

Hanus and Mechthild Papousek

- Hanus
 - Born September 9, 1922; died May 5, 2000
 - Doctor of Medicine (1949) Masaryk University, Doctor of Sciences in Developmental Psychology (1969) Charles University
- Mechthild
 - Born January 10, 1940
 - Doctor of Medicine in Psychiatry and Neurology (1966) University of Tübingen

Major Employment

- Hanus
 - Apl. Professor of Developmental Psychobiology, Institute for Social Pediatrics and Youth Medicine, University of Munich: 1975-1988
 - Research Scientist, Head of Developmental Psychobiology Unit I and II, Max Planck Institute for Psychiatry: 1972-1988
 - Senior Research Scientist, Secretary of State Research Project, Research Institute for Mother and Child Care in Prague: 1964-1970
 - Head of Department of Developmental Infant Physiology, Research Institute for Mother and Child Care in Prague: 1958-1970
- Mechthild
 - Head, Munich Interdisciplinary Research and Intervention Program for Fussy Babies, Institute for Social Pediatrics and Youth Medicine, University of Munich: 1989-2005
 - Research Assistant, Working Group for Developmental Psychobiology, Max Planck Institute of Psychiatry: 1976-1982

Major Areas of Study

- Preverbal communication, infant vocal and musical development, intuitive parenting, developmental psychobiology, learning

SRCD Affiliation

- Distinguished Scientific Contributions to Child Development awardee (Hanus, 1995)

SRCD ORAL HISTORY INTERVIEW

Hanus and Mechthild Papousek

Interviewed by Darwin Muir
1996

Muir: Tell us where you were born and something about your background and your parents.

H. Papousek: I was born in the middle part of the former Czechoslovakia Republic which is Moravia and spent part of my life there. That means I studied in the capital of Moravia at the Masaryk University in Brno. Then I moved to Prague when they opened the research institutes in health services and I won competition and then spent twenty years in Prague doing research in infancy.

Muir: And what about your parents?

H. Papousek: Well, my family was sort of polluted with teachers and musicians so most of my relatives from the father's side were teachers or musicians. My grandfather, for instance, was a friend and colleague of Janacek and I think that might have sharpened my attention to deductive capacities in people and to the role of musical elements in my later studies.

Muir: Did you have brothers and sisters or were you an only child?

H. Papousek: One sister.

Muir: You had one sister. Did she also go into a profession?

H. Papousek: She worked as a social worker in social services, where you have to know that we had difficulties because when we came to the age of our higher studies; in my case it was 1941 when I finished secondary school. By that time we were occupied by the Nazis. They closed all high schools so my sister couldn't study, I couldn't study medicine and as a young man I was forced to work in war industry. The Nazis required total engagement of the young Czech generation in the war industry. So I had to wait four years before I could start university studies.

Muir: And where did you go to school?

H. Papousek: As I said, secondary schools in Moravia, the capital of Moravia which was Brno and also the medical studies then after the end of the Second World War

Muir: So you became a physician first?

H. Papousek: A physician and I specialized in pediatrics. As a pediatrician I then became interested in research and actually in the research concerning babies.

Muir: Why, what inspired you?

H. Papousek: That's very difficult to say, I think that might have something to do with a kind of predispositions in the family. As I said most of them somehow tended to do something with children and educational services. My father was director of a Masaryk experimental school in Brno so there may be a genetic kind of handicap or divine intervention whatever you take. Well, and then there was this experience of four years prior to university studies which was very interesting; it gave me an opportunity to study languages, which I then later appreciated very much, but it was also a time of very unusual experiences with the war events. We were waiting until either the Russian Army or the American Army liberated us, but when these armies approached my city it also meant air raids and I was caught by a four hour air raid in the middle of a factory with no shelter, just lying in the middle of everything. As a matter of fact I thought that I was dying, I was hit by different things from the explosions and all those things. It was a very interesting experience and I have to say since that day I have appreciated every single day as an unexpected acquisition. I really thought that was the end of my life during that air raid so I sort of changed in a sense that I made very serious decisions about my future life. I didn't want to spend any time on unimportant things or irrelevant things. My conviction that something should be done against the danger of another war lead me to the conclusion that we have to start very early in bringing up a new generation which would be—well, wherever it is possible to change something—better prepared for eventual conflicts than our generation.

Muir: That's a very good insight; perhaps that drove your research into infant studies, and certainly you've made major accomplishments in that area. What really excited you when you began to do infant research? What was the piece of research that you were very proud of as your first accomplishment?

H. Papousek: Well, probably I would have to say that I was sort of primed by other pieces of experience and that is that my uncle and a friend of my father were biologists and I was very much influenced by their help. They found that I was interested in those things and my uncle allowed me to use his biological laboratory so at the age of 14 or 15 I already, you know as a hobby, was doing sort of advanced things in biology. I was collecting algae and using a microscope; I had a microscope when I was, I think, 12. I got my first microscope and there was professional help, a kind of lead. The friend of my father's, for instance, spent with us weeks in nature. We couldn't go abroad but we like nature

so we were doing a lot of tours or spent weekends in the nature and I learned all kinds of interesting things. So before I actually started studying medicine I was aware of the issues like evolution, different comparative approaches to motives in human behavior and animal behavior. I knew a lot about these things. I was particularly interested in psychology during my secondary school studies, that was just due to the fact that my teacher of philosophy—which was compulsory at that time, you know—in secondary schools was a psychologist.

