

Conversation is the Heart of Interaction

IxDA Pittsburgh — November 2019

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Human-Computer Interaction Institute
Carnegie Mellon University

pangaro.com/ixda2019/

Cybernetic Serendipity

Serendipity

Serendipity

the faculty of making
happy chance discoveries

of means of control and communication machines
both human and electronic

An exhibition

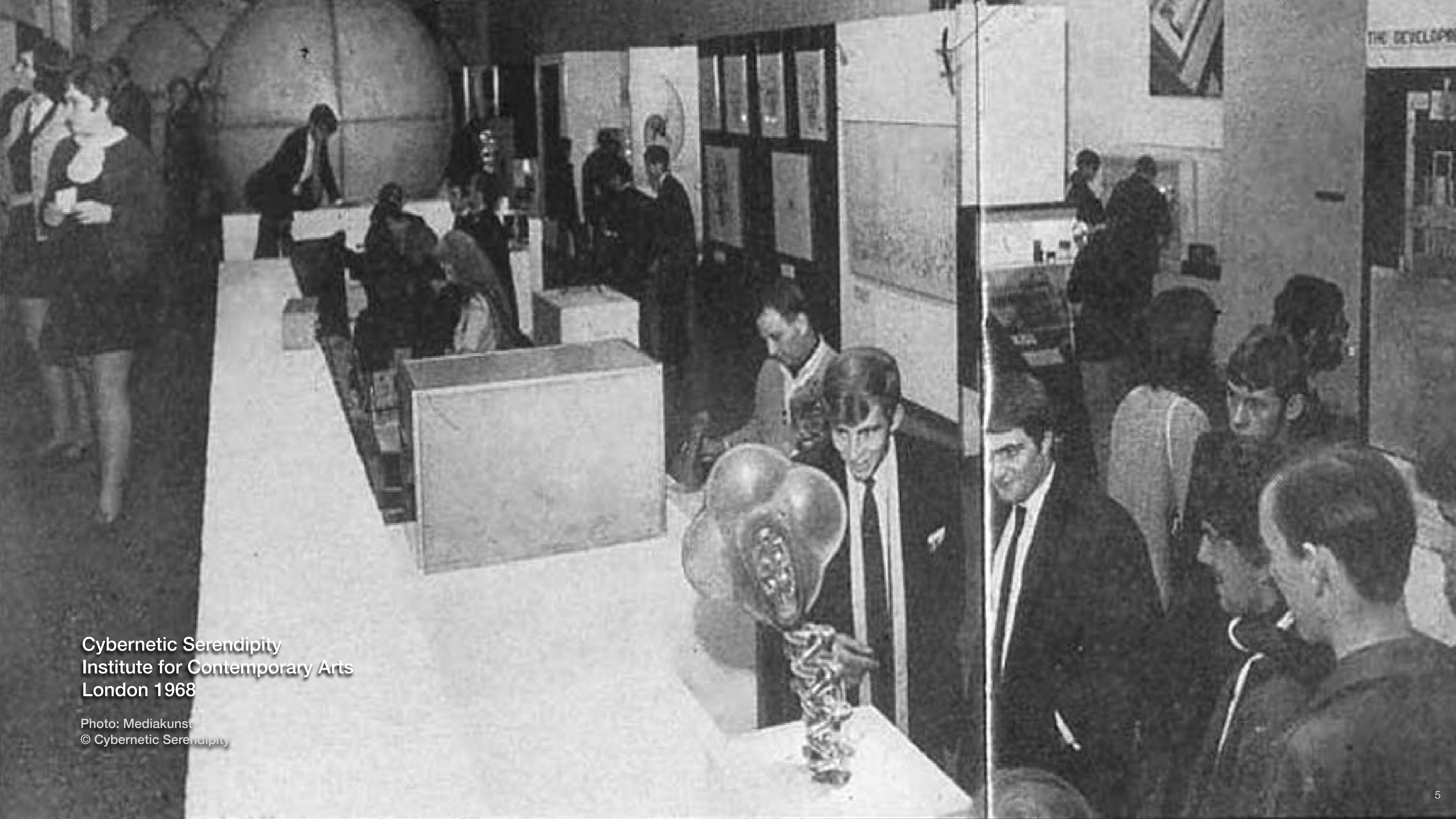
at the Science Museum, London, from 1955 to 1957





Cybernetic Serendipity
Institute for Contemporary Arts
London 1968

Photo: Mediakunst
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Cybernetic Serendipity
Institute for Contemporary Arts
London 1968

