Date: 10 APR 1975 2139-PDT
From: LEDERBERG at USC-ISI
Subject: ARPA RESEARCH POLICY.
To: LICKLIDER
cc: FEIGENBAUM at SUMEX-AIM, LEDERBERG at SUMEX-AIM

DEAR LICK:

ED FEIGENBAUM HAS SHARED YOUR 'EASTER MESSAGE' AND LATER ARTICULATIONS OF CONCERN WITH ME, I HAVE BEEN GIVING SERIOUS THOUGHT TO MANY OF THE POINTS YOU RAISE, AND WILL BE DISCUSSING THEM FURTHER WITH ED AS A PRELIMINARY AND A VEHICLE TO REPLY TO YOU AND TO THE ISSUES YOU RAISE.

MEANWHILE I HAD ONE CONCRETE BUT SMALL QUESTION, AND TWO META-QUESTIONS THAT I WILL BE PURSUING FURTHER.

1. OBVIOUSLY THE IMPLICATIONS OF THE INSTANT HARDWARE CRITERION FOR ARPA RESEARCH POLICY ARE TO DISCOUNT ANY SIGNIFICANT CONTRIBUTION OF ACADEMICALLY BASED RESEARCH FOR OUR LONG RANGE DEFENSE NEEDS, MY PERSONAL RESEARCH PROGRAM BENEFITS FROM APPA SUPPORT; BUT I WILL CERTAINLY FIND SOME WAY TO SURVIVE WITHOUT IT, I AM MUCH MORE PESSIMISTIC ABOUT THE LONG RANGE SURVIVAL OF MY COUNTRY IN A WORLD OF HARSH TECHNOLOGICAL-MILITARY COMPETITION IF THIS POLICY IS SYSTEMATICALLY PURSUED. I AM SURE YOU CAN FIND MANY MORE EXAMPLES THAN THOSE OF WHICH I AM PERSONALLY AWARE THAT WOULD BEAR OUT THE VERY HIGH COSTS OF AN INSTANT HARDWARE POLICY; AND PERHAPS IT IS EVEN OUT OF PLACE FOR ME TO MENTION SUCH EMBARRASSMENTS. BUT IF I THINK OF THE HECTOMILLIONS THAT WERE WASTED BY THE PURSUIT OF THIS PHILOSOPHY, E.G., IN THE HI-POWER LASER CATEGORY THAT SHOULD BE SUFFICIENT REMINDER.

THIS IS NOT TO SAY THAT EVERYTHING ABOUT PAST POLICIES WAS IDEAL -- MUCH OF THE PROCEDURAL RECOMMENDATIONS OF THE BERLEKAMP AMC COMMITTEE WAS DIRECTED TO IMPROVING THE SCIENTIFIC AND TECHNICAL YIELD FROM ARPA'S INVESTMENTS, AND YOU WILL RECALL THAT I DID NOT BELIEVE THAT APPA WAS THE APPROPRIATE AGENCY TO SUPPORT WORK IN FIELDS LIKE NEUROBIOLOGY ALONG LINES THAT SEEMED TOO REMOTE FROM ARPA'S MISSION, AND TO BE QUITE BLUNT, I WAS RATHER UPSET BY LUKASIK'S ENTHUSIASM FOR A RESEARCH PROGRAM (PINNEO@SRI) THAT WAS ADVERTISED IN THE LOCAL PRESS AS DIRECTED TO THE READING OF A PERSON'S INNERMOST THOUGHTS; AND I GOT NOWHERE IN MY CORRESPONDENCE WITH LUKASIK ON THIS POINT.

