

UNCLASSIFIED

AD NUMBER: AD0489058

LIMITATION CHANGES

TO:

Approved for public release; distribution is unlimited.

FROM:

This document is subject to special export controls and each transmittal to foreign governments or foreign nationals may be made only with prior approval of the Office of Naval Research Branch Office, Box 39, FPO, New York 09510.

AUTHORITY

ST-A ONRL LTR, 8 JUN 1971

489058

OFFICE OF NAVAL RESEARCH

BRANCH OFFICE

LONDON, ENGLAND

TECHNICAL REPORT
ONRL-35-66

NOTES ON PSYCHOLOGICAL TRAINING AND
RESEARCH IN YUGOSLAVIA:

PSYCHOLOGICAL INSTITUTE, UNIVERSITY
OF ZAGREB

AND
THE INSTITUTE FOR MEDICAL RESEARCH
AND INDUSTRIAL HYGIENE, ZAGREB

BY

JOHN E. RASMUSSEN

6 August 1966



This document is subject to special export controls and each transmittal to foreign governments or foreign nationals may be made only with prior approval of the Commanding Officer, Office of Naval Research Branch Office, Box 39, FPO New York, 09510.

NOTES ON PSYCHOLOGICAL TRAINING AND RESEARCH
IN YUGOSLAVIA
PSYCHOLOGICAL INSTITUTE, UNIVERSITY OF ZAGREB
AND
THE INSTITUTE FOR MEDICAL RESEARCH AND INDUSTRIAL
HYGIENE, ZAGREB

Yugoslavia is comprised of at least five major, separate and distinct cultural groups (as well as a number of smaller groups) united into a single political state. The differences among these cultures would appear to be more pronounced than the similarities in several areas such as language, standard of living, education, literacy, art, and literature. The geography ranges from semi-arid land to magnificent beach resorts and from fertile farmlands to a beautiful alpine lake region.

A train trip through the length of Yugoslavia serves to highlight these differences. Watching the swarthy peasants of Macedonia till the fields with oxen and wooden ploughs, one is led to wonder how much this particular culture has evolved since the time of Christ. On the other hand, Belgrade, Zagreb, and Ljubljana have both business and residential areas which differ little from those found in other cities throughout Europe. Zagreb, particularly, is a center of music, art, science and university life. One cannot help being impressed with the amount of building which is underway and the contrast of the old and the new ultra-modern structures.

Mechanization and partial industrialization have made a major impact upon Yugoslavia during the post-World War II period. In fact, this country constitutes an excellent example of the realistic problems engendered when changes are made in the mores, value system and living habits of deeply-rooted and traditional cultures. For example, the major Yugoslav airline flies Caravelle jets on its international routes; however, reserving a seat is a major undertaking. All reservations are controlled from Belgrade, and an effective system has not as yet been developed for making and confirming reservations. On occasion, all Yugoslav airline flights have been cancelled for a national holiday; but, unfortunately, this information may not be disseminated until immediately prior to the holiday. There are new telephone booths, but many of the phones don't work. Nowhere is the clash between ancient culture and industrialization more apparent than in the public market, where the beatnik with his guitar rubs shoulders with peasants in their age-old traditional costumes who are

attempting to sell containers of rich country dirt to the city dwellers. These examples may be either amusing or irritating, depending on one's frustration tolerance; nevertheless, they are reflections of the difficulties and growing pains which are created by the drastic changes now occurring in the Yugoslavian way of life.

During the International Congress of Applied Psychology in Ljubljana two years ago, the Yugoslav Government reduced customs and immigration formalities almost to the point of nonexistence. Special arrangements to ensure adequate hotel accommodations and transportation for Congress participants were made. Certainly there was no attempt in any way to control, restrict, or hamper the movement and activity of the foreign participants. The Yugoslav psychologists one met at this meeting tended to be open, friendly, and unguarded. Many foreign psychologists attending this meeting expressed surprise at how much the general atmosphere of the country and the behavior of the people differed from what they had anticipated would be an "Iron Curtain" country. However, most persons also had a rather unclear or vague concept of what they might expect. In any event, most of the Yugoslav psychologists present were so occupied with the activities related to management of the Congress that the majority of foreigners obtained only a limited feeling for Yugoslavian psychology. Accordingly, a return visit could be anticipated with some interest.

