

Brožek, Josef

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JOSEF BRŮŽEK

MULTIFACETED PSYCHOLOGY: A RETROSPECT

ABSTRACT: My life has been complex, from its beginning. I was born in the heart of Europe, at Mělník on the Elbe, in mid — August 1913. Having taken a 7– year „ leave of absence“ , spent in Russian — occupied Poland and Siberia, I returned in June 1920. Formal studies in the Czech lands terminated with a PhD. in psychology and philosophy, awarded by Charles university in June 1937 on the basis of a dissertation on „ Memory, its measurement and structure: A psycho–technological study“ . In Prague I served as assistant in the Department of Philosophy in 1936/37 and concurrently, in 1937, as psychologist at the Vocational Guidance Center. For the next two years I served as psychologist at the Bata Shoe Co. in Zlín, Moravia, leaving in November 1939 for what was to be a year of post–doctoral study in the United States. I spent the remainder of the school year 1939/40 at the University Pennsylvania in Philadelphia but the war prevented my return and I spent the next year at the University of Minnesota, in Minneapolis. In the fall of 1941 I joined the Laboratory of Physiological Hygiene, a research arm of the School of Public Health. I spent the years 1959–1979 in the Department of Psychology of Lehigh University, Bethlehem, Pennsylvania. In Minnesota my research was concerned, consecutively, with the impact of inadequate nutrition on behavior, lighting and visual work, and aging, with focus on development of coronary heart disease. At Lehigh University I focused on the history of psychology — an „old love“, with roots going back to 1933/1934. It continued to serve as the focus of my activities following retirement from Lehigh in 1979.

Mailing address: J.B., The Plaza, Apt. 220,
2353 Youngman Ave., St.Paul, MN, USA

PSYCHOLOGIE — ČÍSLO MNOŽNÉ

Souhrn

Můj život, osobní a pracovní, byl složitý. Přijel jsem „na černo“ (a bez pasu) z polské Varšavy, narodil se na Mělníku vinorodém a po šesti nedělích jsem se vrátil. Další osudy určila válka. Jako rakouský občan byl otec internován r. 1914 v Sibiři, v altajských horách, na sever od Mongolie. Já jsem žil v různých částech Sibiře od konce r. 1915 do dubna 1920, kdy jsem se vrátil do Čech jako „přifařený“ člen Pátého československého střeleckého pluku pražského T. G. Masaryka. Studie v Čechách končily doktorátem filosofie, uděleným Karlovou univerzitou v červnu r. 1937 na základě disertace „Paměť, její měření a struktura: Studie psychotechnická“. Roku 1936/37 jsem pracoval jako asistent Prof. J. B. Kozáka a knihovník Filosofického semináře. Od začátku r. 1937 jsem též působil jako psycholog karlínské Poradny pro volbu povolání. Na podzim jsem přešel jako psycholog do Zlína. Se souhlasem a pomocí firmy Baťa jsem odjel na podzim r. 1939 na rok dodatečných studií do Ameriky. V důsledku války nebylo možno se vrátit. Zbytek školního roku 1939/40 jsem strávil na pennsylvánské universitě ve Filadelfii a roku 1940/41 jsem pokračoval ve studiích na minnesotské universitě v Minneapolis. Byl to můj neúspěšnější školní rok vůbec, s důrazem na psychologické poradenství na úrovni universitní. Na podzim r. 1941 jsem se stal členem — členem nejmladším — Laboratoře pro Fysiologickou Hygienu, která sloužila jako výzkumná složka Školy Národního Zdraví. Hlavní témata výzkumu byla tři: Vliv nedostatečné výživy na chování, osvětlení a vizuální práce a stárnutí, s důrazem na koronární srdeční onemocnění. Začátkem r. 1959 jsem přešel na Lehigh University, v městě Bethlehem, PA, založeném potomky Českých bratrů v 18. století. Má účast na výuce i výzkumu byla zaměřena na historii psychologie — „starou lásku“. Na tomto poli jsem pokračoval i po odchodu do výslužby v červnu 1979.

