in the empirical and in the theoretical sense, grounded in basic research, but obviously basic research has a number of avenues to application. Where do you see your work in the applied realm, and what do you think your role is, if any, in kind of bridging the gap between your basic research and its application?

Gottlieb: Okay. And that's another failure or weakness. I have not really pushed that very strongly. I have not really done much in that area. I think that the take-home message from the research and the theoretical writings is the idea that there are racial or genetic inferiorities or racial -- bad racial or genetic differences, that that is not a good category of explanation. And then, when we have obvious differences between ethnic or "racial" groups -- racial now being used in quotes -- that those require a more thorough developmental analysis and not merely ascribing things to the activity or the inactivity of genes.

Lickliter: And on a related note, in the sense of the relationship of science to the larger society in which it takes place, as you and I both know, to be able to do research over a period of years requires research funding. And you mentioned that you were well funded by Dorothea Dix and the state of North Carolina for a good number of years in your career, and in addition to that, you mentioned from the early '60s forward you were funded by the federal agencies, like the National Institutes of Health and the National Science Foundation. I'd like your thoughts and kind of reflections on the national research funding situation, how that's changed over the course of your 40 plus year career, how much you depended on it, what would have happened without it, and where you see it now, and where it might be going?

Gottlieb: Yes. I -- what I see as -- I feel like even though I had very good funding from Dorothea Dix, the research -- the state of North Carolina -- that I really -- in order to really do the sorts of research that I needed to do that I really still required that extra money, because most of our money was coming in the form of salaries naturally for myself and the two research assistants. So that was also true for Ron Oppenheim's lab and John Vandenberg's lab. And so we really needed to have that NIH and NSF funding in order really to have well-rounded fully functional research programs, particularly since we were full-time and we had a lot of time, and energy, and good health. They also had -- they didn't have two full-time research assistants; each of them had one full-time research assistant, and I just had mine because I had been there before they ever came and happened to have two research assistants when they came on board.

The recent move I think to stress the interdisciplinary aspect, to get social behavior and biological mechanisms together in one research program, which a lot of the institutes are now emphasizing, and NSF has emphasized, and I think that's a very salutary point of view and I hope that that goes on for the future in true interdisciplinary style where the, you know, the same subjects are studied by different people so that they're not multidisciplinary in the sense that everybody's studying their own sample, but that the same sample is being studied, as we're doing now in our study in Durham with the Center's grant studying infants longitudinally, that we have anthropologists, sociologists, psychologists, and biologists all studying the same group of people. And I think that's extremely important to really engage the interdisciplinary or the multidisciplinary point of view.

Lickliter: And if I might use that as a springboard, we've talked about your time at Dorothea Dix, and we talked a little bit now just more recently about your time at UNC Greensboro, but for the last number of years you've been affiliated with the Center for Developmental Science at UNC Chapel Hill. Could you speak a little bit about your involvement with the Center and how the structure and mission of the Center has influenced the work that you're doing?

Gottlieb: Yes. I started with the Center in 1988. It wasn't called a Center for Developmental Science at that time. It was called the Carolina Consortium on Human Development and it was headed by Bob Cairns, who died in an automobile accident in 1999. Cairns was very influential in the -- in instigating the Carolina Consortium on Human Development and then also being very welcoming to me, and such that, when we started the Center and we got grant funding, five year grant funding for the Center for Developmental Science, I was able to leave the UNCG in 1995 and become a research professor here at Chapel Hill in 1995. And the Center actually actualizes -- the Center actualizes the four levels in my model of behavior, nervous system, environment, and gene activity, and the bidirectional arrows. The work at the Center actually exemplifies that and so that has really been for me, you know, just very fulfilling indeed. And it's accepted over here that, in fact, though there's always a lot of surplus

meaning about just what is developmental science, that certainly at the heart of development science is that four-level model and the bidirectional arrows among and within each level.

Lickliter: Yes, and the Center is really a unique opportunity it seems, as you put it, to actualize many of the ideas that have been really on the table since, well, as you mentioned it, since 1970 when the first chapter appeared, and for many other publications along the way it's, I imagine for you, very gratifying to "make it real."

Gottlieb: Yes, exactly, and to, you know, have such widespread acceptance, and that not only -- you know, not only among faculty, but also the postdocs really are lapping it up as it were. They really are, and you know, maybe they won't necessarily all of them put it in practice, but some of them are actually trying to put it in practice, and that's really --

Lickliter: There's a strong feeling I would think at the Center of -- present company for you included -- that you're influencing the next generation of scientists --

Gottlieb: Yes.

Lickliter: -- in a very constructive way.

Gottlieb: Yes, and they want to be influenced, and that -- you know, they seek that influence, and it's really -- that's what makes it so gratifying, and they see how good that point of view is, and that's just really wonderful.

Lickliter: And I'm going to use that then to springboard to a related topic. And it's probably one of those big picture questions, which is what are your hopes and your fears for the future of the field, and I'll say developmental science being that field?

Gottlieb: Okay.

