Improvised Comedy as a
Turing Test

Piotr Mirowski
HumanMachine.live
Kory Mathewson
University of Alberta

HumanMachine
Artificial Intelligence
Improvisation

Photo (c) Curtis Comeau, Chris Gamble

Transatlantic AI show: binary2

Photo © Chris Gamble
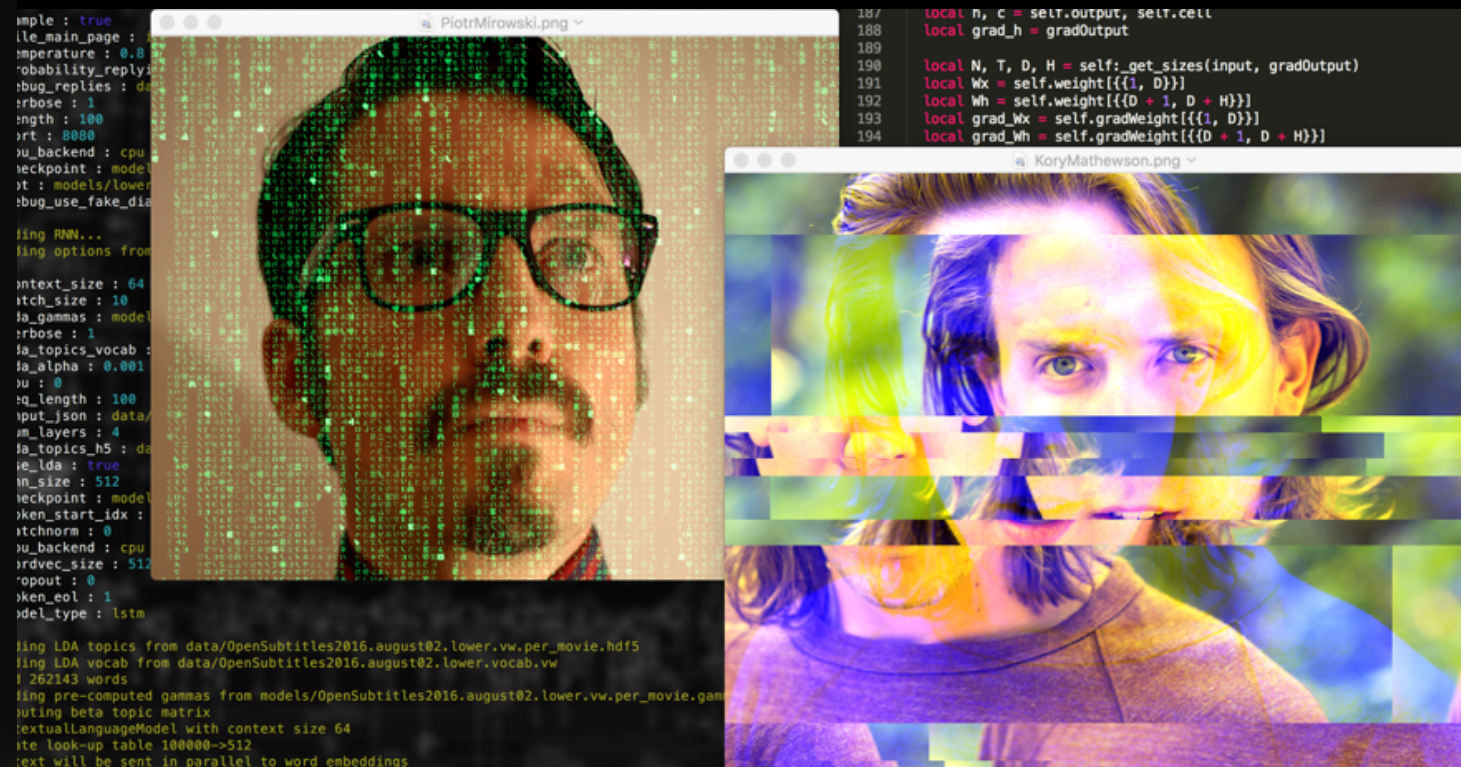
Photo © Chris Gamble

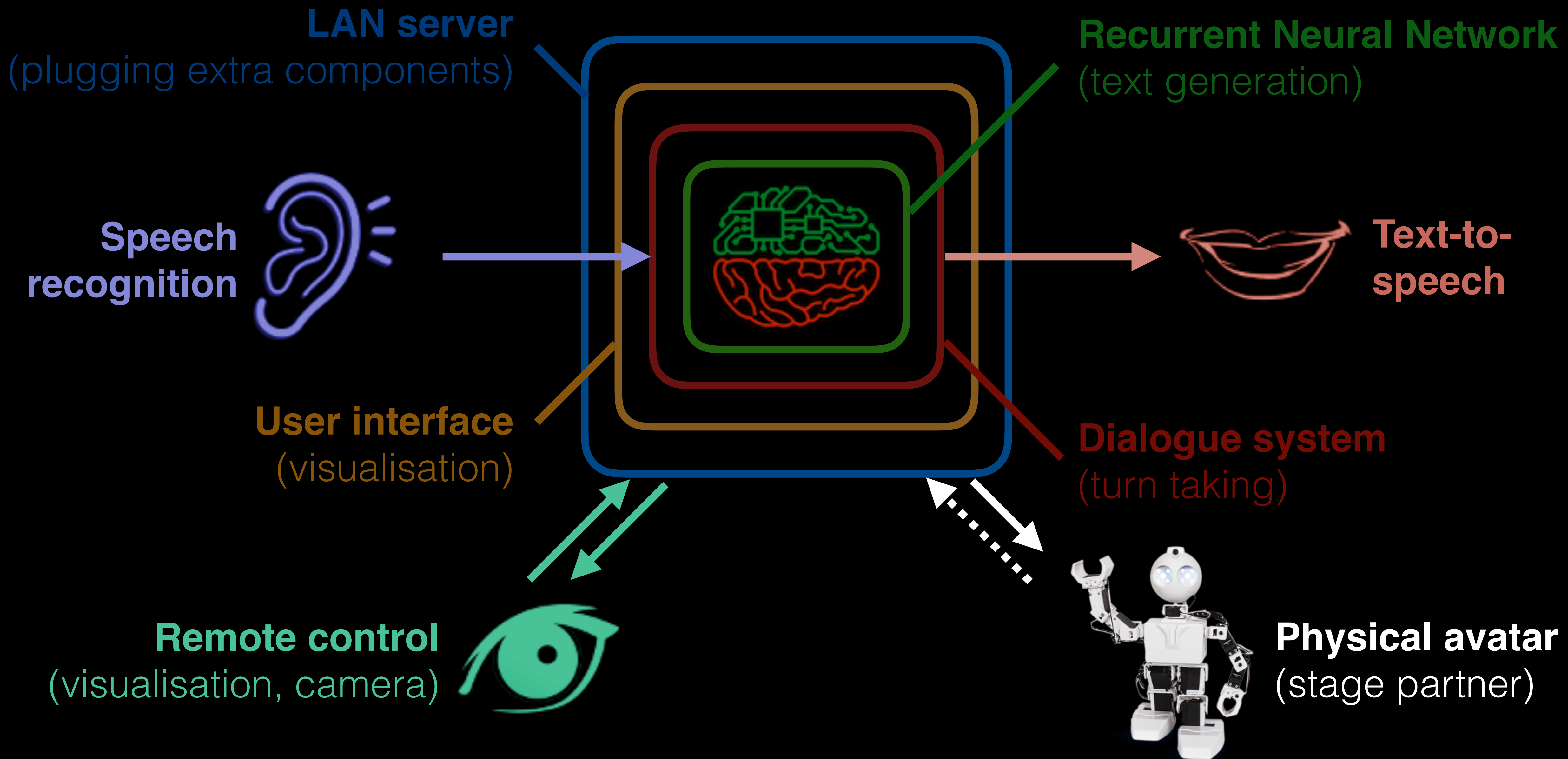Photo (c) David Bourn, *ImproFest UK*

Fringe Festival shows

A.L.Ex*

*Artificial Language Experiment

LAN server
(plugging extra components)

Recurrent Neural Network
(text generation)

Speech recognition

Text-to-speech

User interface
(visualisation)

Dialogue system
(turn taking)

Remote control
(visualisation, camera)