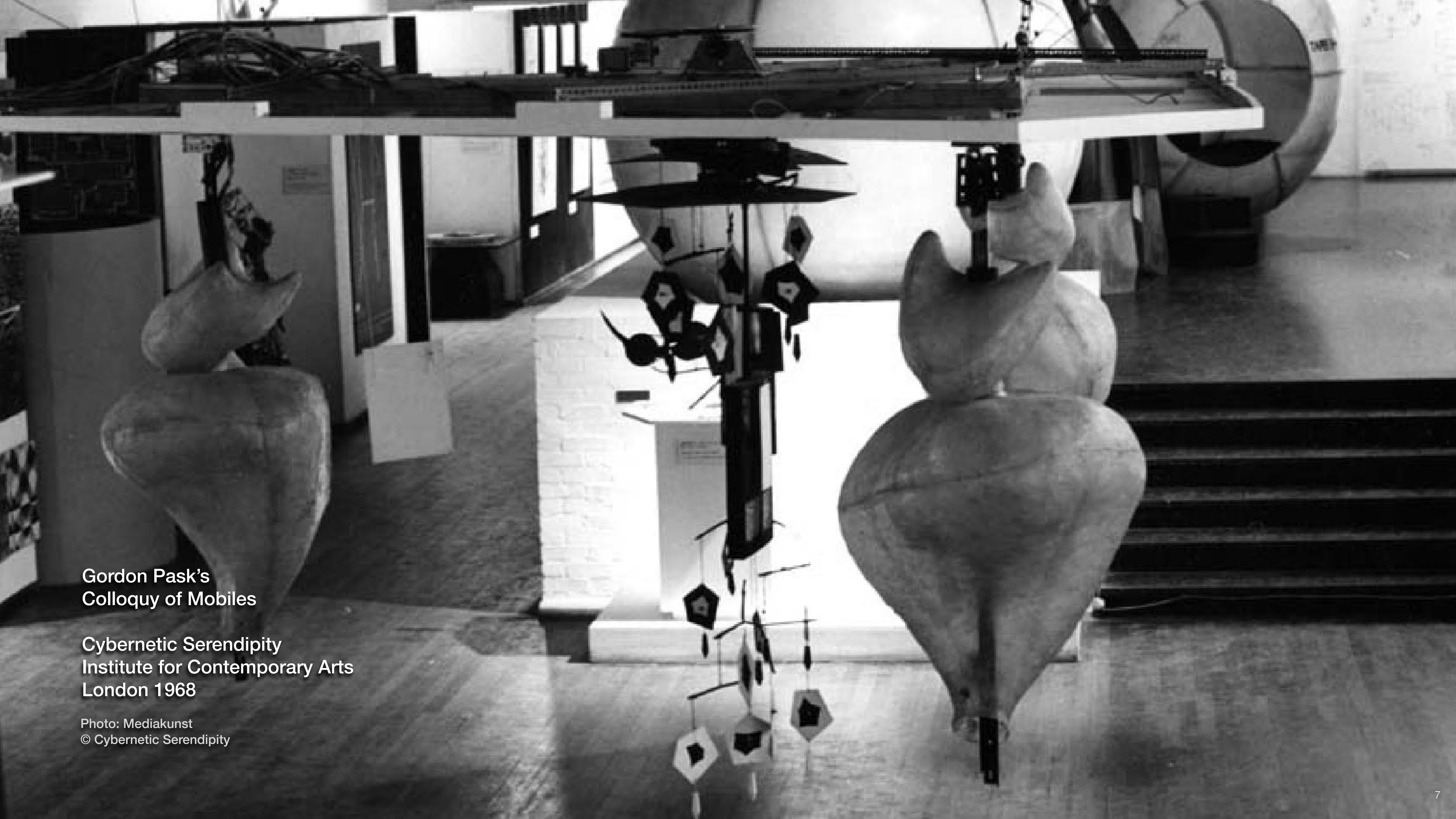
Photo: Mediakunst
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Gordon Pask's
Colloquy of Mobiles

Cybernetic Serendipity
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London 1968

Photo: Mediakunst
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Gordon Pask's
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Cybernetic Serendipity
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London 1968

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Gordon Pask's
Colloquy of Mobiles

Cybernetic Serendipity
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London 1968

Photo: Gordon Pask Archive

**Gordon Pask in front of a male mobile
of his own design**

**Cybernetic Serendipity
Institute for Contemporary Arts
London 1968**

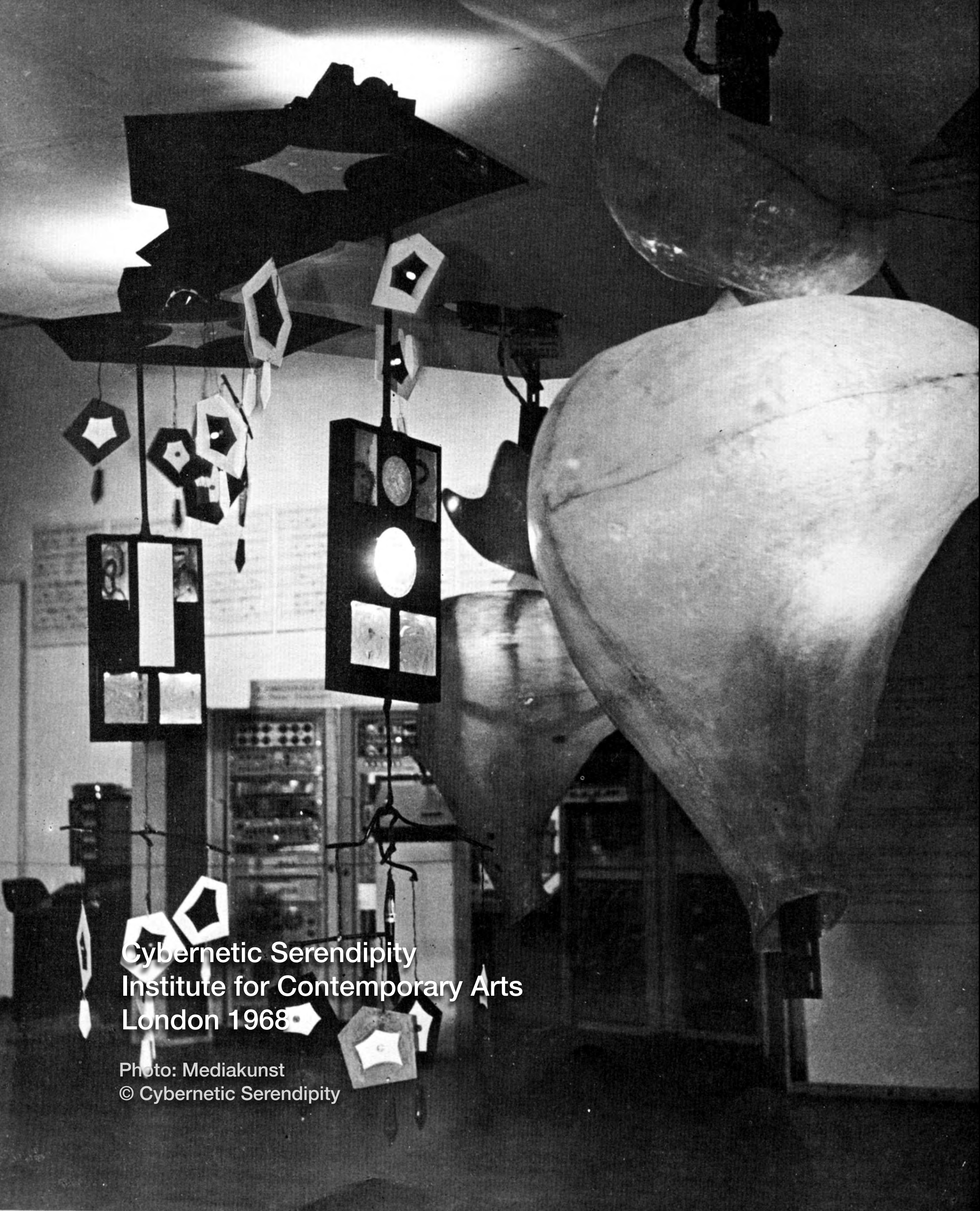
Photo: Gordon Pask Archive
University of Vienna