Lickliter: Where are we going in the next 10, or 15, or 20 years, and what are some of the potential roadblocks or problems along the way?

Gottlieb: I think the stumbling blocks to realizing the full interdisciplinary aspect of developmental analysis. The stumbling blocks are going to be that people still have their own turf, and people still have their own language domains or, you know, conceptual domains as I mentioned with Terrie Moffit. That's just one example. She's not the only example of that. And I think that's a difficulty to be overcome. I think the chances of overcoming that with having our predoc and postdoctoral training in developmental science, which is devoted to going across all the levels of analysis, and having respect for all the levels of analysis and not prioritizing one level over another. I think as those people become active themselves and in their own research programs, and in their writings, I think that's going to help us very much in overcoming this sort of tendency for people to be insular.

Lickliter: Along that line, and particularly focusing on the interdisciplinary nature, a lot of your work through the years, and perhaps in the last decade or so in particular, has been very interdisciplinary in nature, and in particular your work on the developmental behavioral initiation of evolutionary change is a wonderful example of how you're bridging the gap, so to speak, between traditional developmental interests and traditional evolutionary biology interests. And we haven't had much opportunity yet to talk about that, so I think it might be worthwhile to say some words on from your perspective, given that psychology has often been considered by biologists as a second class citizen, do you feel that biology is more open now than it has been traditionally to work like your own that comes from a primarily psychological base?

Gottlieb: Yes, I think so. I don't keep careful track, but when I read in biology, you know, and I happen to see my own work cited, then I realize that we may be entering a new era in which not only

psychologists realize the importance of biology to their discipline but biologists, at least some of them, believe that psychology and the study of behavior are integral to their discipline, especially in the area of evolution if not yet in developmental biology.

Lickliter: I have a question that I think we should certainly address that we haven't really gotten to, although we talked briefly about it, and this has to do with the question that ends the protocol which is to have you speak a little bit about your family and the ways in which your family has had a bearing, and supported, and involved themselves, and contributed to your scientific interests.

Gottlieb: Yes. Well, my wife, Nora, came with me out in the field in the early '60s when we were recording, making those recordings of mallard and wood ducks on the nest, and I have what's called in Yiddish -- a Yiddish term -- I have a shortage of Sitzfleisch. Sitzfleisch means that I -- the absence of Sitzfleisch means that I really get impatient and I can't really sit in one place for very long periods. And when you're doing naturalistic work you have to be quiet and you have to sit in one place for long, long periods, and you have the headphones on, and it becomes boring, and even though you know this is what you need to do, I really wanted to do other things. I wanted to go water ski. We were out on the coast and my wife would not let me do that, and because of that we managed to record the mallard maternal call, the prototypic one as it turned out that I used in all of my research. So I'm so, you know, grateful to her for keeping me and my short Sitzfleisch in check. And also, my wife has been very interested in alternative medicine and that has influenced me very much, and most recently we were able to put that into practice in a very good way. My oldest son, Jonathan, who doesn't mind my mentioning this, had a severe -- developed a severe late onset obsessive-compulsive disorder in 1998. It was so severe that he had to leave his job and take a medical leave, and we did the traditional stuff for a month or two. We did the traditional psychiatric stuff and that just wasn't paying off. The medicine wasn't working, and in fact, he had a very bad reaction to the medicine and had to go into the hospital because of it. And my wife, Nora, had been reading in homeopathy and she decided she just couldn't put up with this way of doing things, and she called a homeopath who was in Durham named Manfred Mueller and asked him if he had any experience with obsessive compulsive disorder, and he said yes, he had, but that it would take four years to treat that. And so, well, it was so serious he was -- Jonathan was living at home and his disorder was so serious that it was influencing our lives in a negative way, and so we decided because of Nora's insistence, and she pulled me along on that, and it's just wonderful. Jonathan is now not only fully recovered, he's functioning better than he did in -- before 1998. It's been just marvelous, and it's mostly been getting the mercury out of his system that -- the mercury fillings affect some people more severely than others, and mercury was at the basis -- the mercury fillings were at the basis of his obsessive-compulsive disorder so that when he got rid of his mercury fillings his disorder gradually -- each time he removed a quadrant of the fillings over a long period of time, over a year, that each time he would improve. And he was, of course, also taking homeopathic remedies as well as watching his diet the way the homeopath wanted him to. That has been very, very influential, and now we're -- Nora's -- my wife's name is Nora Lee Willis Gottlieb -- Nora's a member of Moms Against Mercury, MAM.

Lickliter: And as I recall your sons were also helpful through the years at the field station in keeping you in eggs and protecting them from black snakes.

