

tion to a Federal fund cutoff, but said they had not studied the amendments enough to comment in detail.

Caution is also being expressed in the Administration. Dr. Donald F. Hornig, the President's Science Adviser, says the Wyman amendments put university administrations in an impossible position. Harold Howe II, Commissioner of Education, whose office administers NDEA programs, says of the amendments: "In general I think they are extremely undesirable and unnecessary and kind of a triumph of resentment over wisdom."

Student reaction varies, dividing along political lines, among others. A representative of the conservative Young Americans for Freedom said he thought most of his membership would approve the Wyman amendments. But Pat Sturgis, editor of *NEW LEFT NOTES*, finds the Congressional reaction understandable: "When you are trying to change the government, you can't expect it to

walk arm in arm with you." Passage of the Wyman amendments would not necessarily be bad, says Sturgis, since it would make clear that the government is not interested in furthering education regardless of the political views of those who receive the aid.

Nobody on the firing line expects that the Wyman amendments would do away with demonstrations. "There are many reasons for demonstrations," says Sturgis. The amendments might even furnish another.

University administrators also expect disturbances to continue.

Out of it all, says Dr. Colin S. Pittendrigh, dean of Princeton's graduate school, may come a re-examination of the complex university administrative structure. Students, by definition, he says, will never make administrative decisions, but the unrest may bring them more regular channels for making their feelings and opinions count.

MONEY TALKING

Bright prospects for graduates

In recent years starting salaries for college science and technology graduates have been rising much faster than wages generally. Since 1960, for instance, industry has upped its starting offer to natural science graduates by 50 percent.

A part of this, of course, is due to inflation. The major part is due to the burgeoning demand for scientists and technologists of almost all stripes.

A significant contribution has been made to the increase, however, many labor analysts believe, by industry's desire for fresh blood, the belief that the new graduate has all the latest answers at the tip of his tongue.

So college graduates in science this year will share what the U.S. Department of Labor expects to be an embarrassment of riches in employment opportunity—if they aren't drafted.

A record 820,000 are expected to receive degrees this year—670,000 bachelors and 150,000 advanced degrees. For them, the Labor Department says, "employment prospects are exceedingly bright."

There are expected to be more jobs offered than there are graduates who will take them. Many of the bachelors will try for advanced degrees and many more will be drafted. Competition among employers for the remainder has driven starting salaries 5 percent higher than last year.

As is often the case, the demand for engineers outstrips that for other technology graduates. In fact, it exceeds the demand in all fields except accounting. Chemical, electrical and mechanical engineers are the most sought after, with

starting salaries averaging \$750 a month.

In mathematics and the natural sciences, bachelor's degrees in physics will draw the highest average starting salaries. The Labor Department describes opportunities for chemists and physicists as excellent in industry, government and teaching. Physicists are being offered an average of \$750 to start, chemists about \$725.

Mathematicians have a very good outlook for employment, especially in fields such as computer technology and insurance. Mathematicians who have some background in engineering and the physical sciences are being sought for jobs in operations research, quality control and systems analysis. Starting salaries average about \$700 a month.

Medical research programs seek Ph.D.'s in biophysics, biochemistry, microbiology, physiology, pathology and pharmacology. Among biologists these are in particularly strong demand. Prospects for bachelors in biological sciences generally are limited to jobs as technologists and research assistants, and starting salaries for this group average about \$600 a month.

Openings in the earth sciences call primarily for advanced degrees, though petroleum companies are recruiting a few bachelors in geology.

The Labor Department says the outlook for graduates in health fields is very bright this year. This is due primarily to a continuing shortage of staff in hospitals and nursing homes. Pharmacists are in particular demand; pharmaceutical companies are hiring them to fill positions in sales and production.

MIGHT HAVE IDENTIFIED RAY

Computer encoding of fingerprints

In all of the fingerprints ever studied, no two impressions from different fingers have ever been found to be identical. The Federal Bureau of Investigation alone has some 187 million sets of prints on file, including duplicates. About 64 million of the individuals represented are ordinary citizens; 17 million are in the criminal file.

Since the minute details of a fingerprint remain unchanged through a lifetime, they offer positive identification when they can be matched. However, under the system of classification most widely used for large fingerprint collections, this identification cannot be made easily unless all 10 prints are available for comparison.

Problems arise when only one print or partial prints are available. Then the identification process can be either very time-consuming or impossible.

Such a situation prevented the FBI, with all its resources, from piercing the alias of the suspected assassin of Dr. Martin Luther King Jr. for days after the slaying. Now a concerted attack by computer experts is expected to shorten such a search to a minute or two.

The commonly used Henry system takes account of the different patterns—arches, loops, whorls—and ridge counts. It uses information from all the fingers and, even with a computer to help, requires an expert to be able to recognize the basic patterns.

These recognition problems are serious obstacles to any effort to automate the Henry system. So scientists are looking for another way of using computers to classify and identify fingerprints.

Two fingerprints can be shown to belong to the same finger by comparing a dozen details. Authorities generally accept the demonstration that 12 details agree, with none in disagreement, as proof the two prints originate from the same finger.