Yolanda Sonnabend, prominent theatre and ballet designer for the Royal Ballet, designer of Colloquy's female mobiles

Photo: © Johnny Dewe-Mathews

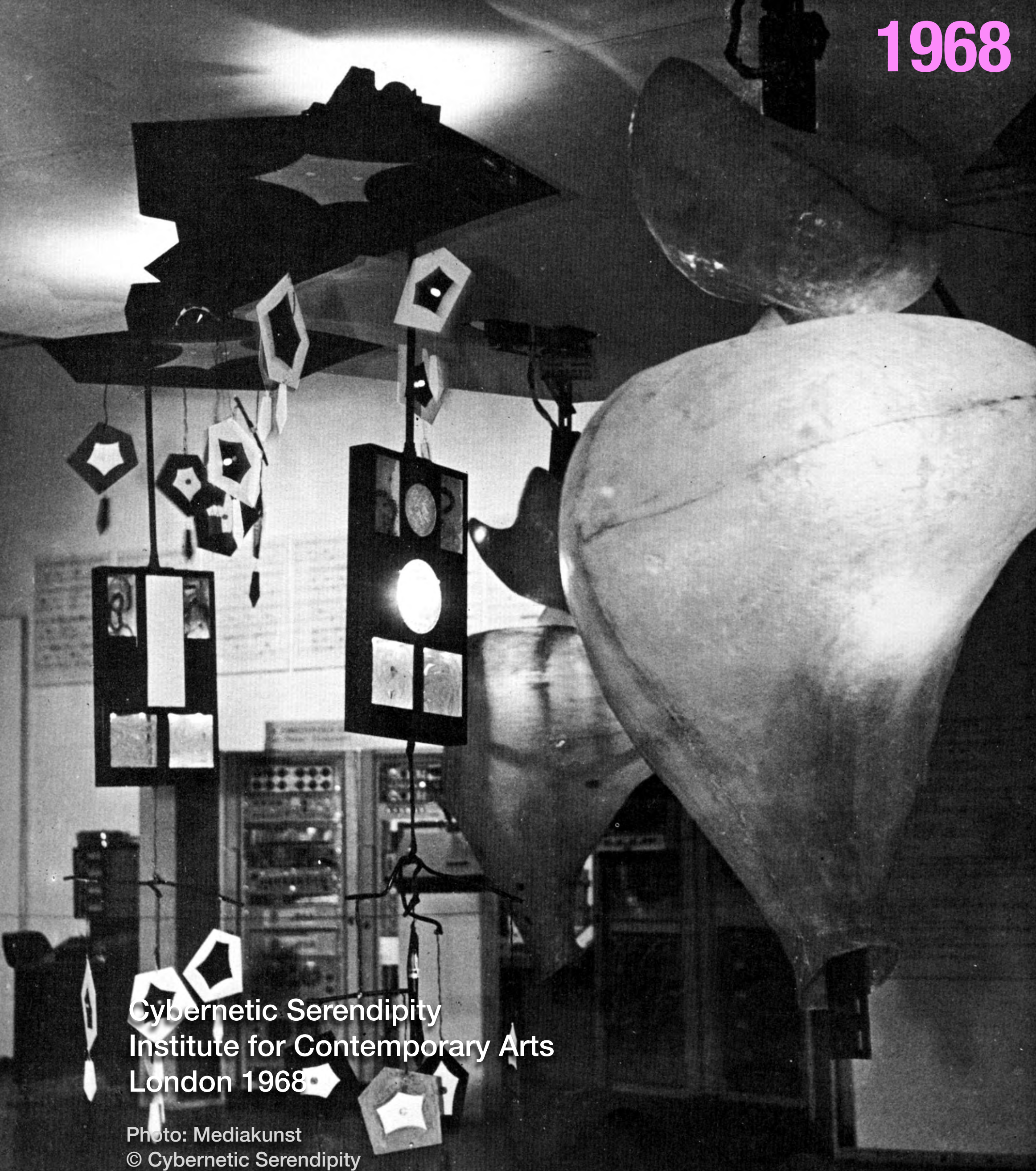




Cybernetic Serendipity
Institute for Contemporary Arts
London 1968

Photo: Mediakunst
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1968



Cybernetic Serendipity
 Institute for Contemporary Arts
 London 1968

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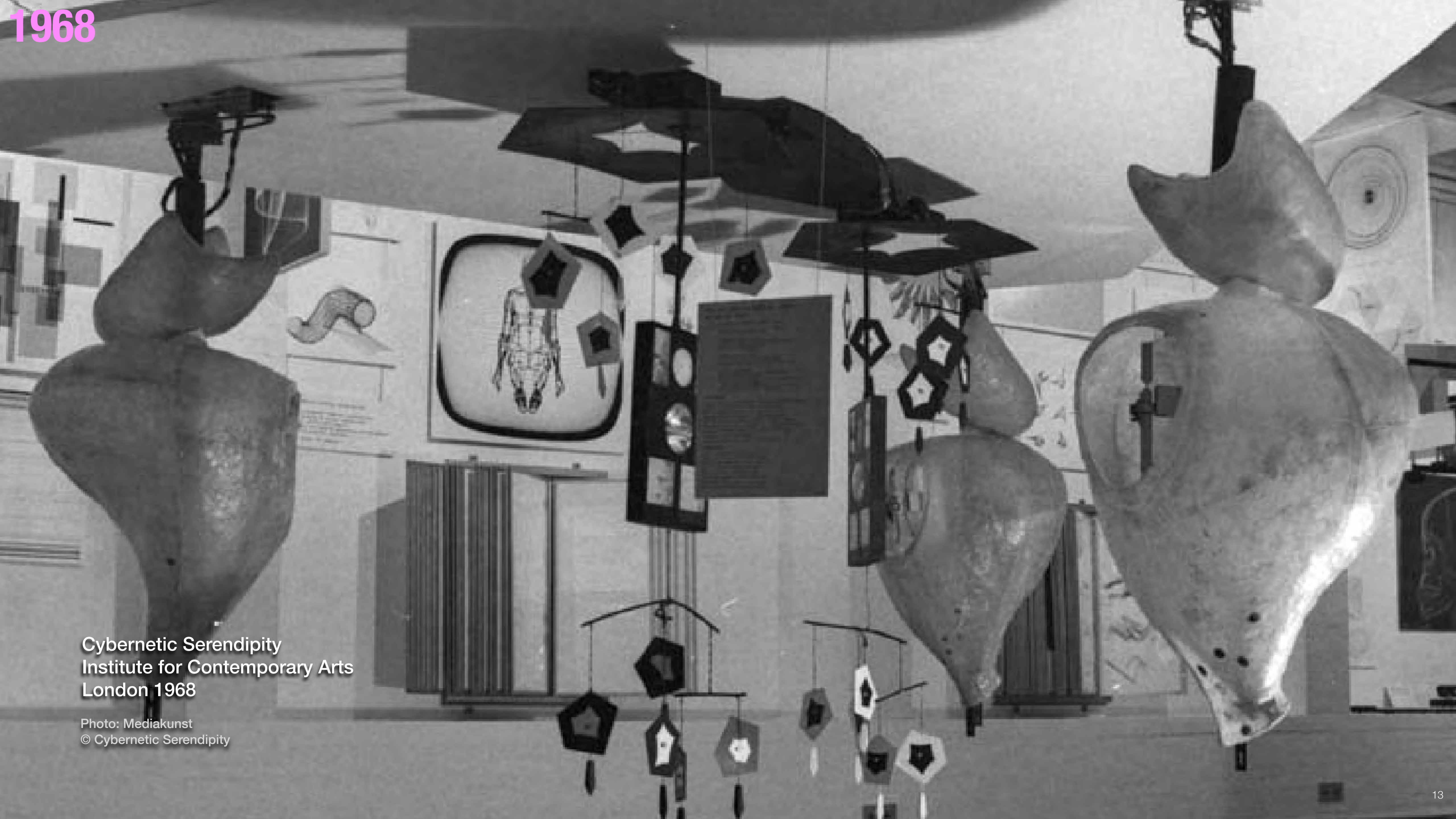
2018



ColloquyOfMobiles.com
 COLLOQUY 2018 Project
 College for Creative Studies
 Detroit 2018

Photo: © Cybernetic Media, Inc.