Studies of psychology in Prague

A fortunate accident introduced me to the history of psychology which, eventually, became my primary specialty: The purchase of Hans Henning's (1932) pocket book, entitled „Psychologie der Gegenwart“ (Contemporary Psychology), in a bookshop located in Prague's Old Town, a stone's throw from the building of the Faculty of Philosophy of Charles University. Its large (pp. 1–47) introductory chapter deals with the development of modern psychology. I was so thrilled by the book that I asked Prof. J. B. Kozak to permit me to review it in his philosophy seminar in 1934. It took me six seminar sessions to do so.

A severe infection in the spring of 1935, requiring two months of ospitalization, that was decisive in my focusing on psychology as a possible vocation. Convinced that the offerings of the Department of Psychology of Charles Uni-

versity did not meet my needs, I took relevant courses offered in other departments, primarily education, but also a course on the anatomy of the sensory organs offered in the medical school of the university and a course on the psychological aspects of law, given in the Faculty of Law.

More than that. I sought to familiarize myself with the paper and pencil tests used in the Institute of Human Work (the successor to the Psychotechnological Institute) directed by Jan Dolezal, and with the apparatus used in the Psychophysiological laboratory of the Army and Airforce Technological Institute, under the direction of Josef Mls, an MD and PhD. I studied statistics in the Psychological laboratory of the Electrical Works of the City of Prague, under the guidance of Josef Vana.

Importantly, I participated in three offerings of the Psychological department of the German University of Prague. A psychological seminar, led by Prof. Johannes Lindworsky, S.J., in which I took an active part; a laboratory course given by Lindworsky's assistant, Franz Scola; and occasional evening lectures presented by psychologists passing through Prague.

In addition, I studied applied psychology from the Polish translations of works written by Franziska Baumgarten, born in Poland but living and professionally active in Switzerland. I visited her in Solothurn, early in 1939, to thank her for the help her writings had given me.

J. P. Guilford's textbook on Psychometric Methods, just published and kindly shared with me by an American exchange student from Lincoln, Nebraska, also proved very helpful.

In the Department of psychology itself I found more rewarding the „practical (laboratory) exercises“ given by Dr. J. Rames than the lectures and seminars of Prof. F. Seracky.

I was awarded the PhD. degree in June of 1937 on the basis of a thesis on „Memory, its measurement and structure: A psychotechnological study“.

Applying Psychology in the Czech Lands

In Prague, at the end of 1936 I was invited to replace temporarily Dr. Anna Smrzova, a psychologist, who requested pregnancy leave from the Vocational Guidance Center, located in Praha-Karlin, a few blocks from where I lived. I was pleased to receive that invitation and the opportunity to apply what I had been learning. I had to familiarize myself with some individually administered tests as well, such as the Stenquist test of technological intelligence.

The position offered an „extracurricular“ benefit: The opportunity to get to know a young physician, responsible for the physical examinations at the center, Dr. B. Sekla, interested in genetics. Jointly, we developed a research project in which I would be responsible for the psychological aspects of a study of human inheritance. I regretted, and still do, that my departure from Prague in the fall of 1937 terminated the project before it began.

On the recommendation of Jan Dolezal, director of Prague's Institute of Human Work, I was invited to establish at the Bata Shoe Factory in Zlín, Moravia, a psychological section serving the needs of the personnel department of this large industrial complex. It was a challenging, many-sided assignment.

In order to be better informed about the functioning of other establishments serving similar needs, I visited the laboratory of the Vitkovice Iron Works and, in Bratislava, the counseling center established by Josef Stavel.

During the summer of 1938, in cities stretching from the west (Tabor) to the east (Bratislava), at the invitation of the Educational department of the Bata enterprise, I participated in the testing of applicants for a popular training program combining education and work.

In the span of time from the end of 1938 to mid — March of 1939, I studied at the Psychology department of the Catholic university in Milano and visited several other cities. Subsequently, I visited psychological establishments, important for their contributions to applied psychology, in both the German and the French part of Switzerland, returning to a German — occupied Prague.

For some time I had planned to complete my studies in the United States. Fortunately, through the cooperation of the International Institute of Education in New York, I obtained one — semester fellowships at the University of Nebraska and the University of Pennsylvania. In addition, I was to receive a stipend from the Denis Fund in Prague and financial assistance from the Czech Ministry of Education.

I was scheduled to leave Bremen for New York on 6 September 1939 but the journey was cancelled when Germany declared war on Poland on 4 September. It was only thanks to the Bata Shoe Co. that I was able to leave the „Protektorat Böhmen–Mähren“ in mid — November 1939.