Muir: Who was that?

H. Papousek: That was—his name was Hrabal, and I had the advantage of having a father as a director of a school so when the psychologist wanted to show us something from observations, psychology, or tests he asked me to bring a couple of kids—

Muir: Oh, you recruited subjects!

H. Papousek: I recruited subjects for testing; that was unusual to do at that time. There were not many people doing this. I didn't know any other, you know, school—gymnasium as we use to have it—where they would do experiments for secondary school students, but we combined these advantages and we headed in psychology and it was this combination of developmental psychology and biology and then medicine. It was my decision to do something for the very young generation that led me to the interest in the early periods of development.

Muir: Okay, now what about research? Tell me the first piece of research that you really were proud of that you felt made an impact.

H. Papousek: That was remote to my later interests because it was a part of the clinical training and basically, in medicine in particular, you start with the exotic unusual cases which, you know, you have in your clinical population, so my first actual publication concerned Toxoplasmosis. This work was related to biology and I think that for sure I was able to tell the medical people a little bit more about Toxoplasma as a biological organism.

My next interest concerned hematology and blood precipitation and actually the vascular changes in neonatal shock, for instance. This study made the people aware of myself who were going to open the research institutes, so I got very early information that the ministry of health decided in Prague to open research institutes in health services and I applied and actually then moved to Prague, finished my specialization in pediatrics at that research institute, which was called the Research Institute for Mother and Child Care. It became a very prominent research institute both in obstetrics and pediatrics.

Muir: What year was that? When did this all happen?

H. Papousek: I came to Prague at the end of 1951 and left Prague then after the Russian invasion, almost twenty years later. So the confrontation with the scientific circuits which were related to Charis University and to other research institutes, and then in particular to the Academy of Sciences, and again we had a very close cooperation with biologists, the biology section at the Academy of Sciences. So I was sort of circling around topics which concerned very early development and actually the biological factors and the cultural factors. So the interaction of those factors and the sequence and the in-direction of biological and cultural factors, which are basically educational factors as well, that was something where I was sort of particularly attentive and maybe even prepared to see things and understand things and conceptualize things which were not quite common in medically educated people or in the psychologically trained researchers.

Muir: Sounds like you followed a bit along the same lines as Piaget. You had a multi-disciplinary background of biology and of science and education which participated in helping you to formulate your initial theory of child development.

H. Papousek: And actually, later on, in 1967 and '68, I gravitated to people who were similarly oriented and had a strong feeling that something should be done to improve all the other disciplines, and there was that interdisciplinary society which was founded at that time, and I actually was one of the founding members of the Developmental Psychobiology. As a matter of fact, I was then one of the first to lecture at the Developmental Psychobiology at Harvard. It quickly became sort of fashionable, but there were no people who were teaching programs for it. Now every better university wanted to have a developmental psychobiology program and so I got an invitation, and when I was then finishing at Harvard there immediately came an invitation from Munich because the Munich University wanted to have developmental psychobiology as well. There is something coincidence in my carrier, but it concerns more disciplines, it is sort of interdisciplinary and so no wonder then later, when I did primatology, for instance.

Muir: Now the major study that made an impact in North America, to my knowledge, the one that you got a lot of renown for, was the study on conditioning head turning in the neonate. That was a very critical question in the 1950s and the early 1960s; can a very young infant learn? Correct me if I am wrong, but I think you probably provided the best and first evidence that, indeed, given the right kind of procedure, very young infants learn.

H. Papousek: Yes.

Muir: Can you tell us a little bit about this?

H. Papousek: Well, that was again a little bit complex. I don't know whether you have seen Stevenson's book on learning, you would notice one interesting thing. He was speaking about Operant Conditioning and Classical Conditioning and then he had a special chapter which was called the "Papousek Studies" because he did not know how to categorize me. As a matter of fact, my purpose was not primarily to study the development of learning abilities, what I was after from the very beginning was the development of goal directed movements, acts, you know, intentional behaviors. I had a kind of intuitive feeling that if you know the earliest development of that we might come to a better—I don't want to say solution because some of the problems have not yet been solved at all, like self-consciousness, the human type of self-awareness. But the idea was that we should understand the origins of these things. That was back in 1961 and I found it very exciting when later Jerome Bruner decided to leave adult cognitive psychology and move to the beginning of development because he had the same feeling that we should study the origins of intentional behavior. He was also very much interested in the organization of the goal directed movements and acts and in relation also to communication acts. So that was like a confirmation of my direction, but basically my studies were conditioning studies because it was the only method in which you could approach those things. But I thought it would be advantageous not to go either the Skinnerian way or the Pavlovian way but to go a way which would allow me to study the specific aspects of human behavior. So I combined the elements in order to get an approach to learning, but that method in just slight modifications allowed me very early to study cognitive processes and this was what was perplexing people. People thought that I was a conditioning guy, that means using either Skinnerian or Pavlovian procedures, but my procedure didn't fit those categories.

Muir: That's right, your procedure was a blend and of course it was very effective.