1968



Cybernetic Serendipity
Institute for Contemporary Arts
London 1968

Photo: Mediakunst
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2018



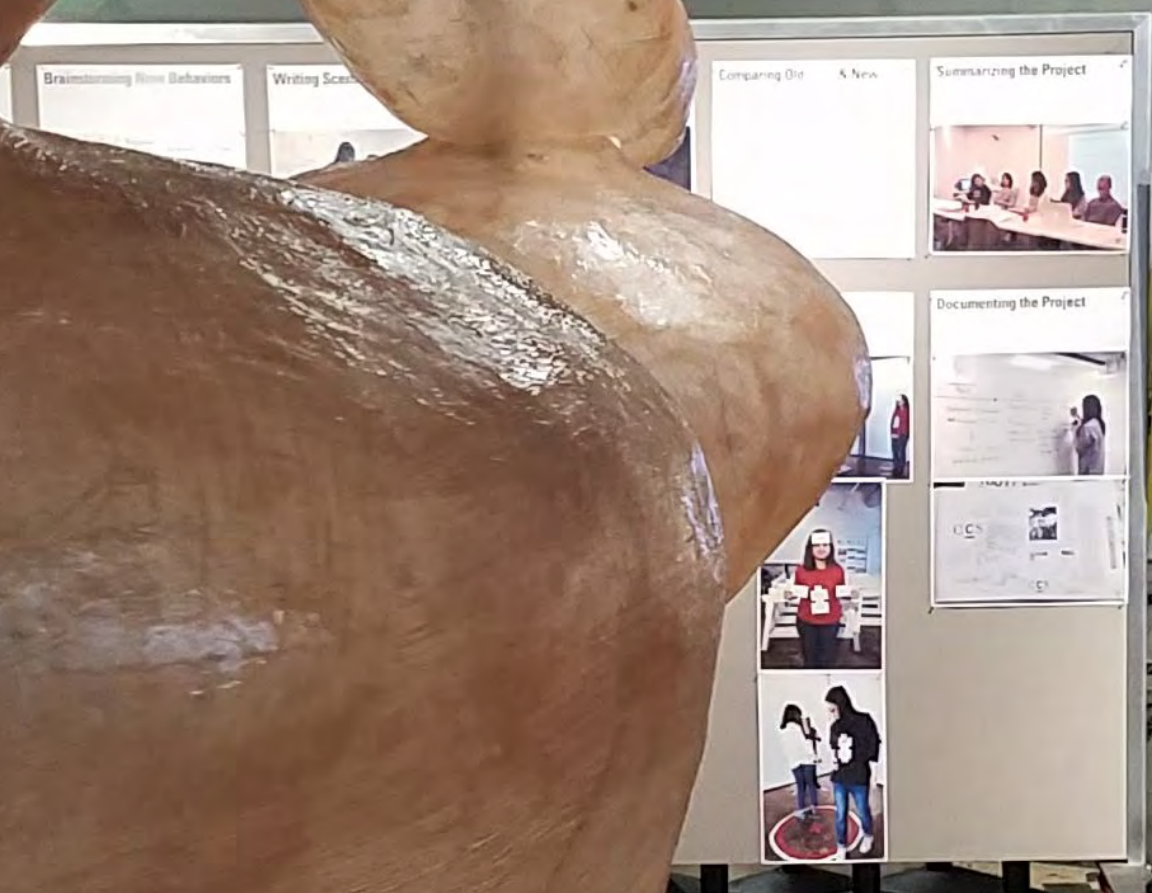
ColloquyOfMobiles.com
COLLOQUY 2018 Project
College for Creative Studies
Detroit 2018