Studying in America

The occupiers of the Czech lands confiscated the funds to be provided by the Denis Fund and the Ministry of Education did not fare much better. As a result, I arrived in New York penniless and saddened by the news, learned in mid — Atlantic, that all Czech institutions of higher learning were closed on 17 November 1939. I had no funds to purchase a train ticket to Lincoln, Nebraska.

The director of the New York International Institute of Education, who learned about my internment at Ellis Island, a few miles by sea from the New York harbor, informed Pendle Hill, a Quaker institution of adult learning located near Philadelphia, of my desperate plight and of the fact that I had a University of Pennsylvania fellowship. Pendle Hill kindly offered to provide room and board, and thus solved a problem that looked hopeless. I borrowed \$ 15.00 from the bursar of the University of Pennsylvania and was able to register.

I arrived in Pennsylvania at the end of November. Little remained of the first semester of the year 1939/40. In the spring semester I focused on industrial and

clinical psychology and statistics. Clinical psychology was, for years, a Pennsylvania specialty and industrial psychology was taught by Prof. Morris Viteles, the author of a recent volume covering that field. By chance, it was one of the very few books that I brought along from Zlin.

In May 1940 the future loomed terribly uncertain. Consequently, I was happy to learn about an opportunity to teach at a special Summer School organized by the American

Friends (Quakers) Service Committee. It was to be held in Stillwater, Minnesota, and taught by recent, unemployed European refugees. My principal potential contribution would be to teach Italian which I spoke fluently. The plan worked out well.

A critical link to my future was a truckload of young Americans, of college age, who participated in a racially integrated summer work camp, operating in the Negro section of St. Paul, the capital of Minnesota, and also sponsored by the Religious Society of Friends (Quakers). The group drove to Stillwater to learn more about the summer school. One of them was a Slovak from North Dakota, Alex Stach. The group invited me to join them when the summer school ended, which I did. Alex convinced me to stay rather than turning back East: Work could be found and I could apply for a fellowship at the University of Minnesota. All of this turned out to be correct. In Saint Paul, I learned first hand a great deal about the problems of urban Black America.

This led to an action — research in the area of applied social psychology. Having heard that at the Minnesota State Fair, then in progress, there were incidents of racial discrimination in food service, we decided to check out the rumors. Two couples, one white, one black, would jointly visit, at random, the food services. The black couple would ask to be served while the white pair just „happened“ to be around to observe, should discrimination occur, so that later they could testify in a court. To my relief, no instances of racial discrimination were discovered. The „negative results“ were one of the reasons why the project was not written up.

Thanks to the warm recommendations of D.G. Paterson, professor of applied psychology, I received an „honorary fellowship“ of the University of Minnesota: It provided no stipend but opened wide the gates of academe. The year 1940/41 turned out to be the crowning glory of my university studies and I came to know the university better than any of the regular students.

In the Department of Psychology, a unit in the College of Arts and Sciences, I participated in Paterson's seminar on individual differences. To learn about the ways psychology was taught „en masse“ in America, I sat in on the course of introductory psychology, with more than 1,000 students. At the other end of the distribution, I attended a seminar on child psychology, offered by Florence Goodenough for a handful of graduate students who participated intensively in the seminar sessions. Each presentation was accompanied by a carefully prepared, typed summary and selective bibliography. In the Department of anthropology I took part in what was one of the earliest seminars on the use of psychological techniques in anthropological research.

In addition, in the Institute of Technology I took part in Prof. Laitala's course on Time and motion studies and in the Medical school I participated in Richard Scammon's course on history of medicine, focused on the black plague.

Most rewarding, however, was a two semester graduate course given in the College of Arts and Science by a young, dynamic professor, J. G. Darley, and intended for future counselors of university students. I drew on this course, several years later, when I was preparing a paper on the role of psychological counseling in the reconstruction of Czechoslovak university education. The paper appeared both in the United States (Brožek, 1944a) and in Great Britain (Brožek, 1944b).

In the fall of 1941 I was invited to join, as research psychologist, the interdisciplinary Laboratory of Physiological Hygiene, shortly to become a research unit in the School of Public Health of the University of Minnesota.