Physical avatar
(stage partner)
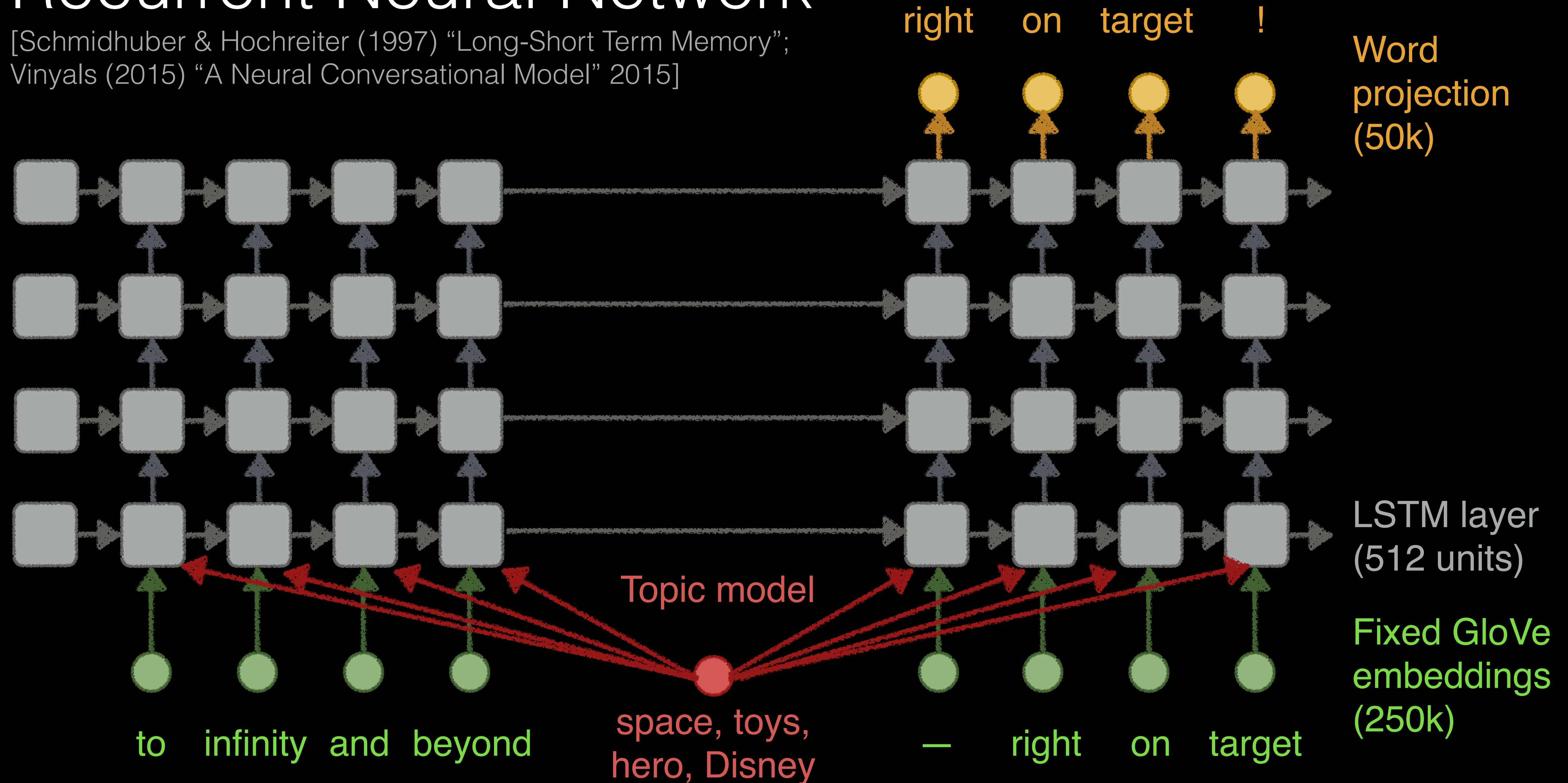
Recurrent Neural Network

[Schmidhuber & Hochreiter (1997) "Long-Short Term Memory";
Vinyals (2015) "A Neural Conversational Model" 2015]

right   on   target   !

Word projection (50k)

LSTM layer (512 units)

Topic model

Fixed GloVe embeddings (250k)

to   infinity   and   beyond

space, toys, hero, Disney

—   right   on   target

Additional inputs: topic models
enabling the chatbot to stay on topic

- Latent Dirichlet Allocation (LDA) with 64 topics

- Computed per movie at training time

- Computed in real-time during improvisation

- Extra input to "stay on topic"

Topic 6:	Topic 21:	Topic 46:	Topic 62:
homicide	samurai	solar	vaccine
defendant	sensei	galaxy	tox
prosecutor	yakuza	nasa	hodgins
nypd	naruto	s.h.i.e.l.d.	e.r.
forensics	angelina	orbit	rayna
unsure	yoko	nadia	bp
callen	honda	galaxies	ct
weeks	shinichi	sonic	serum
dci	yamato	reactor	mri
ween	kato	asteroid	cdc
css	kimura	kraang	biopsy
chi	kyoto	activate	karev
annalise	yamamoto	satellites	surgeries
priors	shogun	tardis	abdominal
provenza	jutsu	spaceship	scalpel

[Mirowski et al. (2010) "Feature-Rich Continuous Language Models for Speech Recognition", *SLT*]

Dataset: corpus of film dialogue

- OpenSubtitles
  http://www.opensubtitles.org
  http://opus.lingfil.uu.se/OpenSubtitles.php

- 100k movies (1902-2016)

- 880M word tokens

- Improv actors work from a huge selection of scripts
  [Martin, Harrison & Riedl (2016) "Improvisational Computational Storytelling in Open Worlds", *ICIDS*]
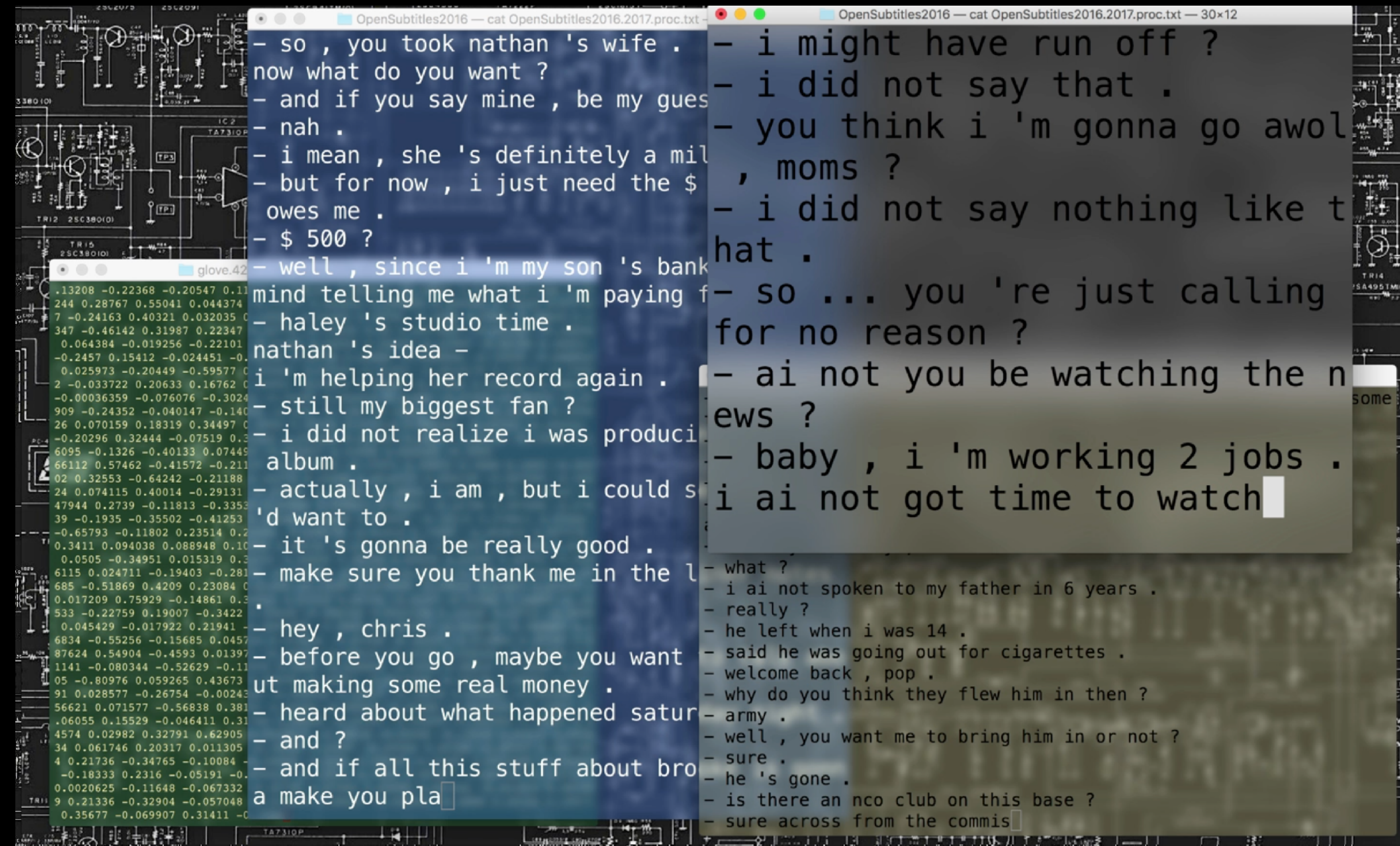
Search query auto-completion

i ◯	imp ◯	improv ◯
instagram itv player indeed iplayer	impossible quizz impetigo imperial war museum imperial college london	improv games improv classes london improv everywhere improv comedy