H. Papousek: I found it very effective and, as a matter of fact, I was not the only one who was using it. In animal psychology Konorski, you know, the Polish psychologist, was actually using this kind of instrumental conditioning, but in my case I combined instrumental conditioning with condition signals because I was persuaded by my observations that the infant not only has to learn how to reach for something but also has to know that the context is constantly changing so that you have to find out where the constant allows you to reach something or not. So it's a little bit more of a complex approach but it includes the idea of concept formation and that was actually the matter of my major interests behind the conditioning.

Muir: You were famous for developing the conditioning technique but people didn't appreciate what you were doing.

H. Papousek: One of the earliest publications explained concept formation and concept transformation so when I actually met Bruner for the first time at a conference he became interested in my studies because I could show that preverbal infants at the age of four months can modify goal directed behaviors in such a way that they use what people would have called numerical concepts. My babies learned how to turn on an interesting visual stimulus but I was giving them rules for switching on the stimulus and they were picking up the rules.

Muir: For example, what's a rule?

H. Papousek: Like you have to turn not only once to a given side, 30 degrees to the left side to switch on the reward, you know, which came from the middle line, you have to turn twice or you have to turn once to left and the next once to the right or twice to the left and twice to the right or three times or four times.

Muir: Once you knew they could count to four that was it!

H. Papousek: Well, the Russians came and I then left the country because I was a chief of a section of the Research Institute and all people in similar positions had to sign the agreement, their readiness to cooperate with the new regime after, you know, the Prague Spring and after Dubcek and after the proceeding things which led to the August events in 1968. I refused to sign this agreement of course and I had the advantage that I already had in my hands the invitation for Harvard so I knew that if I now left the country I knew where to go and what to do there. But that opportunity was facilitated by Bruner who helped to get me out of the country and gave me the new opportunity to work at the Center for Creative Studies and then also in child psychology with Peter Wolf at Harvard. Simply it opened very new opportunities.

Muir: So you benefited from exposure to them and they benefited from exposure to you I would imagine. So Peter Wolf and Jerome Bruner were the two people that you worked with primarily.

H. Papousek: And Jerry Kagan.

Muir: And Jerry Kagan.

H. Papousek: So these were sort of the best friends and the people who helped very much but also who were interested in the type of studies which I did in France.

Muir: How long were you at Harvard?

H. Papousek: Two years. I was acting there as a visiting professor and scientist already in 1968 and then between 1970 and 1972 and that was the end of the Cognitive Center. Then Bruner moved to Oxford and I married Mechthild and she was German and—you know, incidental events which influence your life—her father died and she wanted to return to Germany, although primarily she was ready to stay with me in the United States and eventually to become American citizens, but after the death of her father she wanted to return and help her mother and to work in Germany.

Muir: So you went to the Max Planck Institute from Harvard.

H. Papousek: And I got a very interesting offer from the Max Planck Institute for Research in Psychiatry by Detlef Groth who again was an interdisciplinary guy. He was a psychiatrist and neurologist but studied communicative processes in animals and he was a very good ethologist and biologist, so a similar combination, and he thought that it would be very interesting to have someone who would do

parallel research with human infants. He had a very nice primate center in Munich with squirrel monkeys and high level research in communication and development of communications with squirrel monkeys with outstanding people like Juergens, Winter, and Peter Marler who cooperated with him closely. There was the place where they discovered proto-words or simple words in monkey communication, for instance.

Muir: You were doing the same kind of thing with preverbal communication in infants?

H. Papousek: I then concentrated increasingly on the development of communication.

Muir: What happened when you got to Munich?

H. Papousek: When I got to Munich then something unusual happened. Detlef Groth couldn't give me what he promised to give me because there were some new restrictions at the Max Planck Society and before he found a composition and before I was able to collect additional money from different other funds from the third sides for something like two years I couldn't do any good laboratory research. So I did what I wanted to do but did not have time to do during the preceding years. I started looking at the everyday family life of the babies, so from the birth up to the beginning of speech, and I wanted to first of all find out where the little ones have an opportunity to improve their learning and cognitive abilities. I could show how competent they are in my studies but I could also show that this competence improves, not only with age but also with repeated occasions, opportunities for learning or problem solving. I knew that parents have no idea about these things so I was interested in where infants find opportunities for training their cognitive abilities. Of course the conclusion was easy and fast, it's not the inanimate environment, it's the social environment that provides a lot of opportunities, and actually I soon found that there are not only predispositions in babies, but due to co-evolution there are predispositions in parents and actually in all caregivers, almost independent of culture and age, which provide the babies with learning opportunities and for cognitive improvement. So that was the idea of the later intuitive deductions as a part of parental competencies, but that resulted from two years of filming families where I simply checked what the babies actually experience, what the inanimate versus the social environment gives them. There are some learning situations with objects, but they are simple and rare and there is not much sense in them. You know, the kids can hear cars running around; they can orient to it and habituate to repeated exposures. So you have habituation and opportunities for habituation. They can pick up some sequences in different events in the physical world, but it's not very much of it, but in social interactions there are episodes which you could call learning episodes where several of them—almost every minute. The difficulty is the reason also why we didn't know of it, because parents do all those things intuitively, unconsciously; they are not aware of it.

Muir: So if you ask them they'd say, Well, I've haven't been doing anything here. I was just playing with the baby. But when you look at the analysis of what's happening you find that an incredible kind of complex interaction is going on.