Early writings

The third number of the second volume of the prestigious journal of the Federation of the American Biological Societies, devoted to performance, included a survey paper on „Psychological factors in relation to performance and fatigue“ (Brožek, 1943). A year later, in the same journal, it was followed by a paper on „Evaluation of fitness“, written in collaboration with a colleague who covered the physiological aspects (Taylor and Brožek, 1944).

Two early papers dealt with interdisciplinary research in experimental human biology, a topic falling into the category of „the science of science“: One was concerned with general aspects (Brožek and Keys, 1944) while the other dealt with the studies of behavior (Brožek and Keys, 1945a). The first paper appeared in the widely read journal *Science*. In addition, it was reprinted by a governmental agency responsible for science and distributed to all of the governmental laboratories. It was probably my most widely read paper.

One of the early papers, with its roots in Zlín, was entitled „A new group test of manual skill“ (Brožek, 1944). The data for it were collected during the year 1940/41. However, instead of serving as a group test it became a standard part of the battery of psychomotor tests used individually in experimental studies carried out in the 1940s in the Laboratory of Physiological Hygiene.

A large chapter on „Personal factors in competence and fatigue“ (Brožek, 1948a) appeared in the first volume of a textbook on Industrial Hygiene and Toxicology, edited by F. A. Patty. The chapter dealt with three sets of issues: Selection, fatigue, and maintenance of work competence, with emphasis on nutrition, personal adjustment, and industrial morale.

Finally, a non experimental collaborative report (Brožek and Mickelsen, 1949) dealing with diet was contributed to a volume on Human Factors in Undersea Warfare, prepared by the Panel on Psychology and Physiology and published by the (US) National Research Council.

The research to be reported dealt with three topics: The impact of inadequate nutrition on behavior, visual performance, and aging.

Nutrition and Behavior

Methods

The nutritional studies, experimental and longitudinal in nature, called for repeated measurements. We needed to know more about the impact of repeated testing, of „practice“, both as regards measures of psychomotor and intellectual functions.

The methods used in an extensive study, carried out in 1945–1946 and dealing with the effects of severe reduction of food intake and subsequent nutritional rehabilitation, were described in some detail (Keys et al., 1950, pp. 1094–1104). In the sensory area, auditory and visual acuity, flicker fusion frequency and the rate of perceptual fluctuations was measured. The category of voluntary motor performance was represented by tests of strength, speed of movements (tapping, hand and arm movements, body reaction time, speed of single leg movements) and coordination.

Finally, a non experimental report (Brožek and Mickelsen, 1949) dealing with diet was contributed to a volume on Human Factors in Undersea Warfare, prepared by the Panel on Psychology and Physiology of the Committee on Undersea Warfare and published by the (US) National Research Council.

Restriction of the intake of vitamins

Psychological techniques, increasing in sophistication and number, were used in several studies aiming to determine more precisely daily vitamin requirements, defined as levels preventing biochemical, physiological and behavioral deterioration. The specific dietary components that were studied included thiamine (Keys, Henschel, Mickelsen, and Brožek, 1943) and riboflavin (Keys et al., 1944). In the final study, three vitamins of the B-complex (thiamine, riboflavin, and niacin) were controlled (Keys, Henschel, Taylor et al., 1945). Separate papers dealt with intellectual functions (Guetzkow and Brožek, 1946), motor performance (Brožek, Guetzkow, Mickelsen, and Keys, 1946), and personality (Brožek, Guetzkow, and Keys, 1946).

A later summary (Brožek, 1957) focused on the terminal period of acute deprivation of the vitamins, varying between 15 to 27 days. At the height of the deficiency, there was a general weakness and a pronounced incoordination of the legs. Scores on the „psychoneurotic“ scales (Hypochondriasis, Depression, Hysteria) of the Minnesota Multiphasic Personality Inventory rose dramatically. Surprisingly, the measured intellectual functions remained unaffected.

Semistarvation Nutritional rehabilitation

The psychological aspects of the impact of six months of severe reduction of the food intake, resulting in the loss of about 25% of the body weight, followed by nutritional rehabilitation using diets differing in calories, protein, and vitamins, were described in the monograph on The Biology of Human Starvation (Keys et al., 1950, esp. pp. 767–918) and in numerous papers listed on the occa-

sion of the 50th anniversary of the study (Brožek, 1995). In the starvation period the loss of strength, decrease in voluntary activity, and rise of the Depression score of the MMPI were the dominant features. I was a very happy man when at the end of the rehabilitation period the average „D“ scores returned to the pre-starvation (control) level.