- Simply suggest the most **obvious** (relevant) query given the **context**: query prefix, location, time of day, day of year, previous searches…

- Improvisers: **listen** to **cues** to extend the context!
  (explicit) characters, story, reincorporation of past facts…
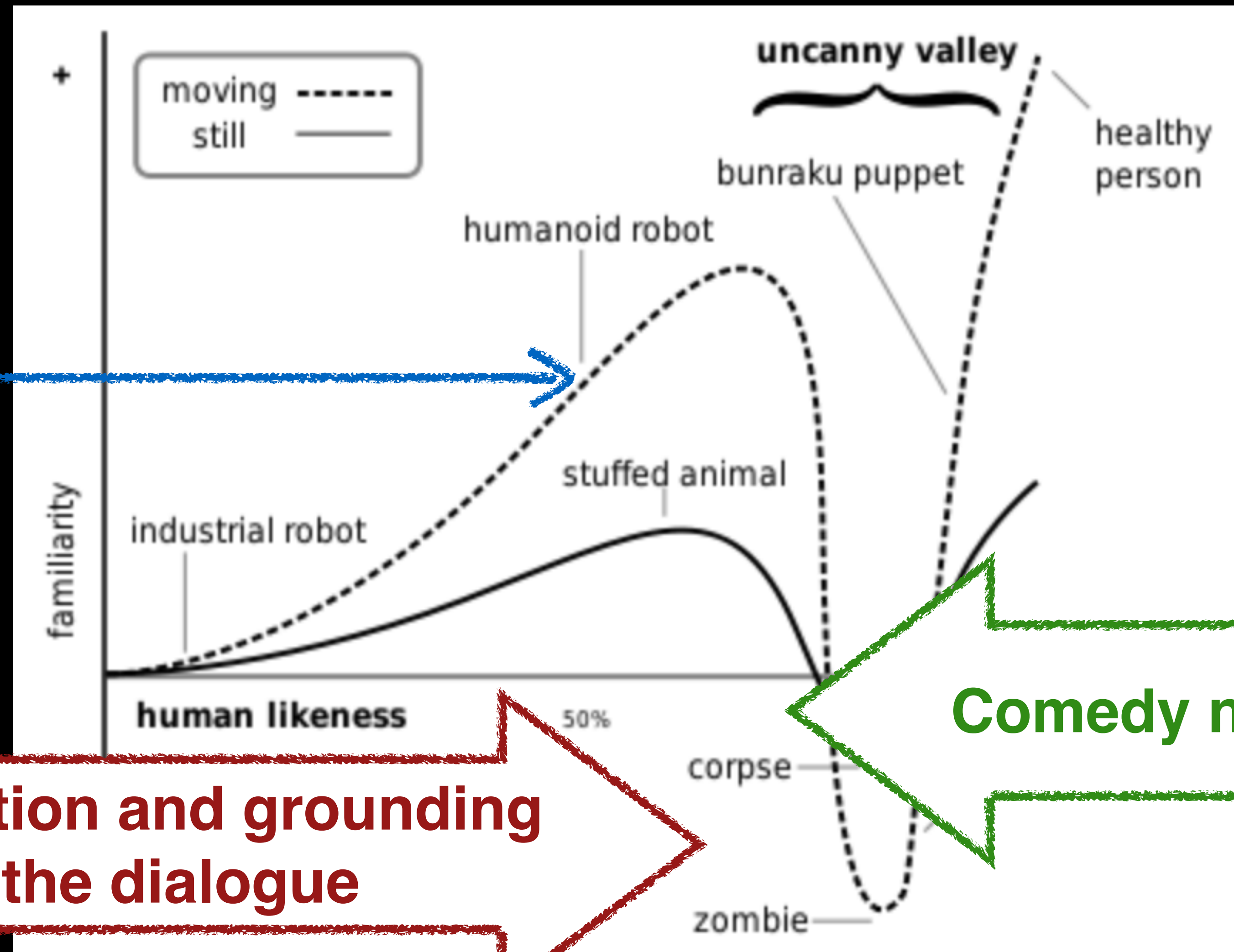 (implicit) body language, theory of mind…

Avoiding the uncanny valley

[Image credit: www.ez-robot.com]

Justification and grounding of the dialogue

Comedy narrative

Experiment: AI vs. Wizard-of-Oz

User interface
(visualisation)

Recurrent Neural Network
(text generation)

Speech recognition

Text-to-speech

Dialogue system
(turn taking)

Wizard-of-Oz illusion
(human controlling the chatbot)

Photograph (c) Metro-Goldwin Mayer

Physical avatar
(stage partner)
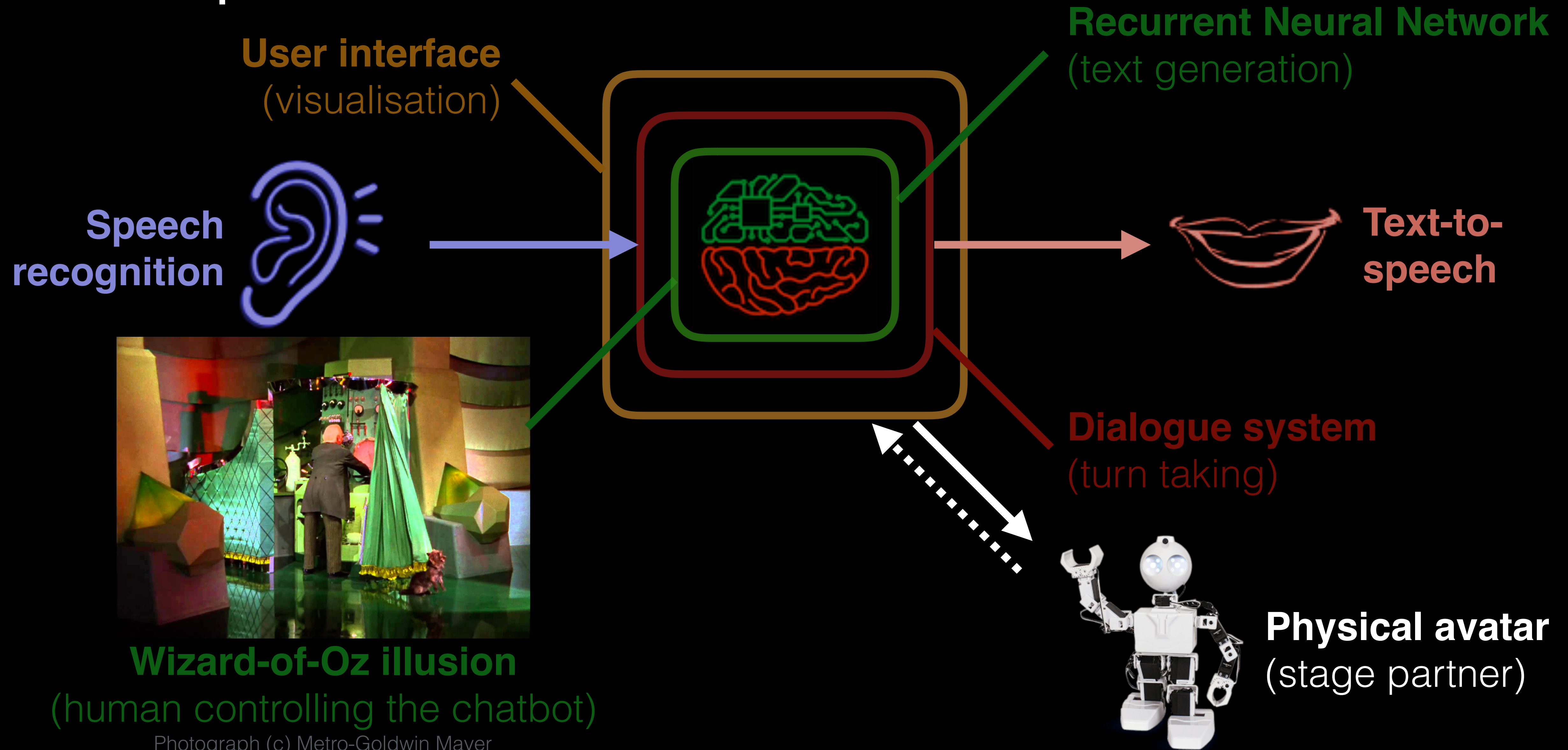
Turing tests on improv audience

Test #1
Compare AI vs Wizard-of-Oz improv
(Camden Fringe Festival, 31 July & 1 August 2017)

First, explain the Turing test to the audience.

