

GENES, INTELLIGENCE AND EDUCATION

COMMENCEMENT ADDRESS

UNIVERSITY OF MICHIGAN

AUGUST 10, 1969

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AND

THE UNIVERSITY OF CHICAGO

GENES, INTELLIGENCE AND EDUCATION

MR. PRESIDENT, CANDIDATES (GRADUATES), LADIES AND GENTLEMEN:

I AM BOTH PLEASED AND HONORED TO HAVE A SMALL PART IN THE
COMMENCEMENT EXERCISES OF THIS DISTINGUISHED UNIVERSITY -- AND FOR
SEVERAL REASONS.

FIRST, IT GIVES ME THE PRIVILEGE OF BRINGING GREETINGS FROM A
SISTER MIDWESTERN INSTITUTION, THE UNIVERSITY OF CHICAGO, WITH WHICH
I PROUDLY CONTINUE TO BE ASSOCIATED.

SECOND, IT IS AN APPROPRIATE OCCASION FOR POINTING OUT THAT THIS
UNIVERSITY HAS ALWAYS HAD A SPECIAL ROLE IN OUR NATION'S SYSTEM OF
HIGHER EDUCATION. THAT SYSTEM IS, I AM CONVINCED, THE STRONGEST IN THE
WORLD -- IN LARGE PART BECAUSE IT IS BOTH HIGHLY DIVERSE AND CONSTRUCTIVELY
COMPETITIVE. I HOPE WE CAN KEEP IT SO THROUGH CONTINUED CONFIDENCE AND
SUPPORT OF BOTH ITS PRIVATE AND TAX-SUPPORTED SECTORS.

FINALLY, I AM GLAD TO HAVE SUCH AN INSPIRING SETTING IN WHICH TO TALK ABOUT MY SPECIAL INTEREST -- GENES AND BIOLOGICAL INHERITANCE -- WHICH HAVE SO MUCH TO DO WITH MAN'S INTELLIGENCE AND HIS CAPACITY TO SUPPLEMENT HIS PURELY BIOLOGICAL INHERITANCE THROUGH EDUCATION, FORMAL AND OTHER. THAT IS WHY I CHOSE THE TITLE "GENES, INTELLIGENCE AND EDUCATION."

IN OUR PURELY BIOLOGICAL INHERITANCE, WHICH IS SO LARGELY DETERMINED BY OUR GENES, WE ARE NOT IN PRINCIPLE MUCH DIFFERENT FROM OTHER LIVING FORMS -- VIRUSES, SPINACH PLANTS, SNAILS AND ELEPHANTS.

I'M SURE THOSE OF YOU WHO ARE RECEIVING DEGREES TODAY KNOW ALL ABOUT THAT. BUT SINCE MUCH OF IT HAS HAPPENED SO RECENTLY AND SO RAPIDLY, I SHALL REVIEW BRIEFLY FOR THOSE WHO HAVE NOT HAD TIME TO KEEP UP OR CATCH UP.

THE BIOLOGICAL INFORMATION WHICH DETERMINES THAT THE FATE OF A MICROSCOPIC EGG CELL OF A HUMAN BEING WILL BE SO VERY DIFFERENT FROM THAT OF A SPINACH PLANT, IS SUBDIVIDED INTO TWO PARTS. ONE PART IS THE JELLY-LIKE OUTER CORE OF THE EGG CELL -- ITS CYTOPLASM. IT CARRIES INFORMATION THAT DETERMINES IN PART WHAT THE CELL WILL DO.

BUT I SHALL TALK MAINLY ABOUT THE SECOND PART -- THAT IN THE CENTRALLY LOCATED NUCLEUS OF THE CELL, FOR THERE SEEMS TO BE MORE OF IT AND WE CLEARLY KNOW MORE ABOUT IT.

IN THE NUCLEUS OF THE FERTILIZED EGG CELL OF MAN THERE ARE 46 CHROMOSOMES. EACH OF THEM IN TURN CONTAINS MANY THOUSANDS OF KINDS OF GENES. EACH GENE IS A LONG THREAD-LIKE MOLECULE OF DEOXYRIBONUCLEIC ACID -- DNA.

COLLECTIVELY ALL THE GENES ADD UP TO SOME 6 BILLION DNA SUBUNITS.