Books

In addition to the starvation monograph, four books dealing with nutrition and behavior should be noted: A volume documenting research reported between 1919 and 1981 (Brožek, 1985), and proceedings of three symposia (Brožek, Ed., 1957a, 1979; Brožek & Schurch, Eds., 1984).

Visual work and fatigue

When research on human nutrition was coming to the end, Ernst Simonson, a colleague with experience in industrial physiology, and I could pursue for a time our shared interest in vision, with focus on visual performance and fatigue.

The principal innovative idea was spelled out in a paper on a work test for quantitative study of visual performance and fatigue (Brožek, Simonson and Keys, 1947), illustrated by four photographs of the apparatus. The visual work consisted in identifying single letters printed on a long „conveyor“ belt and presented, at random heights, through a long, narrow slit. Six subjects, seated in booths, in which the lighting was separately controlled, could work at the same time. The standard work sessions lasted 2 hours.

We were interested both in the general level of performance under given conditions of illumination and the magnitude of the work decrement in the course of work period. In addition, tests of visual functions were made before and following a work period.

The tests included a newly developed procedure involving voluntary eye movements between two fixation points (Brožek, 1949, 1950a). Both the rate of the movements and precision of fixation were measured. Changes in performance over time in two hour and four hour work sessions (Brožek, Simonson, and Keys, 1950) and the effect of different illuminants were studied. Thought was given to studies of visual fatigue reported in the literature (Brožek, 1948b) and an extensive paper was devoted to the uses of miniature work situations as a research tool (Brožek and Monke, 1950), with special attention being given to the studies carried out by E. Sachsenberg at the Technische Hochschule in Dresden.

Aging

The first study (Brožek and Keys, 1945b) was traditional and involved age differences within in a group of 56 healthy employed women engaged in clerical

work and in microscopy, in the age range from 18 to 60 years. The variable measured was the critical (or fusion) frequency of flicker. With age, there was a moderate but statistically significant trend toward lower scores: The average values decreased from 46.7 flickers per second in the age group of 18–25 years to 40.9 in the group of 45–60 years — a statistically significant difference — and we concluded that the fusion frequency test would be a useful tool in gerontological studies.

The second study (Brožek, 1955) involved a comparative analysis of items constituting the Minnesota Multiphasic Personality Inventory, administered to two age categories of men: 157 college students, 17–25 years of age, with mean age of 29 years, and 233 business and professional men, with a mean age of 49 years. The individual items differentiating the younger and older men at the 5 per cent level of statistical significance were grouped in the following 10 areas: Health, Interests, Sex, Work and Work Habits, Religious Attitudes, Emotional Adjustment, Self Confidence, Compulsive and Obsessive Attitudes, Norms of Conduct, and Social Attitudes. The individual items deal with bits of behavior and thus have the merit of concreteness and, when considered together, of comprehensiveness. In contrast to the bits of stone or glass, they can not be readily synthesized into a patterned mosaic.

The third study (Brožek, Keys and Blackburn, 1966) differs radically from the first two studies. It is longitudinal, not cross-sectional and is a part of a large, multidisciplinary effort to identify characteristics of individuals that may be useful in predicting eventual development of coronary heart disease. Of 258 individuals, aged 45 to 55 years, clinically normal at the beginning of the study and followed for 14 years, 31 developed coronary heart disease. As a group, at the outset they had significantly higher mean scores on the „Hypochondriasis“ scale of the Minnesota Multiphasic Personality Inventory and were more „masculine“. Also, they had significantly higher average score on the „Activity drive“ scale of the Thurstone Temperament Schedule.

Book Reviews and Book Lists

Reviewing books has been for me a life long sport. It has been also means of „continuing education“, of myself and of my colleagues, both in America and in post 1989 Czechoslovakia. In America, the focus was on books published abroad; in Czechoslovakia and the Czech Republic, on American and German literature.

A unique contribution to the international exchange of information were the periodical lists of new books written in Russian and other Slavic languages. The book lists were published in the journal *Contemporary Psychology* in the 1960s and the 1970s.

The project had the support of the American Psychological Association (APA), publisher of *Contemporary Psychology* and of numerous other psychological journals, who provided journals sent abroad in exchange for psychological literature.