Generally speaking, the picture had changed little between the time of the Congress and the visit upon which this report is based. The same friendliness and warmth towards foreigners as manifested during the Congress was evident. Again, one had a feeling of total freedom of movement and activity. The Yugoslavs related freely, easily, and opened their homes in genuine gestures of friendship. Domestic and international politics were discussed with the same readiness which was manifested in approaching academic topics. Some persons found a great need to criticize the present political and economic situation in Yugoslavia, and others said little. On the other hand, almost all of the academic people encountered had rather pressing and straightforward questions to ask about the US policy in Vietnam. Probably the most pronounced contrast with the 1964 visit was the marked increase in prices and the apparent economic difficulties and other inflationary problems.

HISTORY OF PSYCHOLOGY IN YUGOSLAVIA

As in most European countries, the roots of Yugoslav psychology are to be found in philosophy. However, the country also is somewhat unique in that Yugoslav psychology has been identified with one name from its founding until the present day -- the name of Bujas. Professor Ramiro Bujas is credited with establishing psychology as a scientific experimental discipline when he created the laboratory of psychology at Zagreb Medical School in 1920. His son, Professor Zoran Bujas, is the commonly acknowledged (and somewhat autocratic) leader of present-day Yugoslav psychology. It is rather difficult to determine which of the two men has had the greater impact on the discipline of psychology in Yugoslavia; certainly, the elder Bujas must be given credit for primary development of the discipline, but one rather suspects that the younger Bujas is responsible for the present day vigor and quality which characterizes psychological training and research -- at least in Zagreb.

Professor Ramiro Bujas, who died in 1959 at the age of 80, initially was trained in philosophy and literature. He developed a keen interest in psychology and psycholinguistics, which persisted through the years. His range of interests extended well beyond psychology -- from the use of hypnosis in childbirth through archeology and the fine arts. In fact, he did considerable research on dating ancient monuments and art works in Yugoslavia. When he was well over 30 years of age, Bujas entered medical school in order to obtain what he believed to be a proper foundation for the more "scientific" study of psychology. In 1920 he established Yugoslavia's first psychology laboratory in the Physiology Department of the Medical School.

Ramiro Bujas also established the only Yugoslavian psychology journal, Acta Instituti Psychologici, which is published by Zagreb University. The majority of Yugoslavian psychological research is published in this journal, which prints articles in English, French, or German, but interestingly enough not in Croatian.

In 1929 a Chair was established in psychology at the medical school, and Ramiro Bujas was appointed as the professor. It is apparent that the strong physiological orientation which still permeates psychology at Zagreb may be traced directly to both of the Bujas. Following World War II, the Department of Psychology was separated from the science faculty, at the insistence of Russia, and

became part of the faculty of philosophy -- a change which many Zagreb psychologists have not yet fully accepted.

A Chair was established at Belgrade University in 1928 and this Department is the largest in Yugoslavia, although probably not as well known as Zagreb. Belgrade is identified with both social psychology and psychometrics. In fact, the first Yugoslav attempt at standardization of the Binet for use with a Serbo-Croate population was undertaken there in the 1930's. While a department has existed at Ljubljana University for some time, it would appear that psychology has never fully developed at this institution.

At present psychological training and research is centered at the three universities mentioned above. Professor Zoran Bujas now holds the Chair at Zagreb and at the same time is temporarily holding the Chair in Ljubljana, commuting between the two universities.

PSYCHOLOGICAL TRAINING AT ZAGREB UNIVERSITY

The Yugoslav educational system is relatively uniform, regardless of discipline, through a level roughly equivalent to the American Bachelor's degree. However, there are considerable differences between the arts, sciences, philosophy, medicine, and technical areas such as engineering, both in graduate training and in degree patterns. Twelve years of education generally is required for university entrance. Medicine is a five- to six-year course, and all other university first-degree programs vary between four to five years.

There are two separate paths to undergraduate degrees in Yugoslavia, which differ primarily in the proportion of time devoted to the major subject. During the first year all students take two major subjects, such as psychology and an elective area, which may be literature, history, geography, education, etc. In addition, courses in logic or philosophy are required. Croatian, and a foreign language, also are required. After the first year examination results have been computed, a student may petition to follow the "single subject" path for the remainder of his undergraduate work. Approval of this request is granted if the student's grades in the first-year subjects are high enough and he has a positive recommendation from his professors. Students who are not successful in their petition will be required to continue along the two-subject path throughout their undergraduate work. For the most part, such students will become high school teachers

and very few will go on to graduate work.