THESE SUBUNITS ARE OF 4 KINDS, AND THE ORDER IN WHICH THEY ARE ARRANGED

IS A MOLECULAR CODE OR LANGUAGE IN WHICH ARE SPELLED OUT THE DIRECTIONS FOR MAKING A PERSON OUT OF THAT TINY CELL. THE ALPHABET OF THE DNA LANGUAGE THUS CONSISTS OF BUT FOUR LETTERS. THIS DNA INFORMATION OF A SINGLE EGG CELL WHICH MAKES UP THE BIOLOGICAL INSTRUCTIONS FOR DEVELOPMENT OF A PERSON, IS THE EQUIVALENT OF MORE THAN 1,000 STANDARD PRINTED VOLUMES, 600 PAGES, 500 WORDS PER PAGE. THAT IS THE SIZE OF THE RECIPE FOR CONSTRUCTING A PERSON FROM THAT TINY ALMOST MICROSCOPIC CELL -- GIVEN PROPER RAW MATERIAL IN THE FORM OF FOOD, A SUITABLE ENVIRONMENT PLUS ADEQUATE TIME.

WE KNOW ABOUT DNA THROUGH THE WORK OF MANY SCIENTISTS -- CHEMISTS, PHYSICISTS, BIOLOGISTS AND OTHERS.

IN MANY WAYS, THE MOST DRAMATIC AND SIGNIFICANT STEP IN OUR UNDERSTANDING OF THIS REMARKABLE KIND OF MOLECULE CAME IN 1953 WHEN JAMES WATSON AND FRANCIS CRICK, THEN AT CAMBRIDGE UNIVERSITY, WORKED OUT THE

NOW FAMOUS DOUBLE HELIX STRUCTURE OF DNA. MANY OF YOU HAVE BY NOW READ
WATSON'S LITTLE BOOK, THE DOUBLE HELIX. IF YOU HAVEN'T, I URGE YOU TO
DO SO.

WHY IS THE DNA DOUBLE HELIX SO IMPORTANT? IT IS BECAUSE KNOWLEDGE
OF IT SO DIRECTLY LEADS TO AN UNDERSTANDING OF HOW GENETIC INFORMATION
IS CARRIED; HOW IT IS COPIED OR REPLICATED, AS IT MUST BE WITH EVERY
CELL DIVISION IN THE GERM LINE OF HIGHER PLANTS AND ANIMALS; HOW IT
UNDERGOES OCCASIONAL MUTATIONAL CHANGE -- THE PRIMARY BASIS OF ORGANIC
EVOLUTION --; AND HOW ITS INFORMATION IS USED IN DEVELOPMENT AND FUNCTION
THROUGH DETERMINING THE STRUCTURES OF PROTEINS. ALL OF THE ESSENTIAL
STEPS IN PROCESSES CAN NOW BE CARRIED OUT AND INVESTIGATED IN CELL-FREE
TEST TUBE SYSTEMS.

DNA IS FAR SIMPLER THAN ANY MAN-MADE LANGUAGE, AND IT AROSE FAR
EARLIER -- MORE THAN TWO BILLION YEARS AGO, IN FACT. ALL 64 POSSIBLE

THREE-LETTER WORDS OF THE DNA DICTIONARY HAVE NOW BEEN DECODED. THAT
IS THE TOTAL DICTIONARY.

BIOCHEMISTS HAVE SHOWN US IN MUCH DETAIL HOW DNA, NATURAL OR
SYNTHETIC, IS REPLICATED THROUGH CHEMICAL REACTIONS CATALYZED BY KNOWN
ENZYMES. DNA MOLECULES OF SOME LENGTH AND OF PREDETERMINED SEQUENCE
OF UNITS HAVE BEEN SYNTHESIZED BY PURELY CHEMICAL METHODS. THERE SEEMS
LITTLE DOUBT THAT BEFORE LONG ENTIRE GENES WILL BE SYNTHESIZED IN VITRO,
JUST AS HAVE SEVERAL BIOLOGICALLY ACTIVE PROTEINS.