Most audience members guessed the AI right

Test #2
Deceive the audience into thinking that an AI is performing (Wizard-of-Oz illusion)
(Edinburgh Fringe Festival, 21-26 August 2017)

Turing test explained only after the scene.

50% of audience members did not guess that a human was performing

- Suspension of disbelief
  Trust in the performance

- High expectations of conversational AI

- [Alex Garland (Ex Machina), Luba Elliott at the Photographers' Gallery, etc...]

A.L.Ex: an exercise in justification

- Justification game: "real-time dynamic problem solving".

- Improvisers need to (observe, repair, accept) divergences.
  [Magerko et al (2009) "An Empirical Study of Cognition and Theatrical Improvisation", *C&C*]

- Great improvisors should be able to improvise with anyone,
  or anything.

- Improv is about positivity, acceptance, and making your stage
  partner the star of the show…

Demo and backup videos ;-D

https://youtu.be/SO7kwfTkau8

Demo and backup videos ;-D

Technology as a creative constraint

Data science and RNN lyrics generation, followed by human curation and interpretation in a musical comedy

Acting and directing a nonsensical, RNN-generated script

"Beyond the Fence" (2016)
Benjamin Till, Nathan Taylor, Alex Davies
Photograph: Tristram Kenton for the Guardian

"Sunspring" (2016)
Ross Goodwin (rossgoodwin.com), Oscar Sharp
[http://arstechnica.com/the-multiverse/2016/06/an-ai-wrote-this-movie-and-its-strangely-moving/]

Technology as a creative constraint

Off-the-shelf chatbot giving lines
to human improvisers

Getting audience suggestions
using AR glasses

"Yes Android" (2017)

Etan Muskat, Kory Mathewson
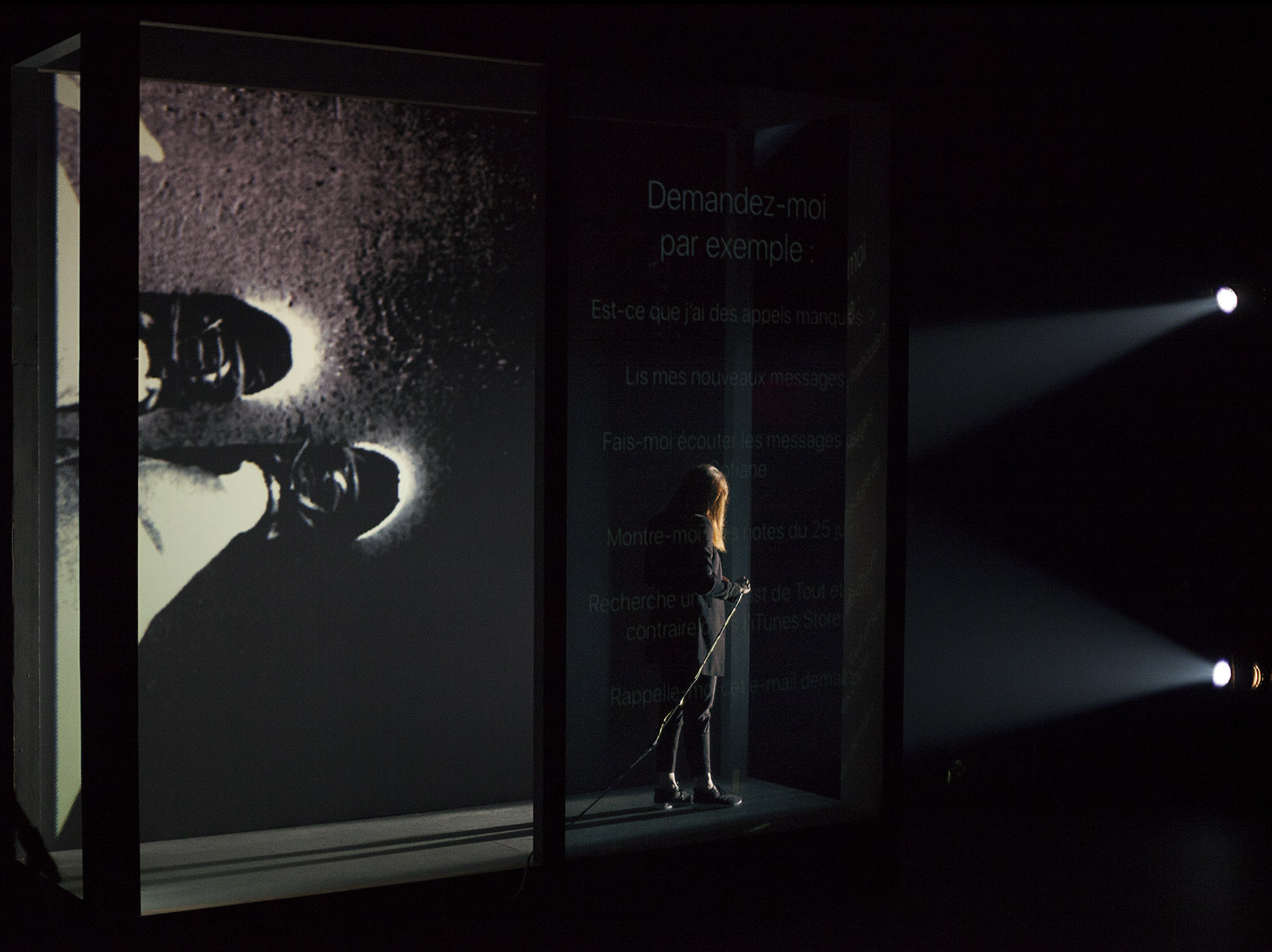
Bad Dog Theatre Company

"GlassProv" (2014)