The single-course psychology student must complete two years of language study at the university level and two years of philosophy or logic, otherwise his courses will be concentrated on psychology and closely related subjects after the first year. In this way, the Yugoslav psychology student is exposed to roughly the same amount of formal academic training for his first degree as the American PhD receives in his seven years of formal course work. However, the single-subject Yugoslav undergraduate receives far less exposure to the liberal arts than his American contemporary.

The psychologist who does not necessarily intend to go into academic work but desires postgraduate training may undertake a major research problem, write an experimentally based dissertation, and receive a PhD. An alternative path of professional advancement is through the university hierarchy. As a first step after appointment as an instructor, a nonexperimental thesis in psychology is required for the rank of docent (assistant professor). With the publication of additional professional papers, an individual may be appointed as a professor extraordinary (associate professor), and ultimately the chairman of the department is entitled to the rank of ordinary professor (full professor). The same relative path may be taken by the nonacademic psychologist as far as the first step. That is, it is possible to acquire the title of "privatdocent," but the title changes to "docent" if a university appointment is received.

Students are admitted to the study of psychology on the basis of intelligence examinations, language examinations, grades, and an interview with faculty members. Roughly 50-60% of applicants are accepted.

The psychology curriculum at Zagreb, which is representative of Yugoslav universities, is as follows:

FIRST YEAR

Statistics - full year. In addition to correlation techniques and Chi-square, parametric statistics are included through analysis of variance. More advanced statistical techniques are taught in later elective courses.

General Psychology - full year. Experimental psychology is included here. During the first semester there are two lectures and one laboratory session (of three - six hours) per week and two lectures with three laboratory

sessions per week during the second semester.

Physics. This course would be comparable to elementary physics courses in American universities. There is a six-hour lecture and laboratory session each week for the year, covering optics, acoustics, electricity, etc.

Electives. A student may take additional subjects during the first year. These probably will be history of psychology, sociology, etc.

SECOND YEAR

General Psychology - full year.

Physiological Basis of Psychology - two hours of lectures and two of laboratory throughout the year.

Educational Psychology - two hours of lectures and two of laboratory throughout the year.

Experimental Psychology Laboratory - six hours per week of training in use of psychological techniques for one semester.

Auxiliary Subjects - One course in social science as well as history of philosophy and logic. (Continued from first year.)

At the end of the second year a student at Zagreb will specialize in either industrial or educational psychology. While a clinical program has been proposed, it has not yet been formally instituted and one receives the feeling that Professor Bujas is not overly concerned with how soon the clinical training starts.

THIRD YEAR

Psychometrics - four hours of lectures and three hours of laboratory per week - full year.

Educational Psychology - two hours of lectures and two of laboratory - full year.

Industrial Psychology - four hours of lectures and four of laboratory in the first semester. Six hours of lectures and four of laboratory during the second semester.

General Psychology - full year.

Psychopathology - full year.

Industrial Majors - Students specializing in industrial psychology also take courses in organization of work, introduction to political economy (which appears to be the only politically tinged course in the whole academic curriculum); and elements of industrial hygiene. The latter course is taught by the medical faculty.

Educational Psychology Majors - Students specializing in educational psychology, in addition to the basic third year courses, have courses in school hygiene (taught by the medical faculty), and introduction to education.

FOURTH YEAR

General Psychology - full year.

Specialized Topics - Each senior student engages in an intensive reading-tutorial course with an individual professor during his fourth year. The course content and direction of the reading is determined by the student's interest, as approved by the faculty. This course usually forms the basis for the thesis research.

Thesis - Each student completes a thesis, based on experimental work, which is roughly equivalent to that required for the Master's degree in the US.

At the end of the fourth year, after the thesis has been formally submitted, the students undertake final diploma examinations. These examinations include all of the subject matter covered during the university course, and are rather analogous to the American PhD comprehensives.

The path to the doctorate in Yugoslavia is essentially the same as that throughout Europe. A student either will remain at the university as an assistant while he undertakes his extensive doctoral research -- which is almost a full-time endeavor -- or he will work as a psychologist in an applied setting and collect his research data "on the job." On the basis of the rather limited sample of doctoral research reviewed during the visit to Zagreb, the quality of dissertations in psychology generally is comparable to those produced at any of the better US universities. It would appear, however, that there may be somewhat less individual supervision of the Yugoslav student during his doctoral work.

PSYCHOLOGY DEPARTMENT AND PSYCHOLOGY INSTITUTE, ZAGREB
UNIVERSITY

Teaching is a function of the Department of Psychology in the Faculty of Philosophy, and research activity is a function of the Institute of Psychology. The faculty hold dual appointments. At present, in addition to the professor, there are two associate professors, one docent, four lecturers, five assistant lecturers, and two laboratory demonstrators.