2. WELL THE PREVIOUS WAS A MAJOR META-ISSUE, HERE NOW IS THE SMALL ONE: JUST WHAT IS THE STATUS OF THE TECHNOLOGY (AND OF THE LEVEL OF THE MILITAERY REQUIREMENT) FOR THE PROBLEM YOU MENTIONED OF EXTRACTING INFORMATION FROM MORSE CODE IN A NOISY CONTEXT? I SHOULD HAVE THOUGHT THAT WAS CRACKED AT LEAST A DECADE AGO; BUT INDEED I AM UNAWARE OF ANY SPECIFICS. IF IT IS STILL AN OPEN PROBLEM IT IS OBVIOUSLY A SIG-

; <LEDERBERG>JL/LICK.TXT;1 SAT 12-APR-75 8:15AM

NIFICANT STEPPING STONE THAT SHOULD PRECEDE ANALOGOUS EFFORTS IN A) SPEECH UNDERSTANDING, AND B)THE SONAR PROBLEM. DO YOU HAVE ANY REFERENCES OR OTHER SOURCES OF AMPLIFICATION?

3. #2 RAISES THE SECOND META-ISSUE: PLAINLY WE NEED BETTER MACHINERY THAN NOW EXISTS FOR BRINGING ABOUT A BETTER UNDERSTAND OF WHAT ARE REAL MILITARY REQUIREMENTS IN RELATION TO THE OPPORTUNITIES OF INFORMATION SCIENCES RESEARCH. THE REQUIREMENTS AND OPPORTUNITIES CAN NOT REALLY BE EXPLORED IN MUTUAL ISOLATION: ONE CAN HARDLY KNOW WHAT IS 'REQUIRED' WITHOUT AN INFORMED PERSPECTIVE ON WHAT IS POSSIBLE.
SO

HOW DID YOU GENERATE YOUR LIST? IS YOUR ALGORITHM AN OPTIMAL ONE IN PROPORTION TO THE SIGNIFICANCE OF THE CHALLENGE IT ADDRESSES?
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4. AN AFTERTHOUGHT: I WILL BE SAYING THIS AGAIN: ONE OF THE REASONS THAT I DECIDED TO COMMIT A SIGNIFICANT PART OF MY FURTHER CAREER TO COMPUTER INTELLIGENCE WAS MY ANXIETY WHETHER UNAIDED HUMAN INTELLIGENCE WAS UP TO THE TASK OF ASSURING OUR SURVIVAL THROUGH THE NEXT 50 YEARS OF NUCLEAR-WEAPONS COMPETITION. THE PLACE THAT I FORESEE A.I. HAVING ITS MOST CRUCIAL ROLE IN DEFENSE IS AT THE TOPMOST LEVEL --TO HELP ASSURE THAT THE FINGER THAT HAS 15 MINUTES TO DECIDE ABOUT THE RED BUTTON WILL BE ADEQUATELY INFORMED ABOUT ALTERNATIVE DECISIONAL OPTIONS. I DON'T HAVE TO TELL YOU HOW FAR WE ARE FROM A SITUATION WHERE WE WOULD PERMIT ANY A.I. PROGRAM TO HAVE A SIGNIFICANT PART IN SUCH DECISIONS. BUT I DO NOT THINK IT IS ARROGANT TO SUGGEST THAT A TECHNOLOGY THAT CAN BRANCH THROUGH A KNOWLEDGE- AND DATA-ORIENTED DECISIONAL TREE LIKE DENDRAL DOES HELP CORROBORATE THE EVENTUAL FEASIBILITY OF SIGNIFICANT HELP TO TOP-LEVEL DECISION-MAKERS FACING MUCH MORE COMPLEX PROBLEMS.

I AM DEPRESSED AT THE THOUGHT THAT THIS PROBLEM WILL BE DISMISSED AS TOO VISIONARY OR TOO LONG RANGE TO BE OF INTEREST TO ARPA, AND I WELL KNOW THAT WE SHARE COMMON OBSTACLES IN PERSUADING OTHERS OF THESE VIEWS, BUT IF I DID NOT EXPRESS THEM TO YOU YOU WOULD BE LESS INFORMED AT LEAST OF MY OWN CONVICTION ABOUT THEM.

YOURS
JOSH
(PLEASE REPLY PREFERABLY TO LEDERBERG@SUMEX; WE ARE DOWN FOR PM JUST NOW, PS OUR IMP HOOKUP SEEMS TO BE WORKING VERY WELL!!!!!!!)