H. Papousek: Yes, but my advantage was that I was filming those things so that I could do an analysis of those situations.

Muir: So there's the ethological background and push in your career as well. So you spent two years essentially without a lab doing—

H. Papousek: Doing this kind of research.

Muir: And that experience led you back to conduct these amazing laboratory studies that you did. One of the studies that's really interesting to me, because I've just rediscovered it, is the work you did on giving the child feedback through a video interplay; similar to my own recent research. I wasn't aware of that particular piece of your research. Perhaps it is not unusual for modern researchers to find out, after they've thought they originated some research, that someone else

has done it earlier and perhaps even better. You were the first person that I'm aware of to actually use a televised video feedback system and show that infants are responding to the contingency between their movements presented to them on TV. Clearly you didn't do the studies that Murray and Trevarthen are famous for, for example, and you didn't do the work that Rochotte and other people are now doing but you were the first person to actually look at their interest in looking at themselves as oppose to another infant.

H. Papousek: We have never properly published it but it was one of the three testing procedures for the studies which I did with Jerome Bruner. They concern something else but the idea was: do babies perceive a television image as an image, can they interpret it somehow? Can they apprehend what's going on, you know, in there and on the screen? So we had to do it as kind of a pilot but we were after more important other things that I didn't want to spend any time with publishing those things. We went on to the study of self-recognition in mirror situations and, you know, you couldn't do that study without knowing that three-month-old babies perceive television image as something real, as an image of reality.

Muir: Yes, yes and when was that? That was in the 1980s, early '80s or '70s?

H. Papousek: No, no that was 1970 to 1972.

Muir: Yes, I thought so, so we are back into the '70s and the next phase of the TV interaction procedures didn't start until the mid-1980s, so you actually did an inspirational study on that which wasn't picked up for another decade.

H. Papousek: It was published in 1973 in the first volume of *Developmental Psychobiology*.

Muir: Right, okay so that really places you in the context of the opening of that field. You said you were an editor of the *Developmental Psychobiology*, on the founding editorial board?

H. Papousek: I was in the editorial board.

Muir: The founding editorial board.

H. Papousek: Yes. For the first volumes and then they introduced a rotating system so I finished off a couple of years, and then recently Smotherman asked me to help again, so I've been there for two or three years as a member of the advisory board or editorial board.

Muir: Now what other journals have you influenced; for example, *Child Development*, have you worked on the editorial board?

H. Papousek: No, for some reason there were no opportunities or no personal contacts, but it was *Infant Behavior and Development*.

Muir: Okay, were you on the first editorial board for *Infant Behavior and Development*?

H. Papousek: Yes, and I think, again, there was a question of rotating system on the board for several years. Then the journal of *Infant Mental Health*, then we founded a new journal with Brian Hopkins, and this is the journal of *Early Development and Parenting*, and then I went on the editorial board of *Early Human Behavior*, which is a kind of more European type journal that was run by Heinz Prechtl. I cooperated with Prechtl as well—we had rather close contacts within his Dutch laboratory.

(Tape is paused)

Muir: We are going to begin by asking you please to tell us how you pronounce your name.

M. Papousek: You can just say *Mechthild Papousek*.

Muir: The second thing I'd like you to tell me of course is where you were born and what your early parental experiences are since we are talking about developmental psychology and we know how important parenting is. I think it would be important to know what your background is.

M. Papousek: Well I was born in East Germany and soon moved with our family, when I was a child, to West Germany. My father was a psychiatrist and I simply grew up with psychiatry, living in a community with psychiatric and epileptic and all kinds of mental patients. I kind of had a nice example, my father, and I think I was very much influenced by the way he worked with the patients. So from my earliest years I always wanted to become a psychiatrist and so this was my career. I studied medicine at medical schools in Tübingen, in Berlin, and in Zurich, Switzerland. After that I had my specialization in psychiatry and neurology. There were several interesting parts. The first part was at Max Planck Institute for Psychiatry where I met my husband when he gave courses there in child psychiatry. The second part of my training was very fascinating for two reasons. My husband and I moved to the states and it was the first time we really could spend together. At Harvard Medical School I had a fellowship which allowed me to do research or to study, whatever I wanted to do, and my interest really was in depression at that time, depression of adult patients, and I was interested in a very interesting clinical phenomenon which my father had observed in some of his patients, namely the therapeutic effect of total sleep deprivation just for whole night. It's a very interesting and very impressive phenomenon and I was interested in the physiology of it and so I got involved in sleep research, chronobiology and chronopathology in relation to manic depressive disorders. This was what I did at that time and then I had further training in Munich in psychiatry and finished my specialization then some years later.

Muir: And then what pushed you into infancy research and interest in mother/infant interaction?

M. Papousek: Well there were several factors which cooperated and they were very influential, they had to be because I was so much engaged in psychiatry work before. Well, the first influence came from meeting my husband and I got to know his fascinating work on learning in infants and I really loved it. Then the second major influence was the birth of our first daughter and the time we spent together when she was a baby, and then a second baby came. So this was a time where we did a lot of observations together at home, but of course enjoyed being with our babies, and I learned a lot at that time.