The Psychology Department and Institute occupy reasonably spacious quarters in a new and modern building of the Philosophy Faculty. The shift in faculty affiliation from science to philosophy, and the move to the new quarters in 1963 has been somewhat marred by unexpected difficulties. First, while the Philosophy faculty reportedly has been most hospitable to psychology, some problems have been created by the experimental animals. Initially, the concept of a rat colony in the philosophy building received at least passive intellectual acceptance; however, the philosophers found some difficulty, emotionally, in accepting the associated olfactory and logistic problems of maintaining the animal colony. As if the interdepartmental problems over the animal colony were not sufficient in and of their own right, additional difficulties were engendered two years ago by the major flood which inundated Zagreb. The one-year-old university buildings suffered rather serious damage in this flood, and the Psychology Department lost not only its rat colony but a great deal of associated material and equipment.

Laboratory space and research facilities are quite adequate, if one adds the laboratories of the Institute for Medical Research and Industrial Hygiene. In fact, the laboratory training facilities for students well may be some of the most adequate of any European university. An extremely well-equipped experimental psychology training laboratory has been constructed which is essentially modeled after the one at Harvard University. Here, spacious sound-attenuated cubicles are provided for students to carry out their laboratory exercises. The shelves in the Department library are lined with a moderately adequate selection of late textbooks, and a limited number of journals are available. Reportedly, it is not difficult to obtain money for reference books in Yugoslavian universities, although it is quite difficult to obtain funds for the purchase of journals.

As indicated earlier, psychology at Zagreb is dominated by Professor Zoran Bujas, who is a colorful and interesting study in and of himself. An intense man in his mid-

fifties, Bujas apparently has had no difficulty in retaining the position of leadership in Yugoslav psychology which was held by his father. He received a PhD at Zagreb University and then spent three years at the University of Paris, working under Henri Piéron, a person who has had a deep and lasting influence on Bujas' professional orientation. While many European professors wield the same autocratic influence within their universities as does Bujas, there are few whose influence so widely permeates psychology outside of their immediate departments.

In addition to a high level of research activity, resulting in over 100 publications in the past 30 years, he has been extremely active in other professional endeavors. These include serving as vice-rector and rector of the University of Zagreb, president of various Yugoslav commissions on psychology, president of the Yugoslav Psychological Society and president of the International Association of Applied Psychology.

As a person, Bujas manifests all of the graciousness and stately charm of a true European gentleman. At the same time, it was observed that he can quickly respond with irritability when colleagues suggest a less than adequate solution to a problem or fail to comprehend his instructions. He speaks flawless French and prefers to use this language with foreigners. Bujas is reasonably fluent in English, although as a general rule he chooses not to use this language in superficial contact with his foreign colleagues. It would appear that this attitude stems from the fact that his command of English is not good enough to dwell at length on high level abstractions or on highly technical subjects. He is obviously a proud man who thinks rapidly and speaks with precision; to carry on extended conversations in English proves most frustrating and even embarrassing as he gropes for words to explain what he might consider to be simple concepts. Accordingly, it is not surprising that the logical way out of a difficult situation is to disclaim any knowledge of English.

Bujas is a prolific, almost driven investigator who sets high standards of excellence in his research and demands the same standards of his students. There are a number of senior professors in Europe whose interests cover a very wide range of psychological problems; however, Bujas is one of the few, if not the only person, who is actively engaged in fairly sophisticated research in several different problem areas. For a number of years he has been active in the area of psychophysics, psychophysiology of work, and

psychometrics; and he is actively engaged in all three research areas at the present time. Occasionally he works on problems out of his three primary areas of interest and competence. When critically examined, however, his work in such fringe areas appears to be less sophisticated and rigorous than might be expected.

While the bulk of Bujas' research is undertaken at the Institute of Medical Research and Industrial Hygiene, for a number of years he has worked on psychometric problems at the Psychology Institute. Of particular concern and continuing interest to him has been the general area of intelligence testing. Bujas is critical of much past as well as contemporary research in this area, both from a philosophical and a psychometric standpoint. First, he believes too much emphasis is placed on finding the "best" or most logical solution to problems in the construction of intelligence tests -- as the best solution may not necessarily be the most realistic or adequate under the circumstances. Thus, for Bujas, the assessment of intelligence involves more than finding "the" correct solution to problems; it requires an evaluation of both the individual's recognition of or sensitivity to problems and his ability to select meaningfully from among the various alternative solutions which may be available. In essence, one might say that Bujas is concerned with the measurement of the ability to utilize intellectual capacity as well as with the native capacity per se. His position with regard to the psychometrics of intelligence testing follows logically from his philosophical criticisms. Thus, he advocates a scoring system which takes into account qualitative variations of response as being fundamental in any effort to assess intelligence.

