A lost Croatian AI program from the 1950's
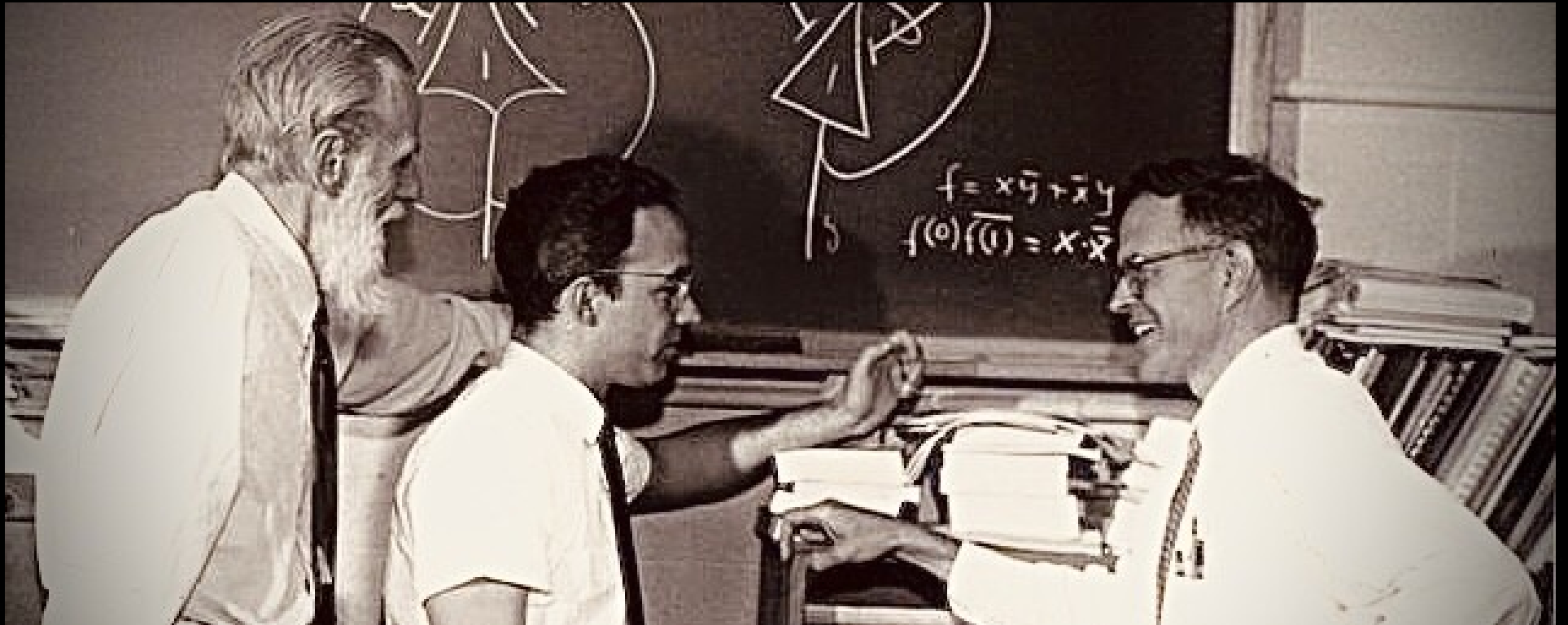
Sandro Skansi

sskansi@fhs.hr

A true beginning of AI...