Muir: I'd like to mention when we teach psychology in North America we tend to emphasize the contrast between the mechanistic view or behaviorism and the organismic view which is typified by biology and by Piaget, and then we sometimes talk about dynamic systems theory sort of at the end. What I'd like from each of you is some idea of your—if they are the same or if they are slightly different—your theoretical background. Where would you classify yourself at this point in your career and where did you come from? Did you think of yourselves as being involved in an organismic kind of world view or a behaviorist world view or something else? So if you just want to comment on that briefly I think it would be instructive for us. So how would you describe your theoretical position, either one?

M. Papousek: Maybe you start because I learned so much from you.

H. Papousek: Well I think primarily I was very much inclined to accept the organismic views and also the systems theory. That may be due to my middle European origin because, you know, dialectic thinking I think was more common in middle Europe than in the United States and also the inclination to see interactions between all kinds of factors was more typical than monofactorial analysis. I don't know whether to mention my interesting experience when I came to the United States—I was actually confronted with a lot of behaviorism at that time. I thought that I might try to analyze the stimulation which was coming from the mother to the baby. You know, at that time babies were supposed to be stimulated by the mother, they were not supposed to participate actively in any dialog. So my idea

was to analyze this kind of stimulation and to find a profile of that stimulation in the given mother under observation, then to change the profile and see, you know, what would be the effect on the infant's behavior. That approach was actually considered to be excellent and people were very much interested in the results of that study.

Muir: When was this?

H. Papousek: That was in 1968. And so, you know, I gave the mother headphones and asked her to do only what I would dictate her to do so I knew her profile. I knew that, for instance, this particular mother was talking such an amount of times, stroking this amount of time and so on and then blew up these proportions and gave her instructions to talk or to stroke or to smile according to the new constructed profile.

Muir: And what happen?

H. Papousek: It was catastrophic. All interactions fell apart, so the uniform result was no matter what you changed as soon as you start to manipulate the mother you lost the interaction and the baby started fussing and sometimes even rejecting the mother and we had to finish the observation. That was a key experience to me, because I realized that what we did in this case violated the participation of the baby.

Muir: How old were the babies?

H. Papousek: These babies were I think three-month-old babies. So the expectance among the colleagues who were inquisitive, you know, who found that method so good, that was a big disappointment, but it was a very important experience which turned my attention from the behavioristic concept, you know, stimulus and response, to the interaction approach. Because I knew enough about the mental competence of the baby I just started looking at those things in a very new light.

Muir: That sounds very much like the dynamic systems theory approach that encourages you to turn the system on and make a perturbation and then find out if the system can make a change and recover, and when it breaks down. So your procedure foreshadowed twenty years later a very popular new approach in psychology. Did you publish this?

H. Papousek: No, and actually I've always regretted it, you know, these were negative results and at that time I thought that you cannot just publish something like that. Retrospectively, I found that finding so effective and so important in my life but also, you know, in the consequences among the colleagues that I think that would deserve a publication, but at that time I thought that no one would publish such a paper.

Muir: That's really interesting. And when did you, Mechthild, get involved in this work?

M. Papousek: Well, during my psychiatric training I came basically from a more psychodynamic approach plus the more organismic one which I got with my medical training. Then at the Max Planck Institute for Psychiatry in those years, which was the late '60s, there was a kind of very 150% behaviorism.

Muir: Is that right?

M. Papousek: Very strict and rigid way of behaviorism. I kind of had difficulties with this approach, was kind of fighting against it. In this period Hans came from Prague and gave one of his fascinating seminars on his experiments in infant learning with a very much more complex approach to learning. This was much easier for me to accept and it also helped me to understand what can be done just with methods of observation in a structured context and how you can approach very complex psychological

phenomenon. So this was the beginning, but it took a while then until I really became more closely involved and this was when our daughters were born. At that time I first just helped out a little in his laboratory and then, very soon, I slipped into this new field and got totally involved in it and began to look more closely at vocal communication at preverbal age with a very close look at the parental behavior, particularly maternal speech and paternal speech to young infants.

Muir: So it's organismic and perhaps a bit systems as well, which we can come back to in a few minutes when we talk about the intuitive parenting issue. What was your—we now hear how Hans Papousek has described the big study that made him really aware of what was going on. I presume you were quite proud of that work, even though you didn't publish it, because it gave you a major insight. What was the research that really made you feel good and got you going in this business?

M. Papousek: Just the research on parental speech, I think.

Muir: So parental speech was where it all began and you looked at both the maternal speech and paternal speech in the presence of an interaction and you filmed it, is that how you did the work?

M. Papousek: Yes, at that time it was really—you couldn't find anything like that in the literature. The linguists just studied vocal development in an isolated way separate from the context in which infants vocalize usually, and maternal speech was also studied separately from what the infant did. We tried to look at both infant directed speech and infant vocalization and its development in the naturalistic context. It was in a way more difficult perhaps to really develop appropriate methods which would allow us to describe all the details, not only of the vocal behavior in acoustic terms and auditory terms but also the context in which these behaviors evolved.

Muir: Was there an ethological influence? Do you think it's valuable to have animal research on this topic, and does it reflect anything about human behavior? Do you think that animal research was useful?