At present Bujas is engaged in the development of a multidimensional intelligence test which meets both his philosophical and his psychometric criteria of an adequate measurement technique. Work on this test is reasonably well advanced, and several preliminary validation studies have been completed, including a factor analysis of the existing battery which yielded a "G" factor of 0.94. Inasmuch as none of this work has been published, only a broad outline of Bujas' approach will be presented here.

The battery involves approximately a half-dozen subtests, all of which are of either a verbal or symbolic problem-solving nature. In many respects, this battery might appropriately be considered a test of creativity. Throughout the tests there is an emphasis on evaluating

ability to change set in approaching problems or flexibility of intellectual functioning which appears to be weighted as heavily, if not heavier, than factual correctness or incorrectness of answers. In addition to the subtests being designed so that various alternative responses are elicited, several require a ranking of the relative adequacy of the alternative solutions. Three of the subtests are quite unique and different from previously published material of this nature. The remainder have been evolved from more conventional tests.

Bujas' interest in measurement of intelligence, achievement, and personality is quite sharply focused on theoretical and methodological problems. Once the work proceeds to the stage of routine test development and validation, it is quickly delegated to others. Thus, the routine item analysis and validation of the test described above is now being carried out by students.

Next to Bujas, Dr. Borislav Petz is the most active investigator at the Institute of Psychology. Petz trained under Bujas although he also had a period of postgraduate study in England. He now holds an appointment equivalent to Associate Professor at Zagreb University and is responsible for the industrial psychology program. From discussions with Petz, it is obvious that he plays a major part in determining the psychology curriculum and in dealing with departmental administration.

While industrial psychology at Zagreb includes personnel selection, training, and studies of worker motivation, etc., the primary emphasis is in the area of psychophysiology of work. Moreover, the research in this latter area would appear to be far more sophisticated and methodologically sound. The majority of Petz' work has been done in collaboration with Bujas, and almost all has been published in Yugoslavian journals. Earlier in his career Petz worked on the development of a series of intelligence tests, but his later research has been in the area of fatigue. After early studies on decrement of intellectual functioning under conditions of fatigue and nonfatigue, he has gone on to studies of the relationship between muscular fatigue and performance effectiveness. Most of his investigations have been concerned with the static work situation, and include studies of endurance and recovery in repeated performance, the relation of oxygen consumption and static work, and the influence of psychopharmacological agents on performance.

Dr. A. Krković, who holds an academic rank equivalent to Assistant Professor, took his PhD under Bujas and spent a postdoctoral year at Western Reserve University. Like Petz, Krković speaks excellent English and was most interested in discussing Yugoslav psychology. Krković is responsible for the teaching of psychometrics in the Psychology Department, but his primary research interests are in the areas of activation theory, sleep, and vigilance. As is the case with the majority of the faculty members, most of the Krković's research is a team effort.

Probably the most impressive single individual at Zagreb in terms of present accomplishment and future potential is Dr. Norman Sartorius, a psychiatrist who recently completed his PhD training in psychology under Bujas. Sartorius, who holds a permanent appointment in psychiatry in the Zagreb teaching hospital, now is on a British Medical Research Council postdoctoral fellowship in psychopharmacology at the Maudsley Hospital. He is one of three psychiatrists in Yugoslavia who also has completed the full psychology curriculum through the PhD. Moreover, while still in his early thirties, he has published some 20 papers.

Sartorius has two primary research interests, schizophrenic thought disorder and psychopharmacology. His most recent work in schizophrenia was the research which he submitted for his as yet unpublished doctoral dissertation. Basically, this was an experimental approach to the question of whether schizophrenic thought process is best characterized as over-inclusive or as overly-concrete.

Fifty matched pairs of subjects provided a normal control and an experimental group. The schizophrenic subjects were all previously untreated, first admissions to the Zagreb Medical School hospital. In each case a diagnosis of acute paranoid schizophrenia was unanimously agreed upon by three psychiatrists and possible organic complications ruled out. After the experimental subjects had been selected, a search was instituted for the 50 "normal" controls. Each pair of subjects was matched on the basis of age, sex, education, socio-economic background, and occupation. All control subjects also were examined prior to their selection to rule out overt psychiatric illness.