Colloquy

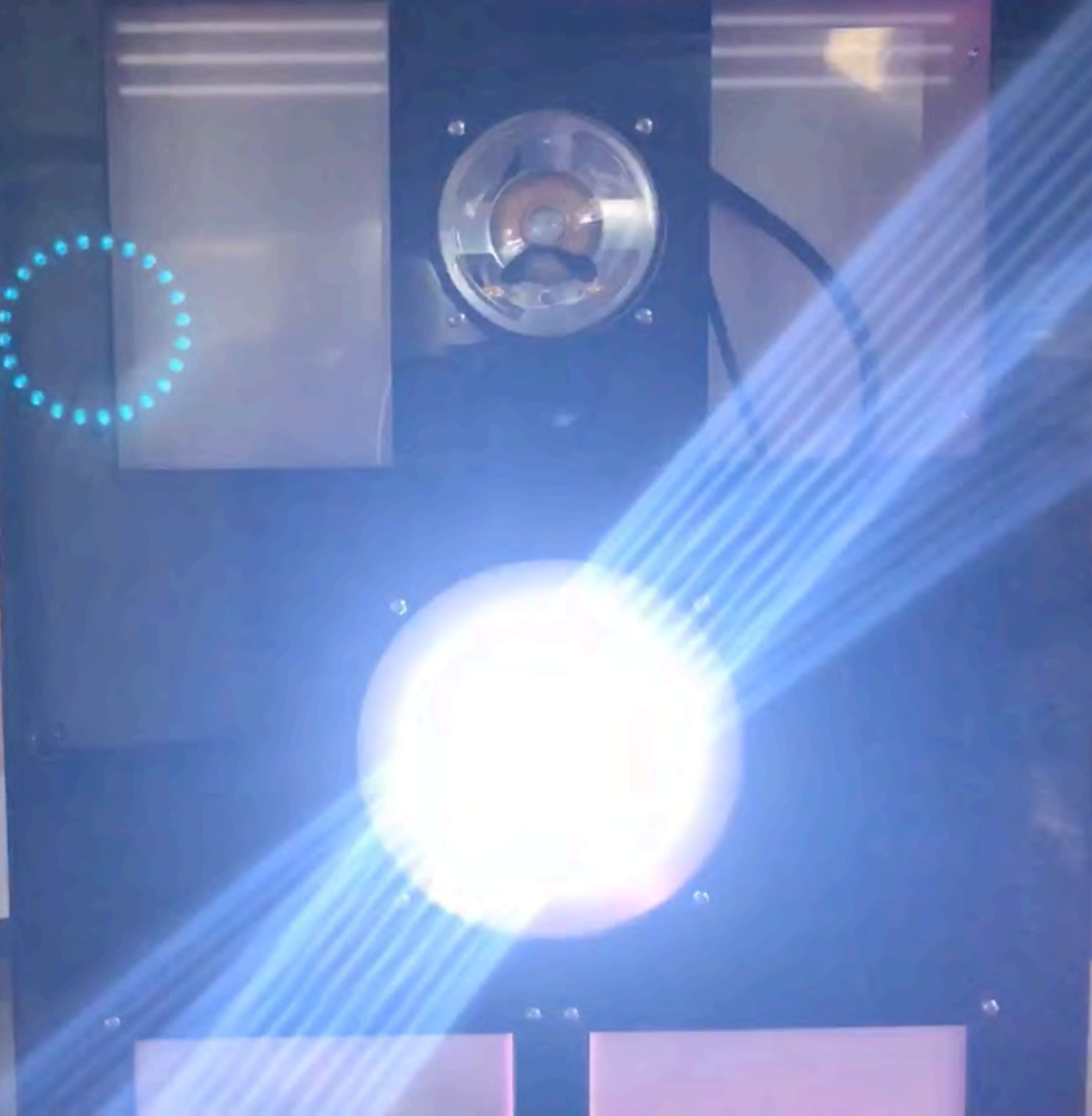
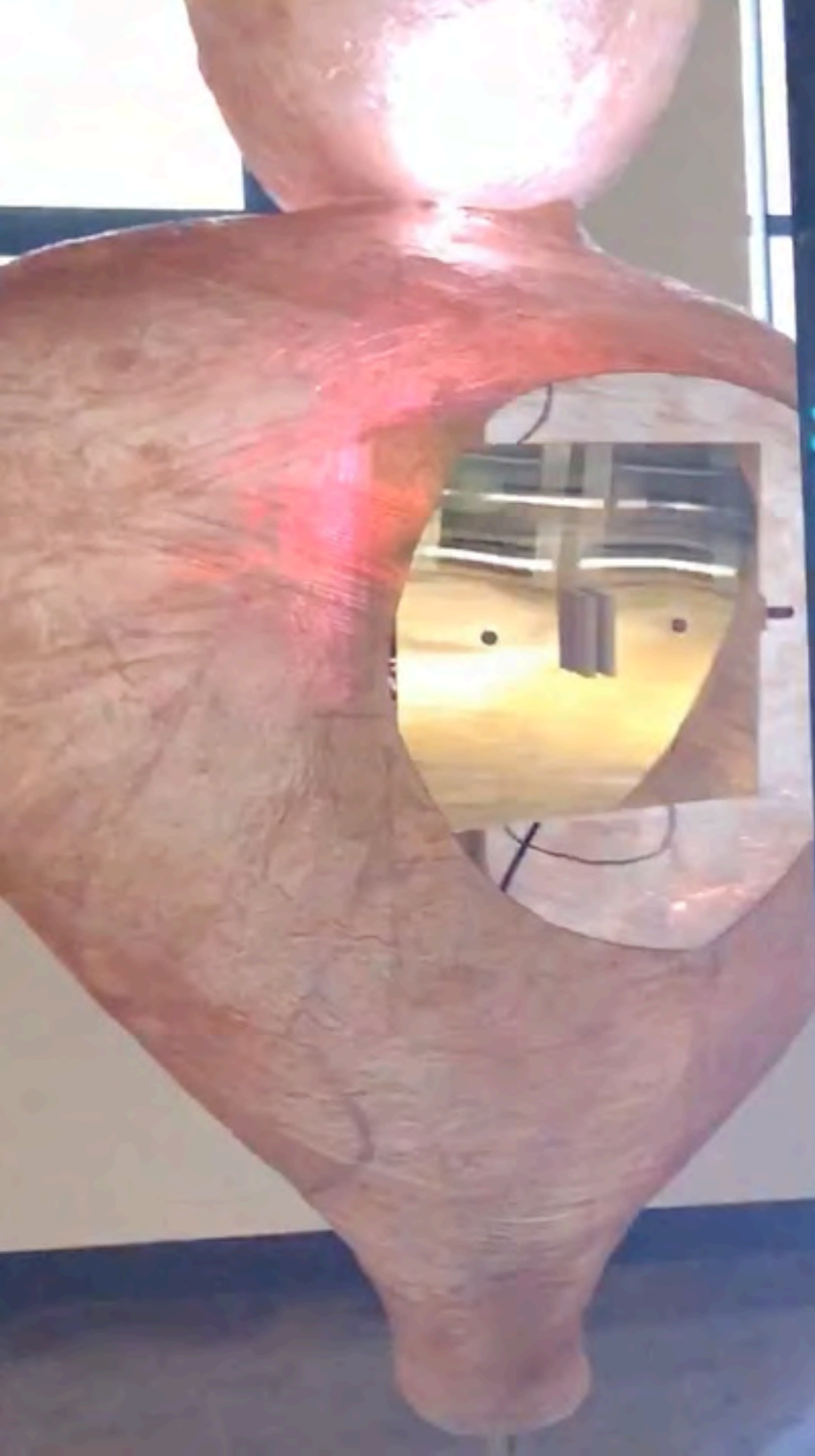


ColloquyOfMobiles.com
COLLOQUY 2018 Project
College for Creative Studies
Detroit 2018

Colloquy



ColloquyOfMobiles.com
COLLOQUY 2018 Project
College for Creative Studies
Detroit 2018





In 2020, two prominent European Museums will exhibit our faithful replica of Colloquy of Mobiles:

Centre Pompidou, Paris, France



ZKM Museum, Karlsruhe, Germany



ColloquyOfMobiles.com
COLLOQUY 2018 Project
College for Creative Studies
Detroit 2018