IN MAN WE KNOW MANY MODIFICATIONS OF DNA SPECIFICATIONS. IT IS
THIS RESULTING DIVERSITY THAT GIVES EACH OF US BIOLOGICAL INDIVIDUALITY.
EXCEPT FOR IDENTICAL TWINS, AND THEIR COUNTERPARTS IN HIGHER MULTIPLE
BIRTHS, NO TWO OF THE THREE BILLION PERSONS ON EARTH ARE EXACTLY ALIKE
GENETICALLY.

SOME GENETIC MODIFICATIONS ARE EXPRESSED IN GENETIC DISEASE.

SEVERAL HUNDRED SUCH ARE NOW KNOWN. FOR SOME, THE HARMFUL EFFECTS CAN BE PREVENTED BY APPROPRIATE MEDICAL INTERVENTION OF A KIND THAT DOES NOT REPAIR THE DIRECTING GENETIC INFORMATION -- THE GENE. THERE ARE PROSPECTS FOR MORE DIRECT METHODS OF MODIFYING FAULTY OR UNDESIRABLE GENES DIRECTLY, BY SPECIFICALLY REPAIRING OR REPLACING THEM; BUT IN MY OPINION, IT WILL BE MANY YEARS OR DECADES BEFORE THESE WILL FIND PRACTICAL AND WIDE-SPREAD MEDICAL APPLICATION IN MAN.

LET ME NOW TURN BRIEFLY TO OUR SECOND TYPE OF INHERITANCE -- CULTURAL INHERITANCE -- ON WHICH DEPENDS OUR VERY ABILITY TO UNDERSTAND SO MUCH ABOUT OURSELVES AND OUR FELLOW CREATURES ON EARTH. SOME ANIMALS SHOW THE BEGINNINGS OF CULTURAL INHERITANCE, BUT WE WHO ARE MEN DEPEND ON IT FAR MORE THAN ANY OF THEM.

THIS SECOND TYPE OF INHERITANCE -- TRANSMISSION OF CULTURAL INFORMATION FROM PERSON TO PERSON WITHIN AND BETWEEN GENERATIONS --

DEPENDS ON THAT UNIQUELY DEVELOPED PART OF OUR NERVOUS SYSTEM CALLED
THE BRAIN.

THIS IS A TRULY AMAZING ORGAN IN ITS CAPACITY TO RECORD INFORMATION,
REARRANGE IT AND MAKE IT AVAILABLE AT WILL -- OR UNCONSCIOUSLY, FOR
INFORMATION THAT CONTROLS SUCH INSTINCTIVE AND REFLEXIVE RESPONSES AS
BREATHING AND THE BEATING OF THE HEART.

JUST AS ARE OTHER PARTS OF OUR BODIES, THE BRAIN IS CONSTRUCTED
ACCORDING TO THE DNA INSTRUCTIONS WE INHERIT BIOLOGICALLY FROM OUR
PARENTS. EXACTLY HOW THIS MOST INTRICATE CONSTRUCTION JOB IS CARRIED
OUT WE DO NOT KNOW, JUST AS WE DO NOT KNOW HOW OUR MANY OTHER SPECIALIZED
CELLS, TISSUES AND ORGANS ARE BUILT ON THE BASIS OF DNA DIRECTIONS THAT
SEEM TO BE IDENTICAL FOR ALL CELLS OF THE BODY. THIS IS A MAJOR CHALLENGE
FOR FUTURE GENERATIONS OF BIOLOGISTS.

WHAT WE DO SEEM TO KNOW IS THAT THERE ARE TWO KINDS OF INFORMATION

IN THE BRAIN, THAT BUILT IN ACCORDING TO DNA INSTRUCTIONS, AND THAT RECEIVED THROUGH THE SENSES. WE SEEM NOT TO DIFFER SIGNIFICANTLY FROM OUR CLOSEST NON-HUMAN RELATIVES IN KIND OR AMOUNT OF THE FORMER. BUT FOR THE "PUT-IN" INFORMATION -- THAT RECEIVED THROUGH THE SENSES -- WE DIFFER ENORMOUSLY, PROBABLY IN AMOUNT, BUT SURELY IN KIND, IN ABILITY TO REARRANGE, RECOMBINE, SYNTHESIZE AND RETRIEVE IT, AS WELL AS MEANINGFULLY TO RESPOND TO IT IN ITS VARIOUS PERMUTATIONS. IT IS THIS "PUT-IN" INFORMATION THAT IS LARGELY RESPONSIBLE FOR OUR CUMULATIVE CULTURAL HERITAGE. BIRDS DO NOT LEARN TO BUILD A NEST. THEY DO IT INSTINCTIVELY. IN CONTRAST, WE HAVE NO SUCH BUILT-IN INFORMATION TELLING US HOW TO BUILD A HOUSE. UNLIKE THE BIRD, WE ARE ABLE TO LEARN FROM OUR FELLOW MEN THROUGH THE SPOKEN OR WRITTEN WORD, THROUGH PICTORIAL REPRESENTATION OR BY OBSERVING OTHERS DO IT.