1943

Dept of Philosophy,
University of Chicago
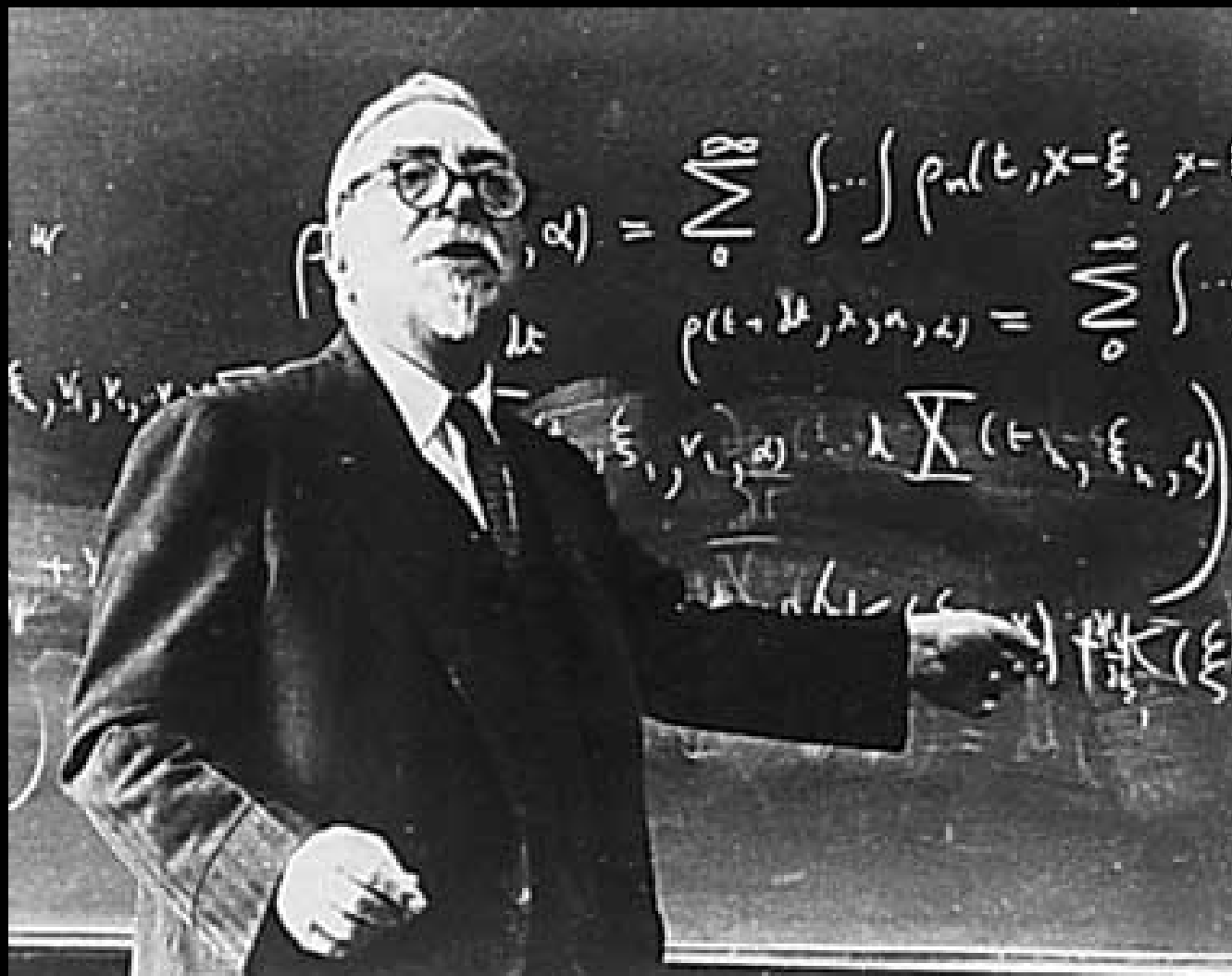
W. McCulloch   W. Pitts

1948

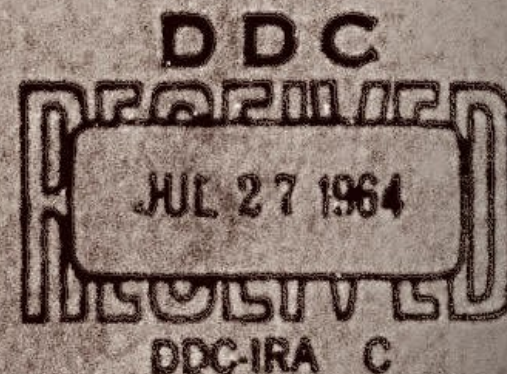## Dept of Mathematics, MIT

Norbert Wiener

1953

Soviet Union

ВОПРОСЫ ФИЛОСОФИИ

"Materialist": Whom does Cybernetics Serve?