H. Papousek: I think that you can do in animal research what you could not do in human research, but you have to understand the species, and one very important thing is that you do not only look for similarities. Many people look for similarities between humans and animals, but as a matter of fact your primary interest should be in the differences because they lead you to the species specific predispositions and capacities and they usually characterize not only the species but also its evolutionary past. They indicate where the most adaptive functions are to be looked for and what's relevant for that species and actually this is what leads you to the interest in communication because, you know, in humans we can probably agree that verbal communication or processing symbolic representation of the reality belongs to our strong adaptive competences.

Muir: Okay, so you've now talked about the influence of animal research on theory, what I'd like you to do is tell me what theoretical model you have worked out now over thirty or more years of research to explain the development of communication in human infants.

H. Papousek: Well I think that one very important circumstance is that we soon learned that you have to pay attention not only to conscious forms of behavior but also to unconscious forms of behavior, because if you realize that parents often do things which they are not aware of and cannot report on verbally.

Muir: For example?

H. Papousek: They regulate the distance between the newborn baby and the parent to the same distance which Richard Hull described as the distance of the optimal visual perceptual capacities in newborn babies. We didn't know enough about it formally; the parents have no idea. Some parents think that newborn babies cannot see anything and yet they adjust very finely the distance between their and the babies' faces, exactly to the distance of 22-23 cm. They do a lot of similar interventions

which concern communication. They imitate babies; they give models so they not only imitate but they add something more; they show the baby, so to say, where to go from that sound, how to improve it, and so on. There's a lot of interventions which we started calling "deductic" because they looked like carefully designed intervention programs but the parents are not aware of it. You cannot find any awareness of it and they cannot report on it in interviews or verbal reports so you really have to observe and then you see it, but you start realizing that there is a category of behaviors the parents are not aware of, a category which is culture dependent.

Muir: Which are?

H. Papousek: Like, for instance, the use of decorative symbols, names, words but they don't do it from the very beginning so we can say that actually before the cultural dependent interventions come there is a period which covers the preverbal development of the baby which is based on biological predispositions that co-evolved on both sides, in the infant and in the parent, and they fit together very nicely.

Muir: So what are some of the things that the baby brings biologically to this relationship?

H. Papousek: I would say that this mental competence in learning capacities and in cognitive processes, which was demonstrated in the infants, and then some preferences like special attention to human voice, the interest in visual contact. We have to know that visual contact—we're unique in establishment and attainment of visual contact. It is very unusual even in primates, you know; direct visual contact is a warning. It's an overture to aggressive behaviors, whereas in humans it's a part of social interrelations between parents and infants, and we spent a lot of time on it and we have different strategies on how to achieve it and maintain it and, of course, it is meaningful because we display a lot of models in our facial behavior. Models how to produce sounds—I think this is something Mechthild could tell more about because that was her specialty.

Muir: Now you've named this Intuitive Parenting, is that correct?

H. Papousek: Yes.

Muir: So you've now described sort of the infant side and the adult side and there is a model that comes out of this, and what I want Mechthild to tell us about is the practical implication of this discovery. I mean, this is a theory you've derived from some observational research on normal infants, so what does it mean in terms of any kind of useful outcome of these observations? Can you tell us something about that?

M. Papousek: Well a couple of years ago I got a new position at the Center for Handicapped Children, it's a center for social pediatrics, and there I got an opportunity to study, or to get more involved in, early interactional failures and was looking for instances of interactional failures. Now, I wanted to study how it looks like, you know, disturbances in this intuitive parenting or in the communication patterns in mutual attunement and I thought maybe I would just look at population which, at least in Germany and some other European countries, has been neglected for a long time in difficult infants. Difficult infants make it sometimes very hard for the parents to cope with them and to establish a nice relationship because they are hard to soothe, they cry, they have an inconsolable crying, unexplained in many instances. They don't cuddle, they are not very rewarding in their responses, and give the parents very easily the feeling of being incompetent. And so we thought this would be an interesting population to look at interactional failures. I designed a program at this institute, the Munich Children's Center, where we offer diagnostic, preventive, and therapeutic services to families with persistently crying infant or colicky infant and at the same time we tried to collect a lot of information on these families, on the infants, on the parents, the family and we did lots of observations; observations of mother-infant interaction in various contexts of the infants' regulatory behaviors in contexts as well which are separate from the mother. So we collected our observations systematically in order to be able to analyze them and to get more information on this population. We also planned it

in a way that we do prospectively follow-up studies of these infants so that we can really find out whether this infant difficulty of persistent crying in early infancy or sleep and feeding disorders, which are often related to it, whether they are antecedents of later relationship disorders or behavior disorders in children.

Muir: So your therapy then is to identify missing intuitions, in a sense, either by the parent or behavioral aberrations on the side of the baby and then work toward modifying them in some way. Sounds almost like a behavioral approach with a sensitivity to a lot of different aspects.

M. Papousek: In this field, which is the field of infant mental health, there are a couple of therapies which are described as parent-infant psychotherapies and they mainly come from psychodynamic origins, and we have an approach which tries to include psychodynamic aspects wherever it is necessary, but we work very much on the level of interaction of communication. At this level you try to verify the concepts which we develop on intuitive parenting and its supportive effect on the infants' self-regulatory behaviors, the infants' integration of experience and speech also.

Muir: Can you give me an example of a technique that worked where you have a mother come in, the baby fusses and cries all the time, and she can't figure out what's wrong; what do you do?