Baratunde Thurston, Will Luera, Scott Greenwald

MIT Director's Fellows, Improv Boston, Big Bang Improv

AI narratives with a human in the loop
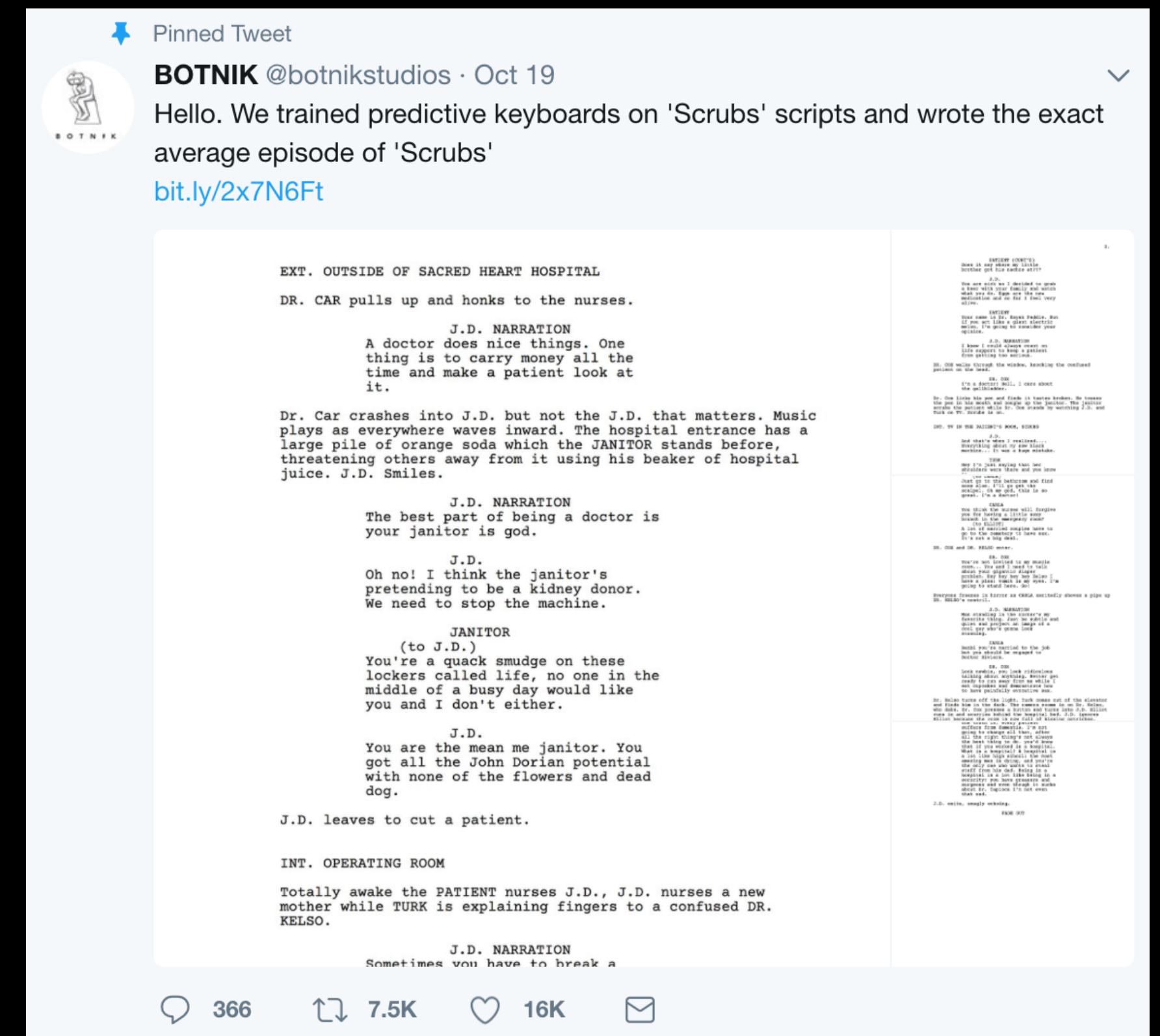
Actress interacting with a smartphone

"Siri" (2017)
Laurence Dauphinais
Photograph: Centre du Théâtre d'Aujourd'hui

Writing stories with auto-complete

@botnikstudios (2015)
Jamie Brew

Improvised Comedy as a Turing Test

Thank you!

Alessia Pannese
Lana Cuthbertson
Luba Elliott
John Agapiou
Stephen Davidson
Roisin Rae
Adam Megido
Arfie Mansfield
Stuart Moses
Charles Sabourdin
Katy Schutte
Holly Bartolo
UK ImproFest
Hoopla
Devoxx
Tristan Bates Theatre
Curious Comedy Theatre
theSpaceUK
Rapid Fire Theatre
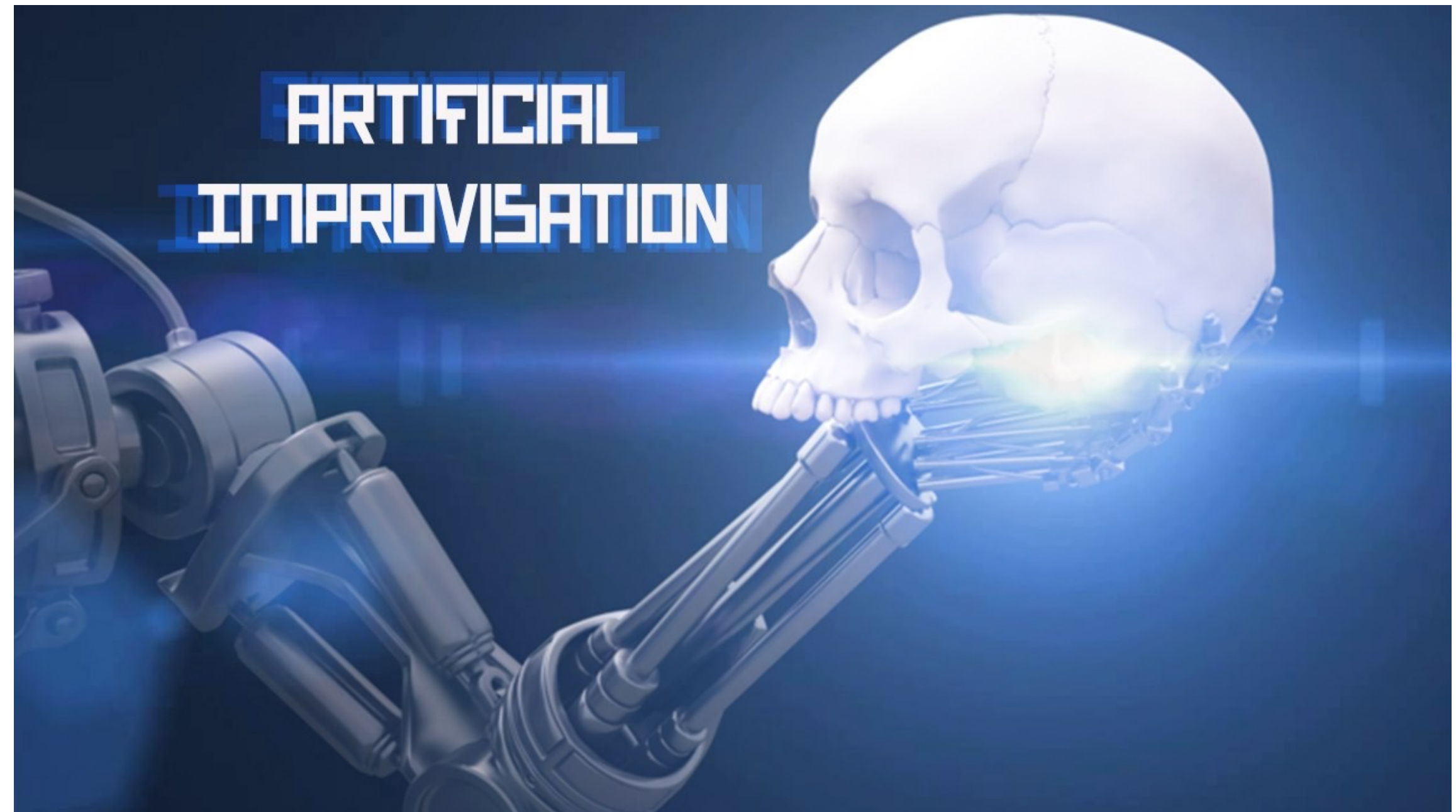
http://humanmachine.live
piotr.mirowski@computer.org
korymath@gmail.com
@PiotrImprov, @korymath

More details: Mathewson, K., & Mirowski, P. (2017).
Improvised Theatre Alongside Artificial Intelligences in *AAAI AIIDE.*

Joseph
Weinzenbaum
(1966)