CYBERNETICS AND ITS DEVELOPMENT IN THE SOVIET UNION

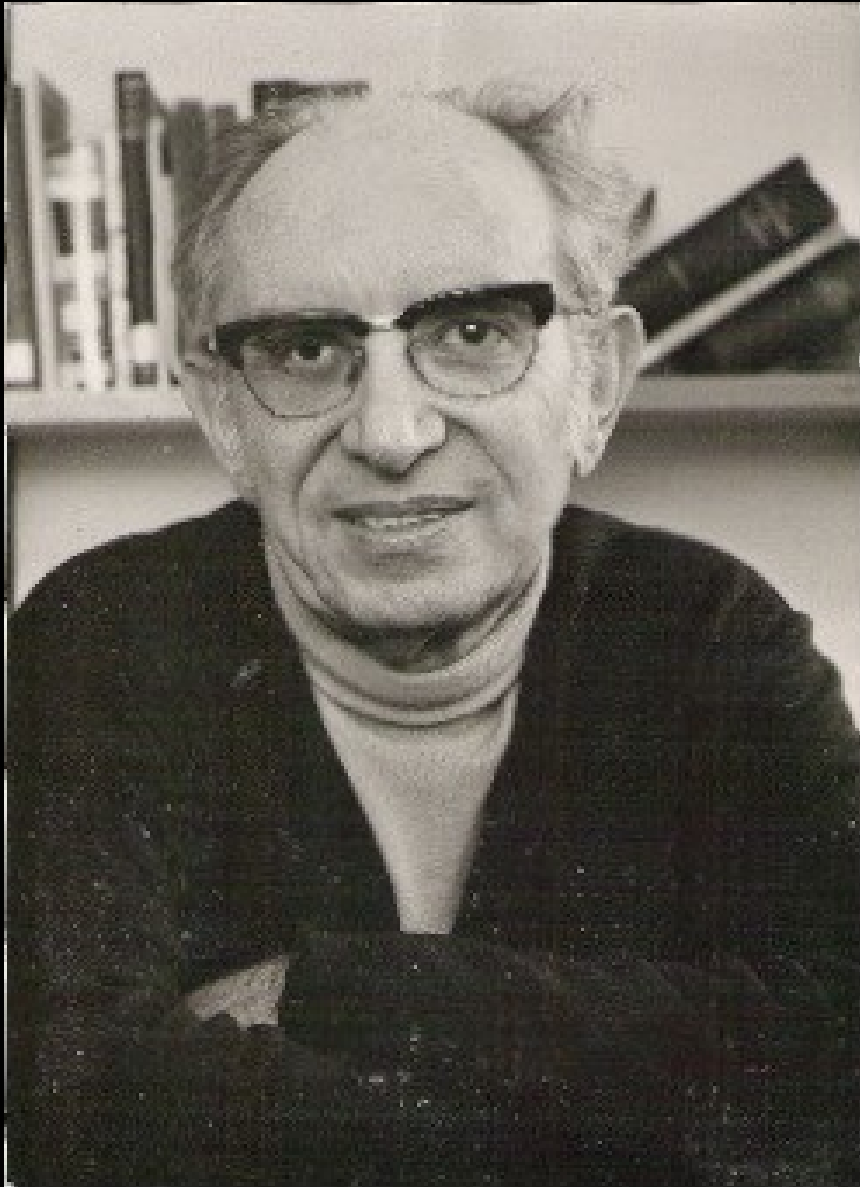Roger Levien and M. E. Maron

STATES AIR FORCE PROJECT RAND

1954
Birth of Machine Translation

Y. Bar-Hillel

Dept. of Philosophy

University of Chicago

1956

Dartmouth Summer Research Project
on Artificial Intelligence

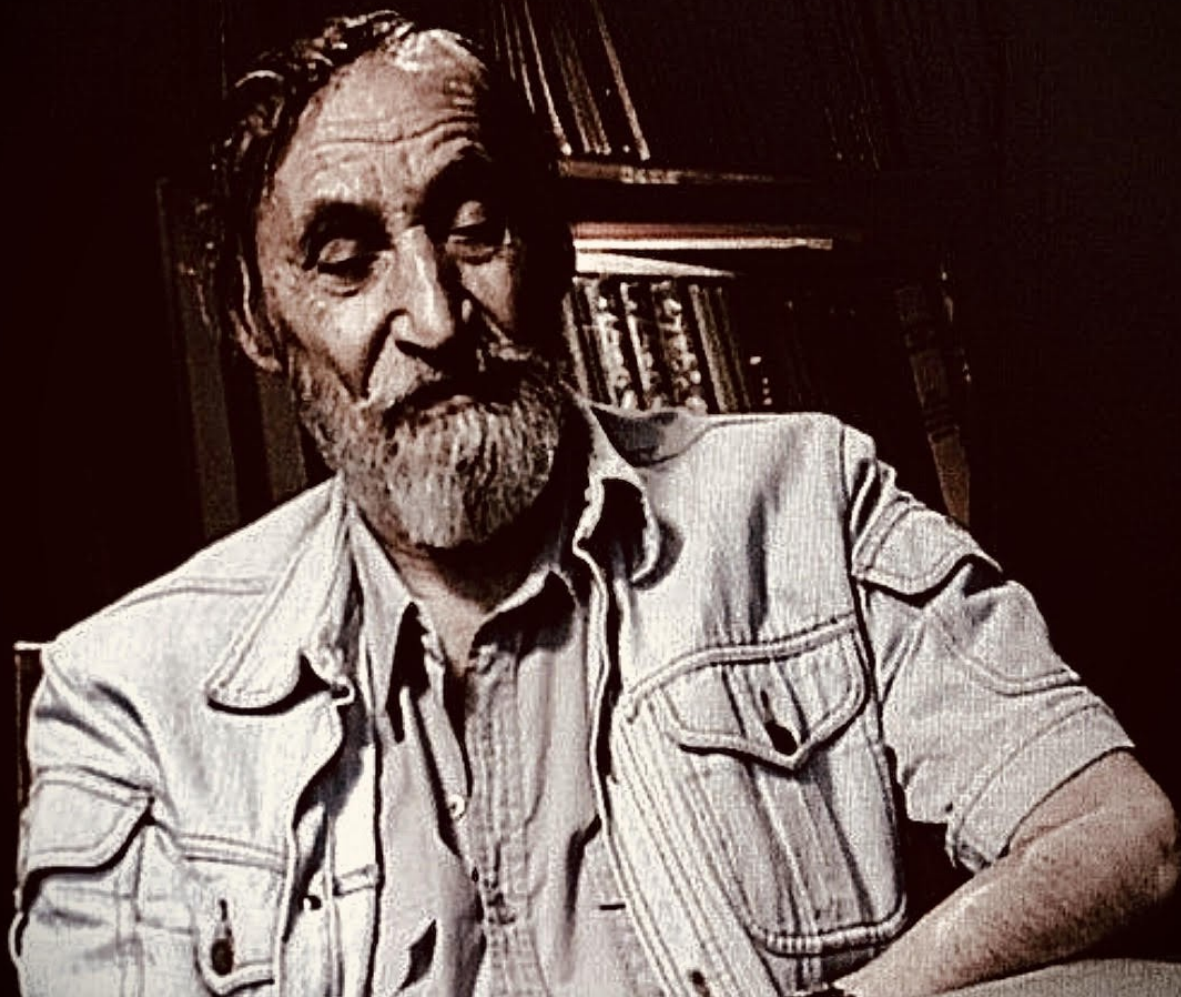# The official birth of AI

J. McCarthy

M. Minsky

C. Shannon

H. Simon

A. Newell

…

1957-1959

University of Zagreb

Bulcsú László

strojno prevođenje i statistika u jeziku

1959

Broj raznolikih elemenata	Broj dvojčanih jedinica ili bita	Broj raznolikih elemenata	Broj dvojčanih jedinica ili bita	Bite većih brojeva dobijemo zbrajanjem bîtā njihovih faktora		
$1 = 2^0$	0	3	1,58496	2 ·	5	= 10
$2 = 2^1$	1	5	2,32193	1 +	2,32193	= 3,32193
$4 = 2^2$	2	7	2,80735	4 ·	5	= 20
$8 = 2^3$	3	11	3,45943	2 +	2,32153	= 4,32153
$16 = 2^4$	4	13	3,70044	2 ·	13	= 26
$32 = 2^5$	5	17	4,08746	1 +	3,70044	= 4,70044
$64 = 2^6$	6	19	4,24793	3 ·	3	= 27
$128 = 2^7$	7	23	4,52356	3 ·	1,58496	= 4,75488
$256 = 2^8$	8	29	4,85798	3 ·	13/10	= 30
$512 = 2^9$	9	31	4,95420	1,58496 +	3,32193	= 4,90689