The first problem toward which Sartorius addressed himself was a determination of whether schizophrenics in his sample, in fact, did differ from the control group in terms of their ability to produce abstract concepts. One

of the "multi-dimensional" tests developed by Bujas for his intelligence or creativity test battery was employed. Here, the subjects were evaluated both on the number and quality of abstract concepts formed from a group of verbal stimulus materials. On this test the mean score of the schizophrenic group was a full two standard deviations lower than the mean of the controls, the difference being significant at the 0.001 l.o.c.

Next, a semantic differential scale was administered to determine if the groups differed in the meaning which they attached to the stimulus words used in the "multi-dimensional" test. Again, clear-cut differences were found. The controls produced normal curves, as predicted, in their evaluation of the emotional connotation of the stimulus words. However, the schizophrenic subjects tended to attribute emotional meaning to even "neutral" words and failed to show the same normal distribution of response. Finally, a free association test was administered. Here there were qualitative differences in response between the two groups although total production of words did not differ significantly. The schizophrenic group was less productive in terms of the number of different associations produced. Further analysis of the responses on the three tests disclosed essentially two distinct sub-groups among the schizophrenic sample. One, which Sartorius describes as "rigid," usually was able to provide meaningful answers, but was not sufficiently flexible in thinking to verify the correctness of the answers. The second sub-group clearly was best described as over-inclusive. Thus, while Sartorius' sample of schizophrenics as a group showed a gross limitation of their ability to shift abstract concept, and they clearly differed from the controls in terms of the meaning which words conveyed; they were not uniform in their pattern of thinking. Both concreteness and over-inclusiveness were elicited as characteristic patterns of schizophrenic thought, and one was no more prevalent than the other.

Sartorius' interest in psychopharmacology is primarily directed toward biometric problems in meaningfully classifying patients in drug studies and in evaluating changes in psychiatric status over time. While he has developed a rating scale where curves describing changes in overt psychiatric behavior are plotted on a time scale (with inter-rater reliabilities above 0.85), Sartorius does not consider the rating scale approach to be particularly fruitful. He has now turned to studies in clinical judgment where the psychiatrist or psychologist becomes an

instrument responding to an input of diverse variables. For Sartorius, the problem becomes one of isolating and identifying the variables which are both meaningful and stable indicators of diagnosis and/or change. The information utilized in his studies ranges from biochemical through psychometric. He has been heavily influenced by W.A. Hunt's work in clinical judgment, and has a strong and rather rigid experimental bias. This, combined with his drive, obviously superior ability, training in experimental psychology, and experience in clinical psychiatry, should mark Sartorius as a future leader. At present he is working on a major research problem aimed at identifying meaningful variables in psychiatric diagnosis through cross-cultural studies.

THE INSTITUTE FOR MEDICAL RESEARCH AND INDUSTRIAL HYGIENE,
ZAGREB

The psychology laboratory of this Institute, which has a primary mission of research in industrial medicine, was established about 15 years ago. Bujas directs the laboratory, which is staffed primarily by graduate students working on their PhD's. Because of the extensive research investment required for the dissertation, and the sophistication of the students, the work of the laboratory tends to be of high quality. However, this approach to staffing means the average investigator does not remain more than three to five years. At present there are three staff investigators (in addition to Bujas) and one assistant. The senior worker in the group is Dr. Branko Sremac, who recently finished his doctoral research in the area of fatigue. The equipment at this laboratory is quite sophisticated and certainly comparable to that found in the average US psychophysiology laboratory. One of the most intriguing aspects of this group is the amount of complex apparatus which they have constructed themselves.

The program of the laboratory does not appear to be systematically related to that of the Institute as a whole. In fact, one suspects there may be more than a little friction between the psychology laboratory and the rest of the Institute. Some feeling for the work of the laboratory may be obtained from the following summaries.

At present Bujas appears to be most interested in extending his studies of the psychophysics of sensation at the laboratory. He has been working with gustatory, visual, and auditory sensation, and now is focused on an apparent difference he has found in adaptation of the

gustatory mechanism. Briefly, Bujas finds that the rise in slope of the subjective response intensity curve is related to changes in both the absolute and the differential threshold in the case of gustation; but with visual and auditory stimuli only the differential threshold is affected. In the future it is hoped to shed light on the mechanism of this adaptation.