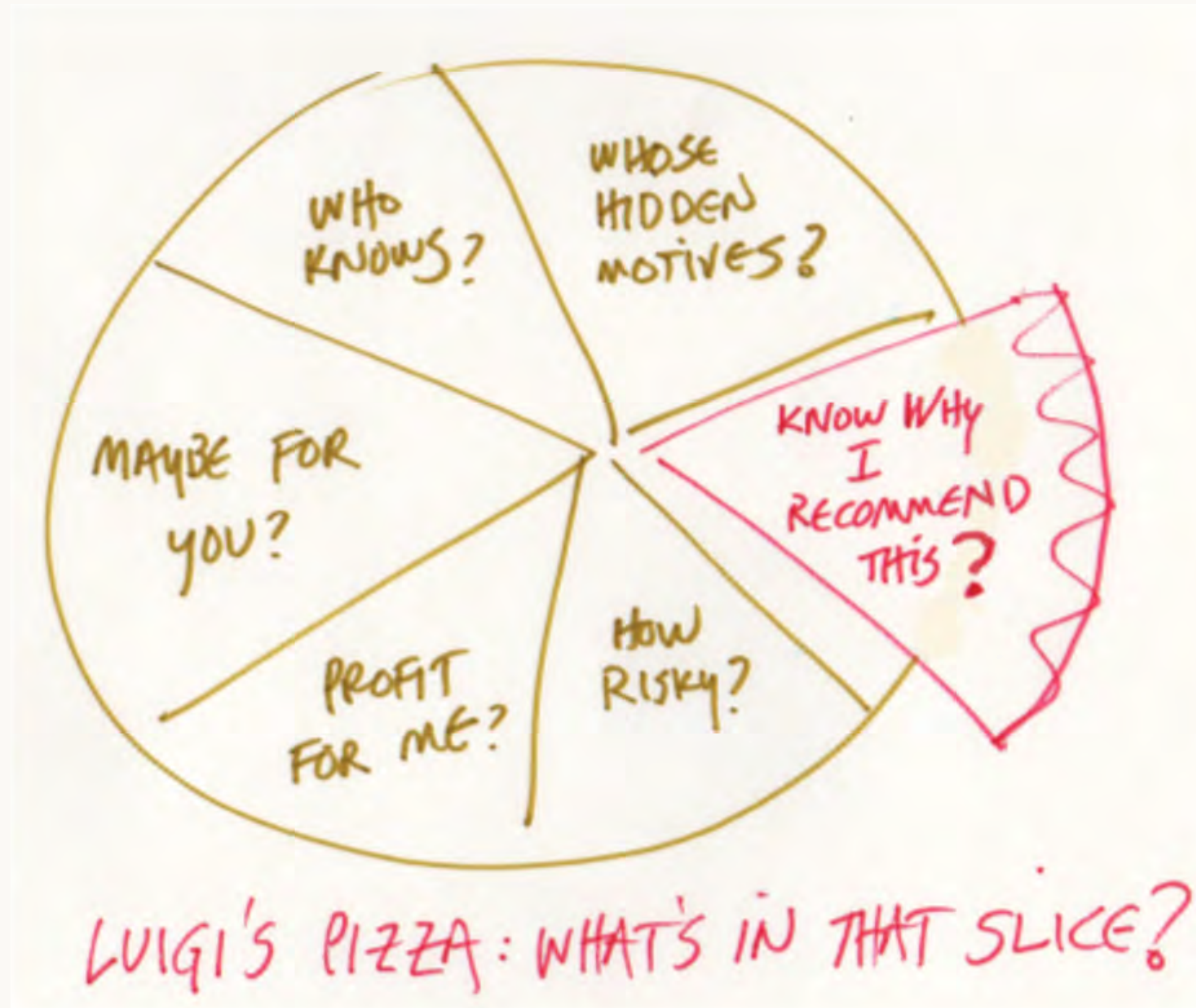


Luigi's Pizza — A Parable about Human Conversation



Click for the Parable of Luigi's Pizza

Luigi's Pizza – A Parable about Conversational Interfaces



[Click for the Parable of Luigi's Pizza](#)