THUS, BECAUSE OF CULTURAL INHERITANCE OUR BEHAVIOUR IS MORE

FLEXIBLE, LESS REFLEXIVE AND LESS INSTINCTIVE THAN THAT OF OTHER ANIMALS.

OUR "PUT-IN" INFORMATION IS ENORMOUSLY GREATER THAN THEIRS IN BOTH

AMOUNT AND KIND. AS GEORGE GAYLORD SIMPSON AND OTHERS HAVE POINTED OUT,

OUR CURIOSITY, IMITATION, ATTENTION, MEMORY AND IMAGINATION ARE FAR

GREATER, AND WE USE THEM IN MORE INTRICATE WAYS. OUR REASON IS MORE

HIGHLY DEVELOPED. WE MAKE AND USE HIGHLY SOPHISTICATED TOOLS AND MACHINES

OF MANY KINDS. WE ARE SELF-CONSCIOUS. WE REFLECT ON THE PAST, THE FUTURE,

AND ON LIFE AND DEATH. WE THINK IN ABSTRACT AND SYMBOLIC WAYS, WHICH

MAKES POSSIBLE LANGUAGE, LITERATURE AND ART. SOME OF US HAVE A SENSE

OF BEAUTY, MOST ARE RELIGIOUS AND ONLY A FEW LACK A MORAL SENSE. WE

ARE CULTURAL AND SOCIAL ANIMALS, WHICH HAS LED US TO DEVELOP UNIQUE

SOCIETIES AND CULTURES OF EVER INCREASING COMPLEXITY, INCLUDING THE ARTS,

RELIGIONS, PHILOSOPHIES, LITERATURES, AGRICULTURES, TECHNOLOGIES,

SCIENCES, COMPLEX INDUSTRIES, GOVERNMENTS, EDUCATIONAL SYSTEMS AND SO ON.

SO HERE WE ARE -- THE PRODUCT OF TWO KINDS OF INHERITANCE, WITH THE KNOWLEDGE TO CONTROL BOTH. WHAT DO WE DO ABOUT IT?

THE FIRST, BIOLOGICAL CHANGE, WHICH WE COULD CONTROL AND DIRECT IN MAN JUST AS WE DO IN THE ANIMALS WE DOMESTICATE AND THE PLANTS WE CULTIVATE, IS SLOW AND DIFFICULT OF REVERSAL. FURTHERMORE, THERE IS NO CONSENSUS AS TO WHAT WE WANT IN MAN. HITLER HAD A SPECIFIC PROGRAM, BUT FEW OF US--NONE, I HOPE--APPROVED OF EITHER HIS OBJECTIVE OR HIS METHOD.

CULTURAL CHANGE IS ENORMOUSLY FASTER. LET ME ILLUSTRATE BY CITING A MANUSCRIPT PROFESSOR JOHN R. PLATT OF THIS UNIVERSITY'S MENTAL HEALTH RESEARCH INSTITUTE RECENTLY SHOWED ME. IT POINTS OUT THAT WITHIN A CENTURY, LITTLE MORE THAN THE LIFE SPAN OF ONE OF US, WE HAVE INCREASED OUR TRAVEL SPEED A HUNDRED-FOLD, OUR CONTROLLABLE ENERGY RESOURCES A THOUSAND TIMES, OUR SPEED OF COMPUTATION A MILLION TIMES AND OUR SPEEDS OF COMMUNICATION BY A FACTOR OF TEN MILLION. THESE ARE ALL CULTURAL

CHANGES. LIKE OTHER CULTURAL CHANGES, AND DECIDEDLY UNLIKE THE BIOLOGICAL CHANGE WE CALL EVOLUTION, THEY COULD IN THEORY BE REVERSED IN A SINGLE GENERATION. OF COURSE IN PRACTICE THIS IS HIGHLY UNLIKELY, SHORT OF A CATASTROPHIC EVENT, SUCH AS ALL-OUT NUCLEAR WAR.