Photo (c) www.masswerk.at

E.L.I.Z.A. Talking

```
Welcome to
          EEEEEE  LL      IIII  ZZZZZZZZ  AAAAA
          EE      LL       II         ZZ  AA   AA
          EEEE    LL       II        ZZ   AAAAAAA
          EE      LL       II       ZZ    AA   AA
          EEEEEE  LLLLLL  IIII  ZZZZZZZZ  AA   AA

ELIZA is a mock (Rogerian) psychotherapist.
The original program was described by Joseph Weizenbaum in 1966.
This implementation ('elizabot.js') by Norbert Landsteiner 2005.
Graphics and real-time text to speech integration added in 2013.

Note: Try Google Chrome to enjoy the true thrills of speech recognition.

VOICE SETUP
Please choose an accent to be used by ELIZA (speech output):

    [1]  English - US
    [3]  English - EN

> █
```

```
109       -- conjugate
110 ▼  local conjugate = {
111        [" I "] = "YOU",
112        [" ARE "] = "AM",
113        [" WERE "] = "WAS",
114        [" YOU "] = "ME",
115        [" YOUR "] = "MY",
116        [" I'VE "] = "YOU'VE",
117        [" I'M "] = "YOU'RE",
118        [" ME "] = "YOU",
119        [" AM I "] = "YOU ARE",
120        [" AM "] = "ARE",
121     }
```

```
55       -- randomly selected replies if no keywords
56 ▼  local randReplies = {
57      "WHAT DOES THAT SUGGEST TO YOU?",
58      "I SEE...",
59      "I'M NOT SURE I UNDERSTAND YOU FULLY.",
60      "CAN YOU ELABORATE ON THAT?",
61      "THAT IS QUITE INTERESTING!",
62      "THAT'S SO... PLEASE CONTINUE...",
63      "I UNDERSTAND...",
64      "WELL, WELL... DO GO ON.",
65      "WHY ARE YOU SAYING THAT?",
66      "PLEASE EXPLAIN THE BACKGROUND TO THAT REMARK...",
67      "COULD YOU SAY THAT AGAIN, IN A DIFFERENT WAY?",
68     }
```
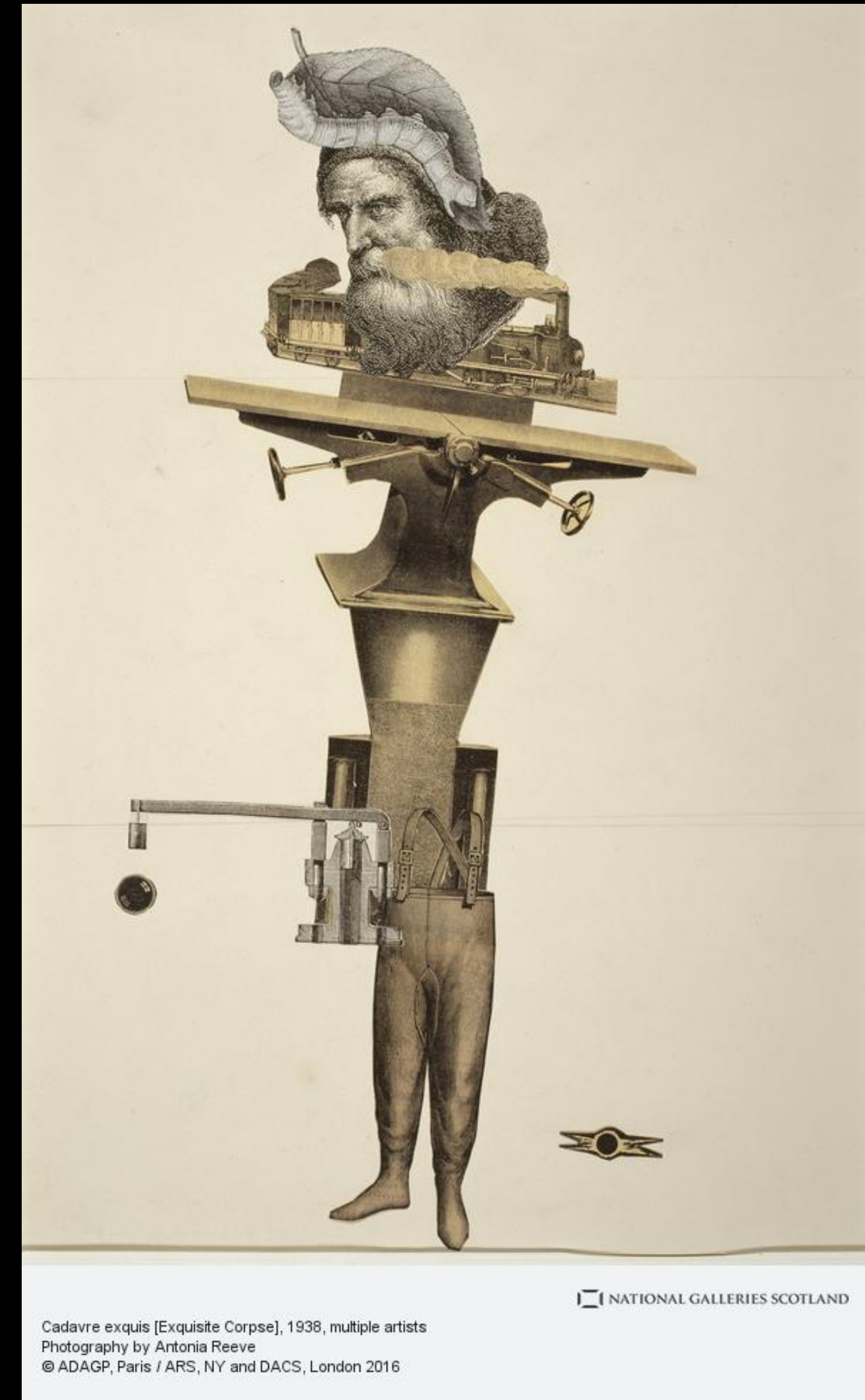
```
70       -- keywords, replies
71 ▼  local replies = {
72       [" CAN YOU"] = "PERHAPS YOU WOULD LIKE TO BE ABLE TO",
73       [" DO YOU"] = "YES, I",
74       [" CAN I"] = "PERHAPS YOU DON'T WANT TO BE ABLE TO",
75       [" YOU ARE"] = "WHAT MAKES YOU THINK I AM",
76       [" YOU'RE"] = "WHAT IS YOUR REACTION TO ME BEING",
77       [" I DON'T"] = "WHY DON'T YOU",
78       [" I FEEL"] = "TELL ME MORE ABOUT FEELING",
79       [" WHY DON'T YOU"] = "WHY WOULD YOU WANT ME TO",
80       [" WHY CAN'T I"] = "WHAT MAKES YOU THINK YOU SHOULD BE ABLE TO",
81       [" ARE YOU"] = "WHY ARE YOU INTERESTED IN WHETHER OR NOT I AM",
82       [" I CAN'T"] = "HOW DO YOU KNOW YOU CAN'T",
83       [" SEX"] = "I FEEL YOU SHOULD DISCUSS THIS WITH A HUMAN.",
84       [" I AM"] = "HOW LONG HAVE YOU BEEN",
85       [" I'M"] = "WHY ARE YOU TELLING ME YOU'RE",
86       [" I WANT"] = "WHY DO YOU WANT",
87       [" WHAT"] = "WHAT DO YOU THINK?",
88       [" HOW"] = "WHAT ANSWER WOULD PLEASE YOU THE MOST?",
89       [" WHO"] = "HOW OFTEN DO YOU THINK OF SUCH QUESTIONS?",
90       [" WHERE"] = "WHY DID YOU THINK OF THAT?",
91       [" WHEN"] = "WHAT WOULD YOUR BEST FRIEND SAY TO THAT QUESTION?",
92       [" WHY"] = "WHAT IS IT THAT YOU REALLY WANT TO KNOW?",
93       [" PERHAPS"] = "YOU'RE NOT VERY FIRM ON THAT!",
94       [" DRINK"] = "MODERATION IN ALL THINGS SHOULD BE THE RULE.",
95       [" SORRY"] = "WHY ARE YOU APOLOGIZING?",
96       [" DREAMS"] = "WHY DID YOU BRING UP THE SUBJECT OF DREAMS?",
97       [" I LIKE"] = "IS IT GOOD THAT YOU LIKE",
98       [" MAYBE"] = "AREN'T YOU BEING A BIT TENTATIVE?",
99       [" NO"] = "WHY ARE YOU BEING NEGATIVE?",
100      [" YOUR"] = "WHY ARE YOU CONCERNED ABOUT MY",
101      [" ALWAYS"] = "CAN YOU THINK OF A SPECIFIC EXAMPLE?",
102      [" THINK"] = "DO YOU DOUBT",
103      [" YES"] = "YOU SEEM QUITE CERTAIN. WHY IS THIS SO?",
104      [" FRIEND"] = "WHY DO YOU BRING UP THE SUBJECT OF FRIENDS?",
105      [" COMPUTER"] = "WHY DO YOU MENTION COMPUTERS?",
106      [" AM I"] = "YOU ARE",
107     }
```

Exquisite corpses

Cadavre exquis [Exquisite Corpse], 1938, multiple artists
Photography by Antonia Reeve
© ADAGP, Paris / ARS, NY and DACS, London 2016

André Breton, Yves Tanguy, Jacqueline Lamba

Game played by the **Surrealists**, ca 1925
(Yves Tanguy, Marcel Duchamp,
Jacques Prévert, etc…)