$1024 = 2^{11}$	10	37	5,20945	4 ·	10	= 52
$2^{20} =$	104.8576	20		2 +	3,70044	= 5,70044

Usporedimo li niz 2 3 4 6 8 12 16 24 32 58 64 s njegovim bitima 1 1,58 2 2,58 3 3,58 4 4,58 5 5,58 6, opazit ćemo, da brojevima **3 6 12 24 48**, koji čine aritmetičku sredinu između svoja dva susjeda, odgovaraju također aritmetičke sredine ù bitima, na pr. 6 se nalazi na po puta između 4 i 8, pa mu se i odgovarajuća vrijednost ù bitima nalazi na po puta između 2 i 3, t. j. 2.58 (s neznatnim viškom od 0,08 ili još točnije 0,085). Dakle i razlomljene bite možemo odoka procijeniti (interpolirati).

KKDD 4 bîta	Razlikovanje bijelih figura od crnih povećava izbornost, a time i obavijesnost svake figure za 1 bît, te je i srednja òbavijest veća za 1 bît.	KkDd 5 bîtā
LL:LL 3 bîta		LLll 4 bîtā
SSSS 3 bîta		SSss 4 bîtā
TTTT 3 bîta		TTtt 4 bîtā
PPPP 1 bît		PPPP 2 bîta
PPPP 1 bît		PPPP 2 bîta
PPPP 1 bît		pppp 2 bîta
PPPP 1 bît		pppp 2 bîta
17 : 8 = 2,125 bîta		25 : 8 = 3,125 bîta

Other members of László's circle

Faculty of Philosophy

Bulcsú László (Dept. of Slavistics)

Svetozar Petrović (Dept. of Lit.)

Stjepan Babić (Dept. of Croat.)

Krunoslav Pranjić (Dept. of Croat.)

Željko Bujas (Dept. of Eng.)

Malik Mulić (Dept. of Rus.)

Faculty of Electrotechnics (and Computing)

Vladimir Matković (Institute for Telecommunications) **[PhD thesis 1957]**

Vladimir Muljević (Institute for Systems Control and Signal)

Yugoslavian Academy of Sciences and Arts

Božidar Finka (Institute for Language)

Vladimir Vranić (Institute for Numerical Research)

BERT, GPT-n, T5...

- Separate language encoding/word embedding and translation algorithm

- Translation can be viewed as "predict next" (or QnA)

- Context (previous/next word) to make a representation for a word

- Key/Value for Queries

- Positional encodings?

- Tokens neither words nor characters, but parts of words

- Separate models based on crossentropy to build internal representations for encoding and decoding

- Both the encoder and decoder "could in theory be powerful enough to be used without the other"

Sounds about right?

Except, this is neither BERT, GPT, T5...

… these were ideas from
László's 1959 paper

Thank you for your attention!

Questions are welcomed!