THE MAJOR SOCIAL PROBLEMS WE FACE TODAY ARE CULTURAL. THEY ARE EITHER THE RESULT OF MISTAKES WE HAVE MADE IN THE PAST OR OF MISTAKES WE ARE LIKELY TO MAKE IN THE FUTURE. YOU KNOW THEM. THEY INCLUDE WAR, *the ever widening gap between the haves and the have-nots,* PRESENT AND POTENTIAL, OVER-POPULATION WITH ATTENDANT POVERTY AND FAMINE, CRIME, POLLUTED ENVIRONMENTS, MALDISTRIBUTION OF MEDICAL CARE, RACIAL AND CULTURAL INTOLERANCE AND INADEQUATE EDUCATIONAL SYSTEMS. EVERY ONE OF THESE IS PRIMARILY A CULTURAL PROBLEM. *They deeply disturb many of us, especially the more thoughtful among the groups to which belong you who are receiving degrees today.*

WE NOW HAVE MUCH OF THE KNOWLEDGE AND MOST OF THE RESOURCES REQUIRED TO SOLVE THEM, ESPECIALLY IN THIS PRIVILEGED NATION OF OURS. ALL WE NEED IS THE GLOBAL WILL TO DO SO AND THE COURAGE INTERNATIONALLY TO REDIRECT

RESOURCES. OUR GREATEST DANGER IS THAT WITH THE GREATLY INCREASED TEMPO OF CHANGE, TIME MAY RUN OUT.

LET ME NOW DEAL SPECIFICALLY BUT BRIEFLY WITH EDUCATION -- IN THE BROADEST SENSE ALL THAT WE LEARN FROM BIRTH THROUGH FATHERS, BROTHERS AND SISTERS, PLAYMATES, OTHER ASSOCIATES, MAN-MADE THINGS (BOOKS, MACHINES AND SO ON) AND THE FORMAL EDUCATIONAL SYSTEM. IT IS STRIKING AND ALMOST IMPOSSIBLE TO APPRECIATE THAT IN THE ABSENCE OF SUCH INFLUENCES, EVEN WITH ALL PHYSICAL NEEDS MET, INDIVIDUALS WOULD REVERT IN A SINGLE GENERATION TO A CULTURAL STATE OF PERHAPS A MILLION YEARS BACK IN HUMAN EVOLUTION. THAT STATE WOULD BE LITTLE DIFFERENT FROM THAT OF OUR PRESENT PRIMATE RELATIVES -- THE CHIMPANZEES, FOR EXAMPLE. YET, SO GREAT IS OUR CAPACITY TO ACQUIRE CULTURAL PATTERNS AND INFORMATION THAT, GIVEN PROPER CONDITIONS, THE PROCESS COULD BE COMPLETELY REVERSED IN A FOLLOWING SINGLE GENERATION.

WE KNOW A GREAT DEAL ABOUT THE ACQUISITION OF CULTURAL PATTERNS, BUT

BY NO MEANS ALL. WE KNOW THE PROCESS BEGINS EARLY -- AT BIRTH OR EVEN BEFORE. BUT IT IS ONLY RECENTLY THAT WE HAVE COME TO APPRECIATE HOW VERY MUCH DEPENDS ON THE EARLIEST MONTHS AND YEARS. IT IS ONLY WHEN CHILDREN ARE DEPRIVED OF THE EARLY EXPERIENCE WE ARE SO PRONE TO TAKE FOR GRANTED IN OUR OWN CULTURAL CONTEXT, THAT WE SEE THE SIGNIFICANCE OF WHAT HAPPENS EARLY. THUS WE COME TO REALIZE THE DIFFICULTIES OF MOVING INDIVIDUALS FROM ONE CULTURAL PATTERN TO ANOTHER, UNLESS THE PROCESS IS BEGUN VERY EARLY -- MUCH BEFORE THE USUAL BEGINNING OF FORMAL SCHOOLING.