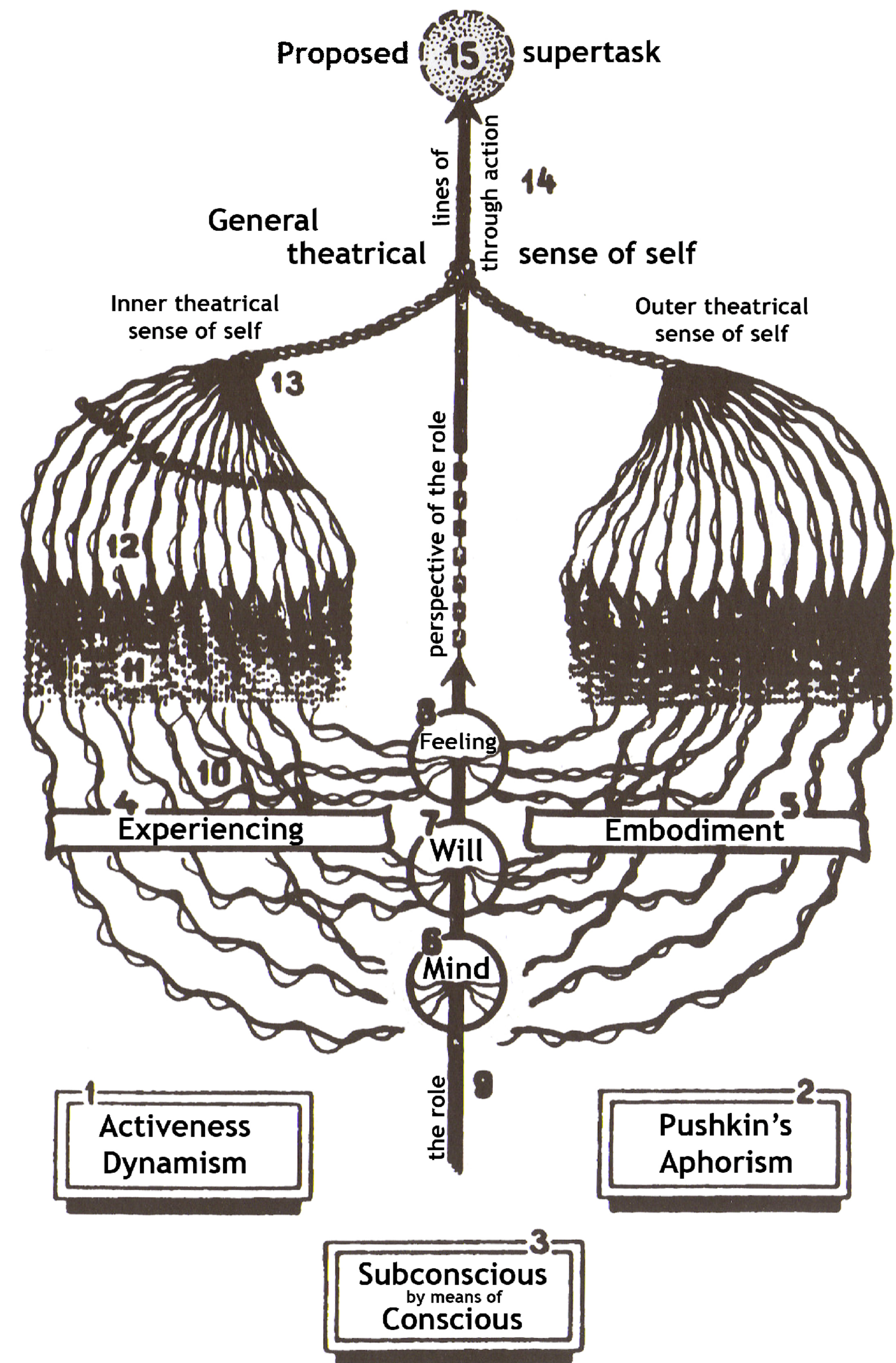"Le cadavre exquis boira le vin nouveau"

Antithesis:
Konstantin Stanislavski
(1863-1938)
and the actor's *System*
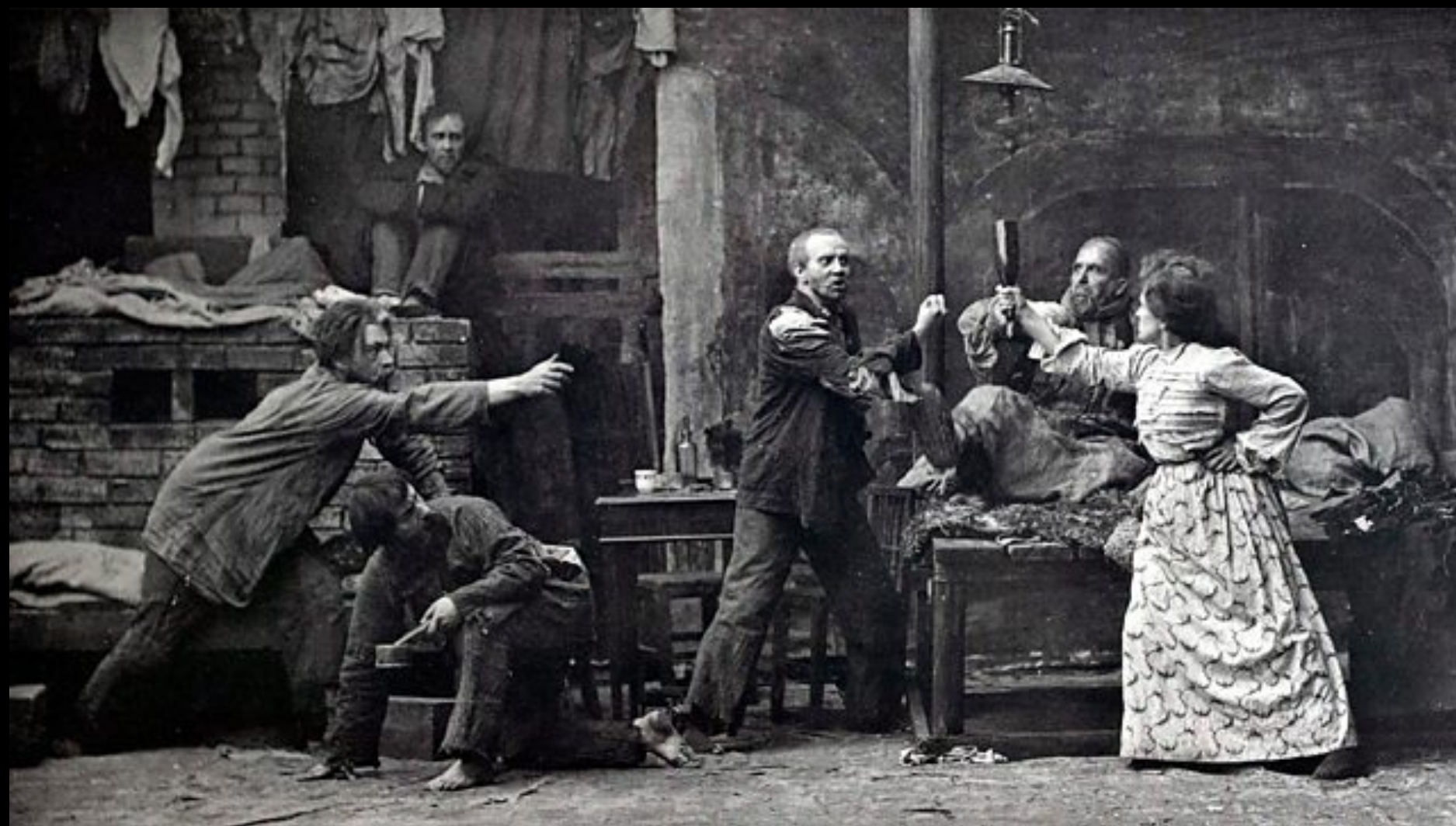
Stanislavski (far left) in The Lower Depths
at The Moscow Art Theatre,1902
[Credit: Stanislavski Centre/ArenaPal, BBC]