Gottlieb: Exactly. You reminded me of that, and I failed to mention it. It has a prominent place in *Synthesizing* -- the book, *Synthesizing Nature/Nurture*, but I did not mention it at all in this context. Each of the children helped to collect the wood duck eggs. The wood ducks nest in boxes, which are on poles in the water, and they're hole nesters, and so it's not like with mallards, which nest on the ground. You have to go out in a boat and you have to take the top or the side off the box to get at the eggs. And sometimes when you do that you're met with a five-foot black snake, which is a very discomfiting experience, even though they're not going to hurt you. They can bite you, but they're not going to kill you, they're not going to poison you. And Marc Gottlieb in particular developed a high dislike for black snakes, and we had boxes on land as well as on the water. And one day he got so mad that he went and got his shotgun, and the snake was in the box, and he blew up the box with his shotgun. And I had to point out to him if he was going to continue to help me with my research, and if

he was going to continue to blow up the boxes that he was going to put me out of work. And Aaron also helped, and also David and Jonathan also helped with the -- we had a -- as you know, we have a field station at our house. We live on nine acres outside of Raleigh, and we had -- we were collecting wood duck eggs at our field station out there, as well as at the Animal Behavior Field Station I established at Dorothea Dix Hospital.

Lickliter: I think that that actually is an interesting note to full circle back to your earlier comment when I was asking about how you've managed to remain so engaged and productive over such a long career, and you mentioned that you were quite single-minded. And I think that that's another illustration of that aspect, which is -- that many people may not know -- that you had at your home your own laboratory, as well as a laboratory at work. So you had in a sense completely wedded your professional and personal life into a whole.

Gottlieb: Exactly, and that's certainly -- you know, once again, without my wife, Nora's, help and her assent this couldn't have happened, and we've just -- it's just been -- you know, the fact that it hasn't been a chore for anybody, you know, to have it be that way, and that we all loved the ducks, and we loved to watch the wood ducks come in and nest, and we liked to, you know, go down to the pond and watch them do their mating exercises and so on, that we all enjoyed that very much. And the kids enjoyed being reared, you know, out in the country, and so we had horses as they were growing up. We had a fenced pasture and we had horses, and my wife was able to have her organic vegetable garden, a very good-sized organic vegetable garden.

Lickliter: I have another question that's, again, related to kind of the shifts in context as one does one's work. And that is when you retired from UNC Greensboro in 1995 and moved full-time to the Center at Chapel Hill you gave up your research laboratory.

Gottlieb: Yes, I did.

Lickliter: And my question is, when you gave up your research lab in '95 you moved from UNCG to the Center at Chapel Hill in 1995, and at that time when you retired from Greensboro you gave up your research lab. My question is, how did giving up your laboratory change the nature, or the level, or the type of work that you'd been doing in the ensuing decade?

Gottlieb: Well, it allowed me -- I missed the lab very much of course, and I particularly miss the lab meetings, because Fridays were a wonderful time where, you know, we sat around over lunch and we discussed what our findings were, and all the different aspects of the lab that week, and where, you know, what that meant and what we needed to do to make them better, and it was just intellectually just a wonderful thing to do. And giving up the lab allowed me much more time to try to get into the human literature and understand what was going on in the human literature, and also to try to familiarize myself once again as a self-taught biologist what was going on with developmental genetics in particular. And it allowed me to really -- and that's really, you know, biting off quite a bit, especially for a self-taught biologist, and so I was pleased with that aspect. And also, it allowed me to get more involved with other people's research, and Jean Louis Gariépy had taken over Bob Cairns' mouse work where they were studying high and low aggressive lines of mice, and that Bob had selectively bred for in the early years. And for several years between 1995 and the present time I have been consulting with that lab, and I've been active with working with grad students and serving on their committees, as well as helping out with postdocs such as Kathy Hood, who's now at Penn State University.

Lickliter: So it allowed you to not only get broader in your interests, but also to develop more to the conceptual and theoretical aspects as well?

Gottlieb: Yes, precisely. Yes, and I think I've written more general articles, you know, since 1995 than I had previously, though, you know, there hadn't been a shortage previously, but I've written more. The density has increased, let's put it that way.

Lickliter: And ten years out, so to speak, do you still miss having a lab?

Gottlieb: Not as much now as I did in the first few years, particularly now, since I have another lab. The Human Developmental Behavior Genetics Lab meets once a week. We meet on Monday or Wednesday for two hours, and that's really been very nice, and that's taken up the slack that I missed from the lab meetings that we used to have at Greensboro.

Lickliter: And that's going to lead me to what may be my last question. You never know how these things lead to something else. But what are you going to be doing in the future? You've mentioned the human genetics work. Where do you see yourself going over the next five years, let's say, in terms of your empirical and your theoretical work?

Gottlieb: I think we're just going to make that deeper and, you know, deeper and broader, the human developmental behavior genetics is a topic that I'm going to be working on empirically. We have three populations that we're working on right now, and I -- you know, and I'm hoping that maybe my understanding will even, you know, broaden at the theoretical level. So that's definitely going to be my full-time preoccupation for the next five years.

Lickliter: Anything else you want to touch on or add that I haven't punctuated well?

Gottlieb: I think you've done such a splendid job. I'm really so pleased and gratified that you were able to take this time and had the interest to do this interview. You've helped out a lot.

Lickliter: Oh, it was my pleasure.

Gottlieb: Well, great, Bob, great. Okay. We'll stay in touch, eh?