Active book exchange was established with libraries in Bulgaria, Czechoslovakia (Prague, Brno, Olomouc, Bratislava), Poland, Soviet Union (Leningrad and Moscow, Erevan, Kiev, Tartu and Tbilisi), and Yugoslavia (Belgrade, Ljubljana, Zagreb).

This enabled me to cover, in a long series of reports, including extensive accounts published in the Annual Review of Psychology (Brožek, 1962, 1964), developments in „East-European“ psychology in general and in the history of psychology in particular.

History of Psychology

My active involvement in the history of psychology, be it in different ways and at varying levels of intensity, covers the years 1933–1998. To speak in biblical terms, „in the beginning“ (as in The First Book of Moses) I encountered Hans Henning (1932). More precisely, I purchased the second edition, just published, of his *Psychologie der Gegenwart*, beginning with a large chapter on the development of modern psychology. I was thrilled, spellbound, and in 1934 I begged J. B. Kozak, Professor of philosophy at Charles University, to allow me to „review“ the book in his philosophy seminar. He agreed, not knowing that it will take six seminar sessions to do so.

In the 1940s and the 1950s, while associated with the Laboratory of Physiological Hygiene of the University of Minnesota, I kept alive my interest in history by reviewing books on history of science in general (Brožek, 1948c) and of psychology in particular (Brožek 1950b, 1951). Special attention was given to Purkyniana (e.g., Brožek, 1956).

Moving in 1959 from the University of Minnesota to Lehigh University's Department of Psychology in Bethlehem, PA, and the award of a Research Professorship in 1963 enabled me to pursue the hobby of history of psychology in earnest.

In the USA, the interest in history of psychology was stimulated by R. I. Watson's paper of 1960 entitled „History of Psychology: A neglected area“. Through Watson's initiative, a Group on the history of psychology was established in which I participated and which in 1965 was expanded into a division (Division 26, History of Psychology) of the American Psychological Association. I served as the Division's President in 1973/74.

A full account of activities in the field of history of psychology from the 1960s through the 1990s would fill a book. I shall limit myself to the registration of a few events and let a list of books speak for itself.

The need to organize the first scientific meeting of the Division, to be held in New York in 1966, called for obtaining systematic information on the current and anticipated research of the Division members (Brožek, 1968), later published in the *Journal of the History of the Behavioral Sciences*, established under Watson's editorship in 1965.

In 1968 in Durham, NH, and in 1971 in Bethlehem, PA the first and the second Summer Institute on the History of Psychology were held, with the financial as-

sistance of the National Science Foundation (Brožek, Watson, and Ross, 1969, 1970; Brožek, and Schneider, 1973). These were major events, of nation wide significance. Importantly, several young European historians and five American graduate students participated in these events. Several of the students eventually came to play major roles in the field.

History of Psychology: Beyond Journal Articles

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ALS OB — As if

Around 7 AM of 23 February 1998, on the highly suspect assumption that I have a valid immortality insurance, my Creative Subconscious came up with the following work program for the next quinquennium:

1. In cooperation with Nicholas Wade (Dundee, Scotland) and Jiri Hoskovec (Prague), to translate into English and evaluate J.E. Purkyne's dissertation of 1818, published in Prague under the title „Beitrag zur Kenntniss des Sehens in subjectiver Hinsicht“ in 1819 and 1823,
2. To write up the fascinating story of the spelling of the word „psychologia“ in the manuscripts of „Vita Marci Maruli“ held in Split (Dalmatia), Zagreb (Croatia), Budapest (Hungary) and Venice (Italy).
3. In cooperation with Marina Massimi (Sao Paulo, Brazil), to transcribe, translate and analyze a manuscript „De Animorum Medicamentis“, written at the end of the 15th century by the Italian humanist Tydeus Acciarinus.
4. To write a paper on the contributions of Rio de Janeiro's Antonio Gomes Penna to Brazilian historiography of psychology.
5. In collaboration with Regina Campos (Belo Horizonte, Minas Gerais, Brazil), to describe and assess the impressive work in Brazil of Helena Antipoff (Antipova), a child psychologist born in Russia and trained in Paris and in Geneva.
6. Last but not least, in cooperation with Jiri Hoskovec (Prague), to write for the journal *European Psychologist* a paper on contemporary psychology in the Czech Republic, thus bringing to the end a series of reports that began in 1990.

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