Proposed **15** supertask

lines of through action **14**

General theatrical sense of self

Inner theatrical sense of self

Outer theatrical sense of self

perspective of the role

13

12

11

8 Feeling

4 **10**

Experiencing

Embodiment

7 Will

6 Mind

the role **9**

1 Activeness Dynamism

2 Pushkin's Aphorism

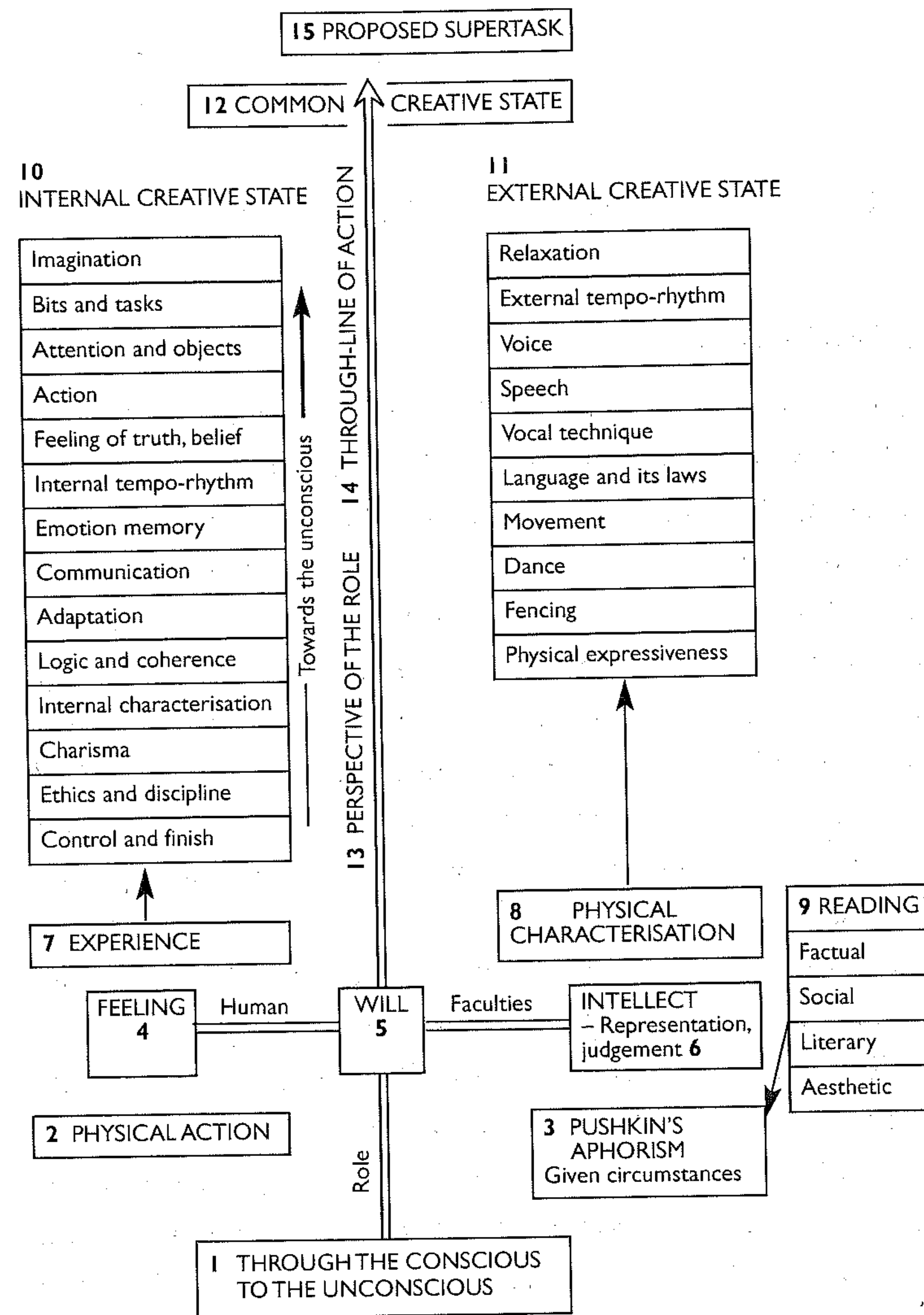**3** Subconscious by means of Conscious

Aim towards **super-objective** of the character and of the play

Create a "third being" character creation as self-transformation

Draw on memory and experience to give **emotional depth** to play

Each line of the script is **actioned**, actor "does" something to others (how to get what one wants)

Determine the **units** of the script with their own **objectives** (what the character wants)

Practice physical characterisations of the character to acquire reflexes (e.g., **animal work**)

Rely on intellect to understand the character

Research the **context** of the play and of its characters: original text, facts, social conventions…

Determine **Given Circumstances**: Where, when, who, what, why, obstacle, how (to overcome obstacle)

[Credit: Jean Benedetti (2008) "Stanislavski: An Introduction", *Bloomsbury*]
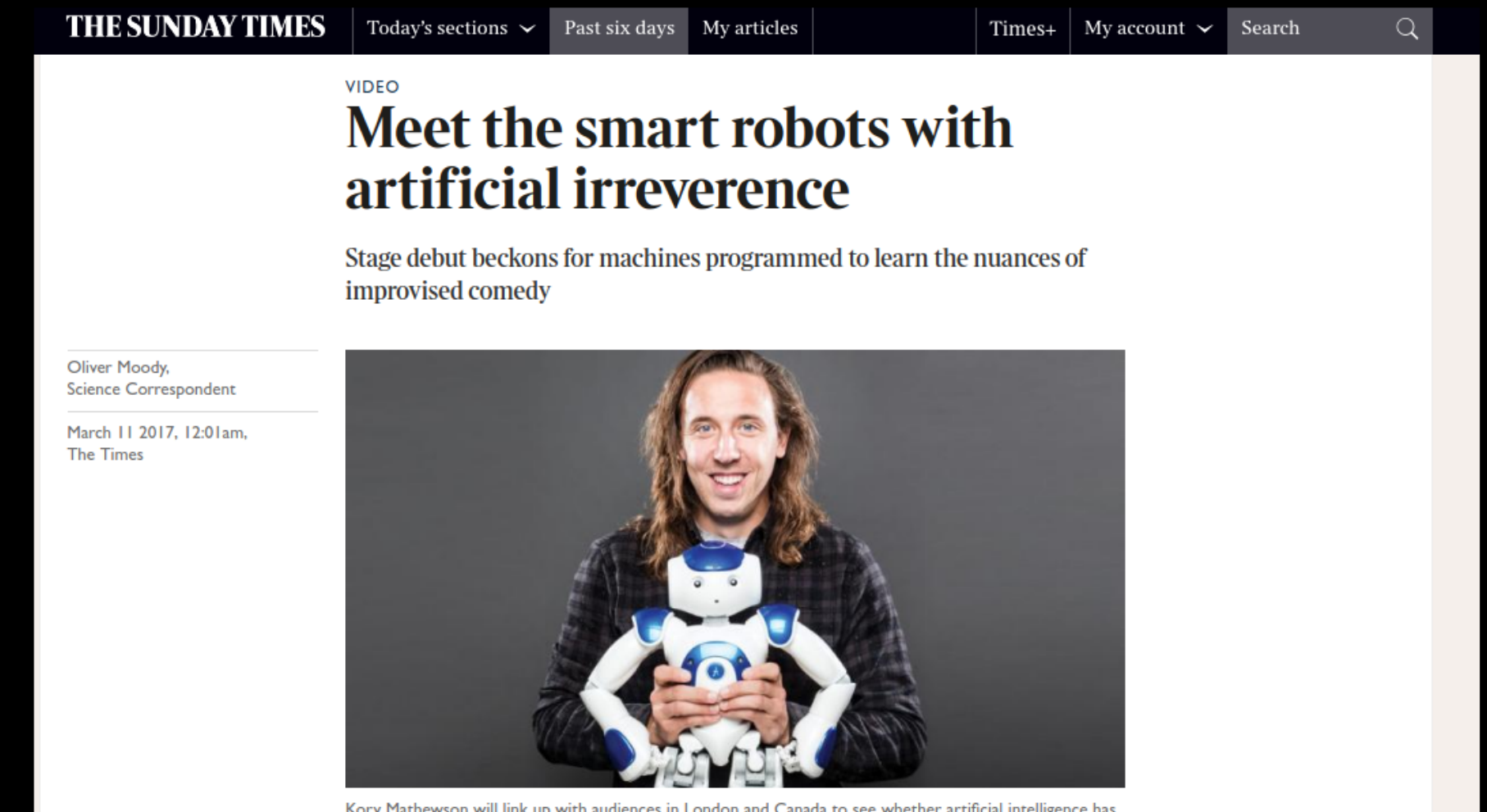
Reviews

"I would not do it"
(Colin Mochrie)

"A transatlantic improv show with humans
and AIs on both sides! Truly, The Comedy of
(Speech Recognition) Errors."
(@KaiLashArul)

"The most fascinating aspect … is that
despite the characters being make believe,
the technology behind this show is genuine."
(viewsfromthegods.co.uk)

"Comedians to Watch in 2017"
(@ThePhoenixRemix)

THE SUNDAY TIMES

Today's sections   Past six days   My articles   Times+   My account   Search

VIDEO

Meet the smart robots with artificial irreverence

Stage debut beckons for machines programmed to learn the nuances of improvised comedy

Oliver Moody,
Science Correspondent

March 11 2017, 12:01am,
The Times

Kory Mathewson will link up with audiences in London and Canada to see whether artificial intelligence has

Oliver Moody, The Sunday Times, 11 March 2017

"has some genuinely innovative ideas that utilise
the idea of international scientific collaboration
and use it to produce a **not-particularly-funny
but endearing** production"
(thereviewshub.com)