Fatigue studies have occupied the attention of this laboratory over many years and have formed the basis for many doctoral studies. There has been a spurt of studies in recent years on the relationship of work output, psychopharmacology, motivation, and fatigue. Generally speaking, motivation consistently has been found more effective than drugs in offsetting the effects of fatigue. Bujas is somewhat pessimistic about future pay-off in the area of drug studies. However, it is possible that his studies might be more rewarding if a stronger group of pharmacologists were associated with the laboratory.

An extensive series of studies have been carried out by Bujas and his colleagues on the relationship of rest to effective work. Under laboratory as well as field conditions, both the duration and intensity of work - rest periods have been systematically varied. A static work situation has been the major focus of the laboratory studies, while athletes have been used for the field investigations. The research to date rather clearly indicates that either a slowing down or changing of pace is more effective than stopping work. This finding holds good for both laboratory and field studies. Further, where the work load varies, such as in the weight of a series of shot thrown by an athlete in the shot-put, greater efficiency is obtained when the weight of the shot processes from heavy to light with each succeeding throw. Current work in this area is being concentrated on explaining why change of pace leads to a higher sustained level of work efficiency.

A study recently has been completed on the relationship of visual fatigue and flickering of light. This work was motivated by a concern with possible adverse effects of fluorescent lighting in industry. Fifteen subjects were required to read mathematical tables for two-hour periods under a control condition of constant stimulus and three experimental conditions involving flicker fusion -- below-, at-, and above-fusion threshold. Using a counterbalanced design, fatigue was found to be greatest under the above-threshold condition. The study now is being expanded to

include EEG recordings.

B. Sremec's doctoral research is concerned with investigating differences between control and peripheral processes in muscle fatigue. Using alternating current in the peripheral condition to stimulate arm muscles in human subjects, Sremec has obtained fatigue curves which clearly differ from those obtained under normal work conditions. In addition, he has been able to demonstrate the differential influence of several pharmacologic agents and a series of varying work - rest cycles on the fatigue curves.

SUMMARY

From the two institutions in Zagreb it is impossible to generalize on Yugoslavian psychology as a whole. However, the sample seen in Zagreb on the whole was quite impressive. One might have some second thoughts about the degree to which Bujas' influence seemingly permeates all research activity and the consequent implications this holds for the development of healthy controversy and differences of opinion among investigators. Moreover, it is unfortunate that more of the work is not published in foreign journals -- a move which surely would lead to a scientifically healthy professional interaction and stimulation.

Social psychology is grossly under-represented at Zagreb. Reportedly the leading Yugoslav social psychologist is Dr. N. Rot at Belgrade University. An interest in experimental social psychology and cross-cultural research appears to be developing in Ljubljana University Sociology Institute. Dr. Misha Jezernik, a Bujas-trained psychologist with a postdoctoral year in the US, appears to be leading this effort. Jezernik has worked primarily in industrial psychology, and his reasons for entering the area of cross-cultural research are not entirely clear. One suspects, however, that the primary motivation here is in the availability of research funds rather than scientific dedication. After a brief visit to Ljubljana, one also suspects that Jezernik does not enjoy the same status in social psychology as does Rot. In any event, Jezernik certainly has a fertile field for cross-cultural research if he is up to the task facing him. There are few countries with such an elegant natural laboratory within its own boundaries as Yugoslavia.

DOCUMENT CONTROL DATA - R&D

(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)

1. ORIGINATING ACTIVITY (Corporate author) Office of Naval Research, Branch Office London, England		2a. REPORT SECURITY CLASSIFICATION Unclassified	
		2b. GROUP	
3. REPORT TITLE NOTES ON PSYCHOLOGICAL TRAINING AND RESEARCH IN YUGOSLAVIA; Psychological Institute, University of Zagreb, and The Institute for Medical Research and Industrial Hygiene, Zagreb			
4. DESCRIPTIVE NOTES (Type of report and inclusive dates) N.A.			
5. AUTHOR(S) (Last name, first name, initial) RASMUSSEN, John E.			
6. REPORT DATE 8 August 1966		7a. TOTAL NO. OF PAGES 16	7b. NO. OF REFS -
8a. CONTRACT OR GRANT NO. N.A.		9a. ORIGINATOR'S REPORT NUMBER(S) ONRL-35-66	
b. PROJECT NO.		9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report) N.A.	
c. N.A.			
d.			
10. AVAILABILITY/LIMITATION NOTICES This document is subject to special export controls & each transmittal to foreign governments or foreign nationals may be made only with prior approval of the Office of Naval Research Branch Office, Box 39, FPO, New York 09510.			
11. SUPPLEMENTARY NOTES N.A.		12. SPONSORING MILITARY ACTIVITY N.A.	
13. ABSTRACT Brief history and summary of current psychological training and research at Zagreb University and Institute for Medical Research and Industrial Hygiene, Zagreb.			