A new system, just developed at the National Bureau of Standards by Dr. J. H. Wegstein, replaces the loops and whorls of the Henry system with ridge endings, bifurcations, incipient ridges, slands and enclosures. Once the location of these details is established, a computer can classify and identify a single fingerprint.

But the input to the computer has to be done by hand. The experts who classify the fingerprints sort them according to the X and Y coordinates of the details, as well as their orientation with respect to each other.

From this information, the computer calculates a set of descriptors that are

then stored in the machine's memory, along with a label identifying the fingerprint.

To make the process totally computerized, the descriptors filed in the computer would also have to be obtained from the fingerprint by an automatic reading device.

Two other studies, both financed by the Federal Bureau of Investigation, are aimed at finding out whether or not computers can be programmed to determine automatically the location and orientation of the minutiae of a single fingerprint.

Because neither of the studies are completed, the FBI and those concerned with the work at the Cornell Aeronautical Laboratories and the Autonetics



NBS

Fingerprint with overlay for computer.

Division of North-American Rockwell talk about their approach and progress only in general terms.

Dr. Morton Spooner of Cornell says the laboratory model developed there has been demonstrated to the FBI, and he hopes a report can be made public within the next six months.

The Autonetics laboratory model of a fingerprint reading device is still being tested, but is expected to be ready for demonstration by the end of June, about a year after the \$115,000 contract was signed.

The FBI is being advised in its technical evaluation of the two systems by the Bureau of Standards. Which company will get the final contract for building the equipment, which must be able to scan and match up to 500,000 fingerprints a day, should be settled

within six months, and production begun.

The advantage of an identification system that uses only one fingerprint, or even part of one, is clearly demonstrated in the Martin Luther King case. For James Earl Ray, the man sought as the assassin of Dr. King, the FBI has 10 fingerprints on file. Another set of 10 could have been quickly matched for certain identity within a minute or two.

In the King case, however, there were only a few latent prints with no clue as to which hand they came from.

It wasn't until mid-April that a clear print of a right thumb (number six in the Henry system) was obtained from a map in the Atlanta room where Ray, who had previously been identified under the alias of Eric Starvo Galt, had been staying.

PSYCHOANALYSTS

They want to be understood

Psychoanalysts in the past have not done much to counter the sneers and satire aimed at their profession. To them it's a cost of the kind of work they do.

They interpret jokes about the couch and Freud and criticism of the value of psychoanalysis and the scientific worth of analytic theories more or less as evidence of public fear. Ever since Freud, psychoanalysts have expected the public to react defensively against their probes of the unconscious.

But now the stakes are higher. The field of mental health is taking off in a big way. New community mental health centers promise to reach many thousands of people with a variety of non-analytic tools—drugs, new therapies and techniques aimed at changing behavior rather than solving internal conflicts.

A casualty of this head-long rush to action is likely to be interest in the unconscious psyche: Just the subject on which analysts have spent years building a body of information and theory.

And they're not about to sit by and watch the theoretical and practical structure, so long and hard in the making, be relegated to the scrap heap.

There is a danger that mental treatment will become too superficial, says Dr. Burness E. Moore, associate clinical professor at Yale University and a training analyst at the New York Psychoanalytic Institute. "The contribution of the psychoanalyst to theoretical ideas may be completely lost."

Faced with the threat of diminishing influence over mental health, the American Psychoanalytic Association decided not to counterattack, but to address itself to the public and those who influence public opinion.

Action then was fast. The FBI ordered a search of the fingerprint file of the 53,000 wanted fugitives, on the basis that the man suspected of shooting Dr. King could very well have a previous record. The computer that sorts the FBI cards, classified on the basis of 10 fingerprints, was programmed to eliminate all females, all non-whites, all males over 50 and all males under 25.

About 1,700 cards were left. These could then be scanned, not for all 10 prints but only for number six. The search started about 10 at night and by 9 the next morning, at about the 700th card, a match was found. The proposed system is expected to do such a job in a fraction of the time, if a satisfactory method of giving the computer sets of descriptors can be worked out either at Cornell or Autonetics.

"In the past, we made no effort," says Dr. Moore. "Now we are trying to represent ourselves as accurately as possible."

It has not been easy. From an initial reluctance even to talk to reporters, psychoanalysts have moved to restrained and cautious communication with the press.

Years of misinterpretation have built up a sense of wariness on the part of the analyst, explains Dr. Martin A. Berezin, Boston analyst on the Harvard faculty as well as the staffs of Beth-Israel and McLean Hospitals.

"Experience with a good deal of resistance and hostility has led older analysts to exercise great caution in dealing with the outside world," adds Dr. Moore.

Psychoanalysts are not accustomed to having to defend their profession. Individually, analysts have exercised considerable hegemony over the field of mental health.

In Boston hospitals, for instance, by far the greatest number of training psychiatrists are in fact psychoanalysts. (The difference between the two is that an analyst spends seven to eight years after psychiatric training at a psychoanalytic institute studying unconscious processes.) Most heads of psychiatric departments in Boston are analysts.

The same is true in other cities with psychoanalytic institutes, says Dr. Berezin. Nearly all analysts hold positions outside their private practice—most of them teaching posts. But the fact is not widely known since an analyst will often identify himself simply as a psychiatrist.

Contrary to popular conception, analysts have also been busy with social issues, Dr. Berezin points out. Of five