M. Papousek: For instance, I have a three-and-a-half little boy who cries a lot, who does not feed well, or there are difficulties in breast feeding, and he has sleeping problems as well. So the mother gets a lot of negative feedback from this little boy. What is most important for this mother is that this baby rarely ever looks at the mother and seems to avoid eye contact at this age, and the mother really suffers from it. Now we did, for instance, the still-face paradigm. Just had spontaneous mother/infant interaction first and then the mother presented a still face followed by a reunion period. And what we saw and observed was that this mother desperately tried to engage the infant in visual contact but the more the mother tried, the baby became more and more inhibited and was really blocked and still faced himself. And then when we did the still face period two minutes; the roles changed immediately totally and this infant started to look at the mother, to smile, to vocalize, trying to engage the mother and have some response from the mother. Well, this was a very elementary experience for this mother and she realized for the first time that this boy did not reject her but was interested in her. This helped us very much to consult with the mother, how she could have more rewarding interchanges with this boy with positive reciprocity. We just encouraged her to wait for the infant's response, and to respond back, but not to do so as much as she did before. We also helped her to understand why she did too much, and I think this is sometimes very important because if you just tell the mother, "Well you are intrusive, you are insensitive to the infant's signals," although that certainly was the case, this usually does not help. It is very hurtful so this mother would never come back to you. Rather, you try to understand why the mother is so desperately trying to engage the infant in eye contact. This was because she had some fantasies, there the psychodynamic aspect comes into the story, and you have to include it in some cases to help these parents understand the miscommunication. This baby was frowning and she felt that this frowning meant the baby was very angry at her, but it was actually her conflict with her father. He was blaming her for having had this child, for having this husband, and so there were lots of conflicts within the family.

Muir: So her perception was interfering with the relationship.

M. Papousek: Yes, and well, you know what Selma Fraiberg described so nicely, the ghosts in the nursery. You know, they just come up and the communication goes on different levels and the mother really does not communicate with the real infant so much but with this fantastic representation so she felt that the boy was rejecting her, but now we could help her to understand the signals of the boy, that he was just detaching himself from what was becoming too much. So he turned away whenever he could not understand his mother's signals, or could not cope with her intense simulation anymore.

Muir: Now I'd like you to comment very briefly on the following title, *Persistent Crying and Parenting; A Search for a Butterfly in a Dynamic System*. What a wonderful title, and people are

very interested in dynamic systems approach today. Can you just comment on its relationship to the work that you do and do you feel that this is a reasonable approach and a good theoretical advance in our area.

M. Papousek: Yes, well, in this clinical work I use dynamic systems theory like a metaphor in a way. We know that currently we don't have statistical methods to really apply it to our work and we never get enough information on all those details which we would have to put into the system to really apply the theory, but the metaphor helps us quite a bit and this means we really think of mother-infant interactions, for instance, as something very dynamic, evolving in time and in fact in the first three months after birth. It is a time for post-partum adaptation and a lot of learning and maturation going on and the mother just becoming a mother and a father becoming a father and the partnership changes, so there are a lot of dynamic things going on.

Muir: What is the role of cross-cultural research in the context of both the theoretical work that you have done and any practical applications?

H. Papousek: Well, I explained that we differentiate the unconscious or intuitive behaviors from the culture dependent conscious behaviors. Now the question is, are the first innate or not and we cannot use any direct evidence of innateness. The genetic research has not yet paid attention to our knowledge of intuitive parenting and we cannot do direct experimental analysis of it. So we have to consider indirect criteria of innateness and from what is known in biology. As we view it, we think that there is a higher probability of innateness if a behavior pattern is universal, universal across sex in the parents for instance, across cultures, across age and in different parts of the behaviors which we have become interested in. We found that, actually, the parenting competence erupts very early so that three-year-old children can actually already provide a young infant with a lot of interventions which have the character of intuitive parenting. On the other side, the older generations, the grandfathers and grandmothers, can do the same thing. The cross culture comparisons showed that some of these things are universal across cultural differences.

Muir: For example?

H. Papousek: For example, we studied the features of the baby talk and we knew the characteristics of an infant directed speech. In our population, the German population, it appeared to be the same one like in the American, the English population and we saw that it would be different in the Chinese population because Chinese use melodies as semantic elements; a melody gives very different meanings to the same syllable. Whereas in our culture the melody depends much more on the structure of the sentence, it's in the service of semantic purposes—I'm sorry, I mean syntactic versus semantic, and he found out that during the preverbal age Chinese mothers formed the same pattern of infant directed speech like German or American or simply like cultures using stress languages rather than in a model.

Muir: Do they actually violate the rules of meaning with words?

H. Papousek: Well, we can say that they violate the interest of their culture and that obviously this biological significance of those parents which we described in infant directed speech are necessary for all babies independently on what the culture is then going to do with that fundament which we cared for as parents. So in other words, we prepare biologically the infant for the cultural integration for the acquisition of the new capacities which are culturally dependent, like speech, in a word, and culture differentiates and every culture has it's language so has to train the child in that area.

Muir: Is it the case in a clinical sense that you find the same problems perhaps across cultures as well, so that the intuitive parenting phenomenon is not simply a western concept but it applies in other cultures? Do you think that is the case here? Is there any evidence?