WE KNOW, TOO, THAT THERE IS GREAT VARIABILITY AMONG INDIVIDUALS IN CAPACITY TO ACQUIRE SPECIFIC CULTURAL TRAITS. IN THE EXTREME, IN SOME FORMS OF FEEBLEMINDEDNESS, FOR EXAMPLE, IT IS CLEAR THAT SUCH DIFFERENCES MAY BE GENETICALLY DETERMINED THROUGH FAULTY DNA DIRECTIONS. WITHIN THE NORMAL RANGE, IT IS LESS EASY TO DEMONSTRATE THAT DIFFERENCES MAY HAVE A GENETIC BASIS. NEVERTHELESS, CAREFULLY DESIGNED AND EXECUTED STUDIES,

SUCH AS THOSE COMPARING DIFFERENCES WITHIN IDENTICAL TWIN PAIRS WITH THOSE OF THEIR FRATERNAL COUNTERPARTS, SHOW CLEARLY THAT THERE ARE SUCH DIFFERENCES. IT IS EQUALLY OBVIOUS THAT DEVELOPMENTAL FACTORS CAN INFLUENCE INTELLECTUAL CAPABILITY. TO TAKE AN EXTREME EXAMPLE, LEAD POISONING IN CHILDHOOD IS KNOWN TO CAUSE MENTAL RETARDATION. SURELY THERE ARE MYRIADS OF FAR MORE SUBTLE AND AS YET UNKNOWN ENVIRONMENTAL FACTORS THAT ARE INFLUENTIAL IN THIS REGARD. MALNUTRITION IN EARLY DEVELOPMENT, PRENATAL OR POSTNATAL, IS PROBABLY ONE OF THEM.

THESE COMPLEX AND SUBTLE INTERACTIONS MAKE IT EXTREMELY DIFFICULT TO IDENTIFY AND ASSESS INNATE CULTURAL POTENTIALS, AND THIS IS THE BASIS OF MUCH OF THE PRESENT CONTROVERSY ABOUT OUR EDUCATIONAL PRACTICES, SUCH AS HAVE BEEN STIMULATED BY THE RECENT PUBLICATION OF THE EDUCATIONAL PSYCHOLOGIST, ARTHUR JENSEN.

THAT THE EDUCATIONAL SYSTEM SHOULD BE DESIGNED BETTER TO RECOGNIZE

AND TAKE INTO ACCOUNT QUANTITATIVE AND QUALITATIVE DIFFERENCES IN INTELLECTUAL CAPACITY, WHETHER GENETICALLY OR CULTURALLY DETERMINED, IS WIDELY RECOGNIZED, EVEN THOUGH NOT OFTEN ENOUGH TRANSLATED INTO EFFECTIVE PRACTICE. THAT SHOULD NOT BE CONTROVERSIAL.

WHAT DOES DEEPLY STIR THE EMOTIONS OF SO MANY OF US, IS THE QUESTION OF WHETHER OR NOT THERE ARE SIGNIFICANT RACIAL OR ETHNIC DIFFERENCES IN INNATE INTELLECTUAL CAPACITIES.

JENSEN CONTENDS THERE MAY WELL BE SIGNIFICANT DIFFERENCES BETWEEN AMERICAN NEGROES AND WHITES IN OUR CULTURAL CONTEXT, AND THAT THIS SHOULD BE TAKEN INTO ACCOUNT IN OUR EDUCATIONAL SYSTEM -- THAT THERE IS EVIDENCE INDICATING NEGROES ARE RELATIVELY STRONGER IN ASSOCIATIVE LEARNING AND LESS SO IN CONCEPTUAL REASONING; THAT IN WHITES THE REVERSE IS THE CASE.

NEITHER MY INFORMATION NOR MY COMPETENCE IN THIS AREA IS SUFFICIENT

FOR ME TO ATTEMPT TO EVALUATE THE FACTS OR THE CONCLUSIONS OF SUCH STUDIES.