14	KEY WORDS	LINK A		LINK B		LINK C	
		ROLE	WT	ROLE	WT	ROLE	WT
	Psychological Training, Yugoslavia Psychological Research, Yugoslavia Zagreb University						

INSTRUCTIONS

1. **ORIGINATING ACTIVITY:** Enter the name and address of the contractor, subcontractor, grantees, Department of Defense activity or other organization (*corporate author*) issuing the report.
- 2a. **REPORT SECURITY CLASSIFICATION:** Enter the overall security classification of the report. Indicate whether "Restricted Data" is included. Marking is to be in accordance with appropriate security regulations.
- 2b. **GROUP:** Automatic downgrading is specified in DoD Directive 5200.10 and Armed Forces Industrial Manual. Enter the group number. Also, when applicable, show that optional markings have been used for Group 3 and Group 4 as authorized.
3. **REPORT TITLE:** Enter the complete report title in all capital letters. Titles in all cases should be unclassified. If a meaningful title cannot be selected without classification, show title classification in all capitals in parenthesis immediately following the title.
4. **DESCRIPTIVE NOTES:** If appropriate, enter the type of report, e.g., interim, progress, summary, annual, or final. Give the inclusive dates when a specific reporting period is covered.
5. **AUTHOR(S):** Enter the name(s) of author(s) as shown on or in the report. Enter last name, first name, middle initial. If military, show rank and branch of service. The name of the principal author is an absolute minimum requirement.
6. **REPORT DATE:** Enter the date of the report as day, month, year, or month, year. If more than one date appears on the report, use date of publication.
- 7a. **TOTAL NUMBER OF PAGES:** The total page count should follow normal pagination procedures, i.e., enter the number of pages containing information.
- 7b. **NUMBER OF REFERENCES:** Enter the total number of references cited in the report.
- 8a. **CONTRACT OR GRANT NUMBER:** If appropriate, enter the applicable number of the contract or grant under which the report was written.
- 8b, 8c, & 8d. **PROJECT NUMBER:** Enter the appropriate military department identification, such as project number, subproject number, system numbers, task number, etc.
- 9a. **ORIGINATOR'S REPORT NUMBER(S):** Enter the official report number by which the document will be identified and controlled by the originating activity. This number must be unique to this report.
- 9b. **OTHER REPORT NUMBER(S):** If the report has been assigned any other report numbers (*either by the originator or by the sponsor*), also enter this number(s).
10. **AVAILABILITY/LIMITATION NOTICES:** Enter any limitations on further dissemination of the report, other than those

imposed by security classification, using standard statements such as:

- (1) "Qualified requesters may obtain copies of this report from DDC."
- (2) "Foreign announcement and dissemination of this report by DDC is not authorized."
- (3) "U. S. Government agencies may obtain copies of this report directly from DDC. Other qualified DDC users shall request through _____."
- (4) "U. S. military agencies may obtain copies of this report directly from DDC. Other qualified users shall request through _____."
- (5) "All distribution of this report is controlled. Qualified DDC users shall request through _____."

If the report has been furnished to the Office of Technical Services, Department of Commerce, for sale to the public, indicate this fact and enter the price, if known.

11. **SUPPLEMENTARY NOTES:** Use for additional explanatory notes.
12. **SPONSORING MILITARY ACTIVITY:** Enter the name of the departmental project office or laboratory sponsoring (*paying for*) the research and development. Include address.
13. **ABSTRACT:** Enter an abstract giving a brief and factual summary of the document indicative of the report, even though it may also appear elsewhere in the body of the technical report. If additional space is required, a continuation sheet shall be attached.

It is highly desirable that the abstract of classified reports be unclassified. Each paragraph of the abstract shall end with an indication of the military security classification of the information in the paragraph, represented as (TS), (S), (C), or (U).

There is no limitation on the length of the abstract. However, the suggested length is from 150 to 225 words.

14. **KEY WORDS:** Key words are technically meaningful terms or short phrases that characterize a report and may be used as index entries for cataloging the report. Key words must be selected so that no security classification is required. Identifiers, such as equipment model designation, trade name, military project code name, geographic location, may be used as key words but will be followed by an indication of technical content. The assignment of links, roles, and weights is optional.