M. Papousek: For sure, of course, we have a lot to do with patients from other cultures, Germany is already a multi-cultural country and we have many Turkish people, many Italian people, many Yugoslavian people, and whatever. And this is very interesting of course because for sure there are cultural differences in parenting, but the basic patterns are the same and very similar across cultures.

Muir: Okay, another question I have is that you both worked on a large number of topics and one of the things that fascinates me about psychologists is their interests in the arts and, in particular, music, and I know that you have also have written on the origins and development of musical competence, so could you just comment on why, other than the singing by parents to their infants, how you got interested in that aspect of infant development?

M. Papousek: Well, we love music and I practice quite a bit, or I used to practice violin and Papousek comes from a family of musicians, but most influential to me was our first little daughter who had this very musical sounding monologues when she woke up in the morning and when she was talking to herself and playing with her voice very inventively and creatively. So this got me into it as one of the first things that I really did myself in this new field was to try to transcribe my daughter's vocalizations into musical notes. This was a very nice job; it was not so easy but it worked. Then, of course, we also realized that the parental speech to young infants emphasizes, makes more salient, the musical aspects of the speech, like the melody, the rhythm intonation. So the preverbal communication is really very rich in musical elements, and so we found when we analyzed these vocal sounds in just a few infants that there may be common roots for both speech development and musical development and there are very early capacities in young infants like vocal imitation, imitation of pitch in young infants at three months. Bill Kessen has shown something like that. Infants perceive global melodies and can easily recognize them even if you transpose the melody into another key, and things like that.

Muir: They also recognize when you make a mistake, don't they?

M. Papousek: Yes, and in a way in our culture right now parents don't sing anymore and somehow these capacities in young infants seem to disappear because they are not reinforced properly. In the early communication with mothers talking to the babies in this musical way there is still something going on but then it stops in many cases. But there is a nice potential and in families where mothers and fathers sing a lot with the infants you really can forward the musical capacities of young infants.

H. Papousek: We could also say that the use of the musical elements is another nice example of the co-evolution of predispositions because you know in the baby the modification of melodies is actually the first thing which the infants can modulate before they learn how to produce consonants and before they learn how to segment breathing and use it to mark the change in syllables. They already perceive and imitate and can use modifications in melody and, as a matter of fact, we as parents give them the first categorical messages in melodies. That was a very interesting thing, one of the exciting things which Mechthild analyzed I think, that she found that the melodic profiles that infant directed speech actually corresponded to the context of the situations and sort of informed the baby to categorize the context to find out, "Here I don't have to worry about anything, everything is in order, I am in good hands, in good care." "Here there is a warning, I should be attentive there may be something unpleasant coming or someone is asking me for something." Mainly we ask the babies to talk and there are melodic contours which are effective in that sense. They really elicit a tendency in the baby to talk and so you learn to differentiate the melodic contours, you realize that the moment we start talking to a baby we actually move from one language to another language. The melodies all of a sudden are not in the service of syntax but in the service of communication and that we're delivering the first categorical messages in the profile of melodic contours, which is a very important preparation for the later use of verbal symbols and also of abstraction; the use of categorical messages can be viewed as a precursor to the use of later abstract symbols.

Muir: It starts even earlier than infancy; it starts in the fetus, doesn't it? Because that's what they hear is the contour pattern of the mother's vocalizations, and that's what they tune into, and then when they are born the mother presents to her newborn her vocal sound pattern contours

with the visual pattern of her face. This multisensory stimulation builds into language which the parents continually use with their infants.

H. Papousek: This reminds me of something which we probably should also explain in the relation to the universals in our behaviors, you know, that should be understood in the biological sense, which means that the universal tendencies are always connected with individual differences in that basic thread so that you deal with universals; but you have to know that at the same time minor variability in the elementary parts of it helps to identify each person. It's like the fingerprints, you know, we all have them, it's a very unique phenomenon, but fingerprints identify each individual. For voice prints it's the same thing but in the voice, which the fetus listens to, the fetus can identify the voice prints of the mother and that, not surprisingly, human newborns know who the mother is, which is a very universal biological phenomena. Birds in colonies identify each other and their mothers [a form of vocal imprinting extensively studied by Gilbert Gottlieb] on this basis as well but it was not known for a long time in humans.

Muir: Okay, so it begins there. The other question that I remember now that I had has to do with segmentation of behavior. I mean, how do you analyze interactive behavior, is it not very complex? When you talk about intuitive parenting, why is it intuitive and why haven't we figured this out a long time ago. The behaviorists did the analysis, did they not? Why are we having such difficulties sometimes articulating what intuitive parenting really is and describing it very easily in our behavioral analyses? Can you give me some idea what your thoughts are on that? Is the question clear? Can you describe for me why we seem to have difficulty in simply describing the contingency in behavior? Is this something you would expect to be difficult to describe or does it surprise you?

H. Papousek: Well, I don't think that it's so difficult, I think that we were perhaps too much influenced by the former concepts and there were some of them one sided and some of them were misleading, actually. I mentioned the concept, you know, the SR [Behaviorist] concept where the baby was viewed as a passive recipient of a stimulation. No active involvement, you know, no spontaneity in its behaviors. No intentional acts in behavior. One of my first studies already showed that in fundamental forms intentionally can be shown in newborn babies. These are publications in the early '60s. In that time behaviorists simply didn't pay any attention to it.

(End of Interview)