BUT AS A GENETICIST, I DO BELIEVE IT LIKELY THAT ANY TWO POPULATIONS OF MAN REPRODUCTIVELY SEPARATED OVER HUNDREDS OF GENERATIONS WILL COME TO DIFFER STATISTICALLY WITH REGARD TO A GREAT MANY MEASURABLE GENETIC TRAITS. I AGREE WITH THE VIEW ONCE EXPRESSED BY THE LATE J.B.S. HALDANE, WHO SAID THAT AS A GENETICIST HE BELIEVED IN RACIAL DIFFERENCES, BUT THAT HE DID NOT KNOW WHO SURPASSED WHOM IN WHAT.

THUS I WOULD EXPECT SUCH DIFFERENCES IN MANY OF THE COMPONENTS OF INTELLIGENCE. THE PSYCHOLOGIST LOUIS THURSTONE IDENTIFIED SEVEN SUCH COMPONENTS -- WHICH HE CALLED VERBAL COMPREHENSION, WORD FLUENCE, NUMERICAL ABILITY, SPACE VISUALIZATION, MEMORY, PERCEPTUAL ABILITY AND REASONING. THESE ARE BY NO MEANS INDEPENDENT, NOR DOES ANYONE CONTEND THAT THEY ADEQUATELY REPRESENT THE TOTALITY OF WHAT WE CALL INTELLIGENCE. IN FACT, THURSTONE'S SUCCESSORS HAVE IDENTIFIED MANY MORE SUCH COMPONENTS OF

INTELLIGENCE.

ONE POINT I WISH TO MAKE ABOUT ALL THIS IS THAT ONE MAY SCORE RELATIVELY HIGH IN SOME OF THESE COMPONENTS AND LESS SO IN OTHERS.

A SECOND ONE IS THAT THERE CAN THEREFORE BE NO ABSOLUTE SCALE OF INTELLIGENCE FOR ALL INDIVIDUALS OR POPULATIONS. IT IS HIGHLY PROBABLE THAT AN INTELLIGENCE TEST DEvised IN ONE CULTURAL CONTEXT WILL DIFFER FROM THOSE FORMULATED IN OTHER CONTEXTS -- THUS THERE IS A STRONG POSSIBILITY, REALLY A PRESUMPTION OF CULTURAL BIAS IN ANY SUCH TEST.

A THIRD POINT IS THAT BY WHATEVER CRITERIA INTELLECTUAL ABILITY IS MEASURED, THERE WILL BE OVERLAPS, ALMOST SURELY LARGE OVERLAPS, AMONG RACIAL OR ETHNIC GROUPS.

MY FINAL POINT, AND THE ONE I WANT MOST STRONGLY TO EMPHASIZE, IS THAT WITH REGARD TO ALL MATTERS RELATED TO INTELLECTUAL CHARACTERISTICS -- EDUCATION PATTERNS, JOB TRAINING PROGRAMS, OCCUPATIONAL OPPORTUNITIES

AND OTHERS OF COMPARABLE NATURE -- WE SHOULD THINK AND ACT IN TERMS OF INDIVIDUALS, NOT OF RACIAL OR ETHNIC GROUPS. TO ME IT SEEMS CRYSTAL CLEAR THAT WE SHOULD ASSIGN OUR HIGHEST PRIORITY TO GIVING EVERY INDIVIDUAL OF OUR SPECIES THE BEST POSSIBLE OPPORTUNITY TO DEVELOP AND USE HIS OR HER FULL POTENTIAL -- GENETIC OR OTHER -- IN WAYS THAT WILL MAXIMIZE BOTH THE WELL BEING OF THAT INDIVIDUAL AND OF THE SOCIETY OF WHICH HE IS A PART. THAT SHOULD BE A PRIMARY GOAL OF ALL PATTERNS OF CULTURALIZATION AND SYSTEMS OF EDUCATION.

IT IS A BIG ORDER AND OF COURSE WE SHALL NEVER FULLY FILL IT. BUT WE MUST DO THE BEST WE CAN. THAT MEANS WE MUST DO OUR BEST TO FAVOR OUR INTELLECTS AND SUPPRESS OUR UNJUSTIFIED PRECONCEPTIONS AND PREJUDICES.

I RESOLVE TO TRY HARDER. I HOPE ALL OF YOU WILL JOIN ME. GOOD

LUCK.