Luigi's Pizza – A Parable about Conversational Interfaces

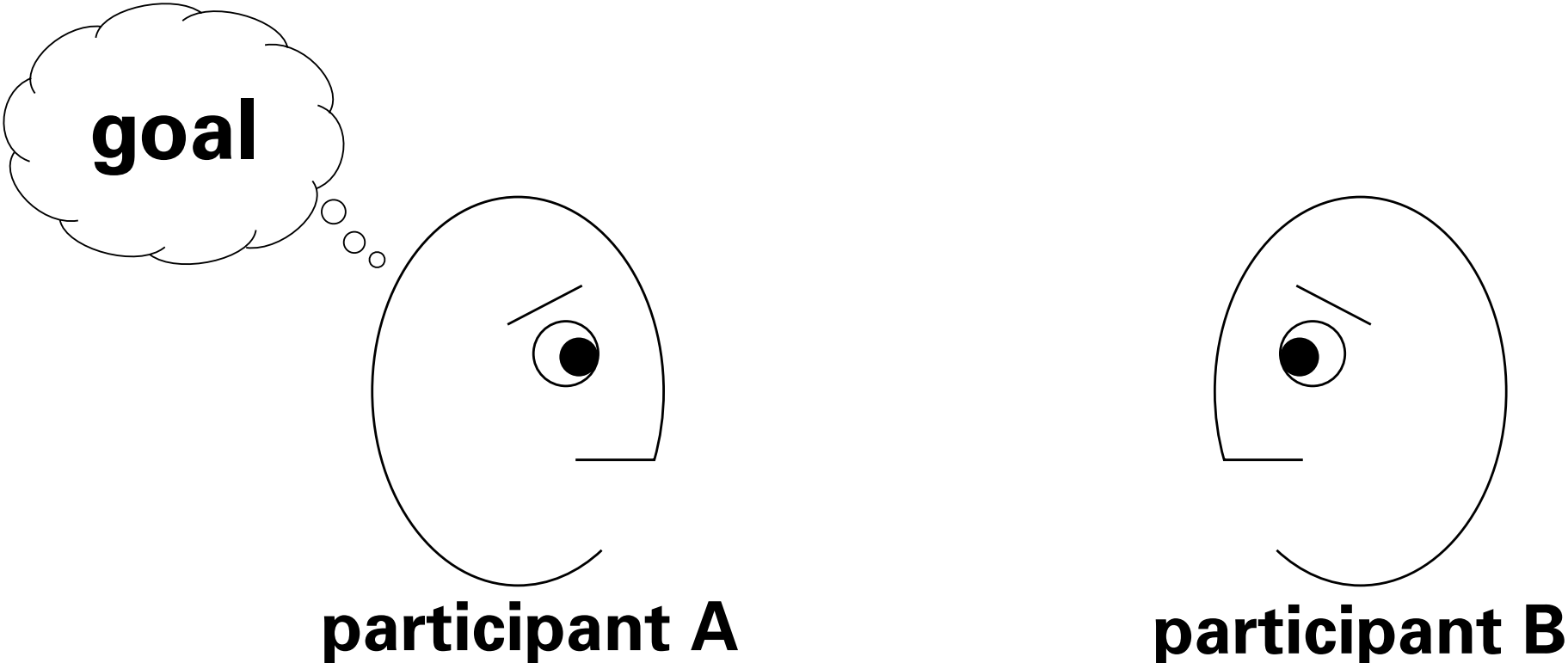
How do we do better at Interaction Design? I propose we:

- ***apply models of human conversation***
- ***strive for interfaces that are cooperative, ethical, humane***
- ***push for new forms of conversational interfaces.***

These are the offers in my presentation today.

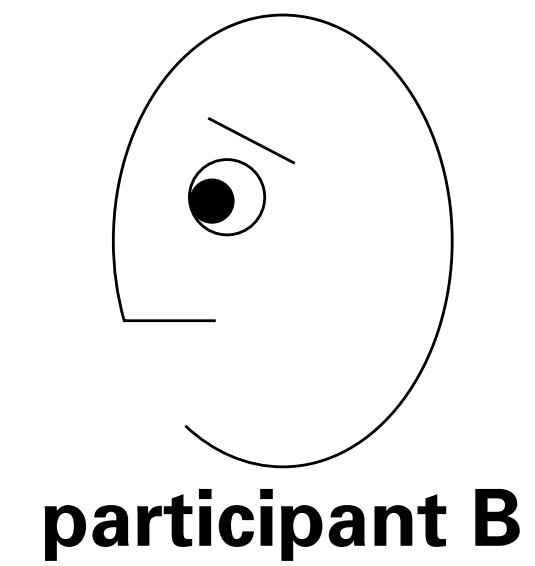
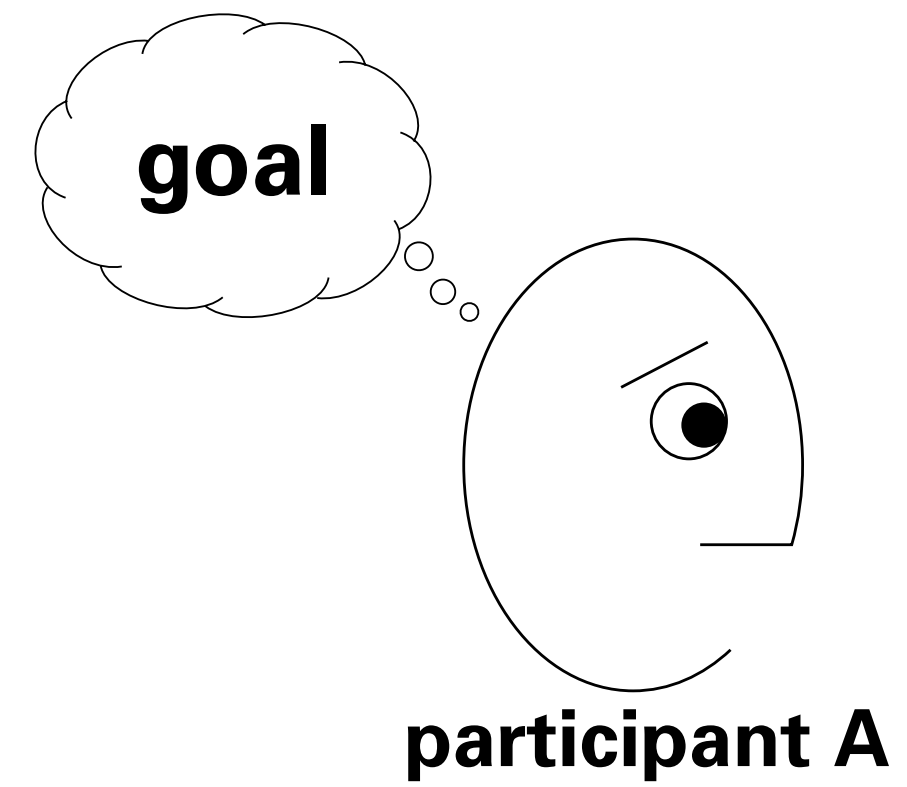
Alexa, can you please acquire the skill of conversation?
Alexa, what is “conversation”?

Conversational Frame



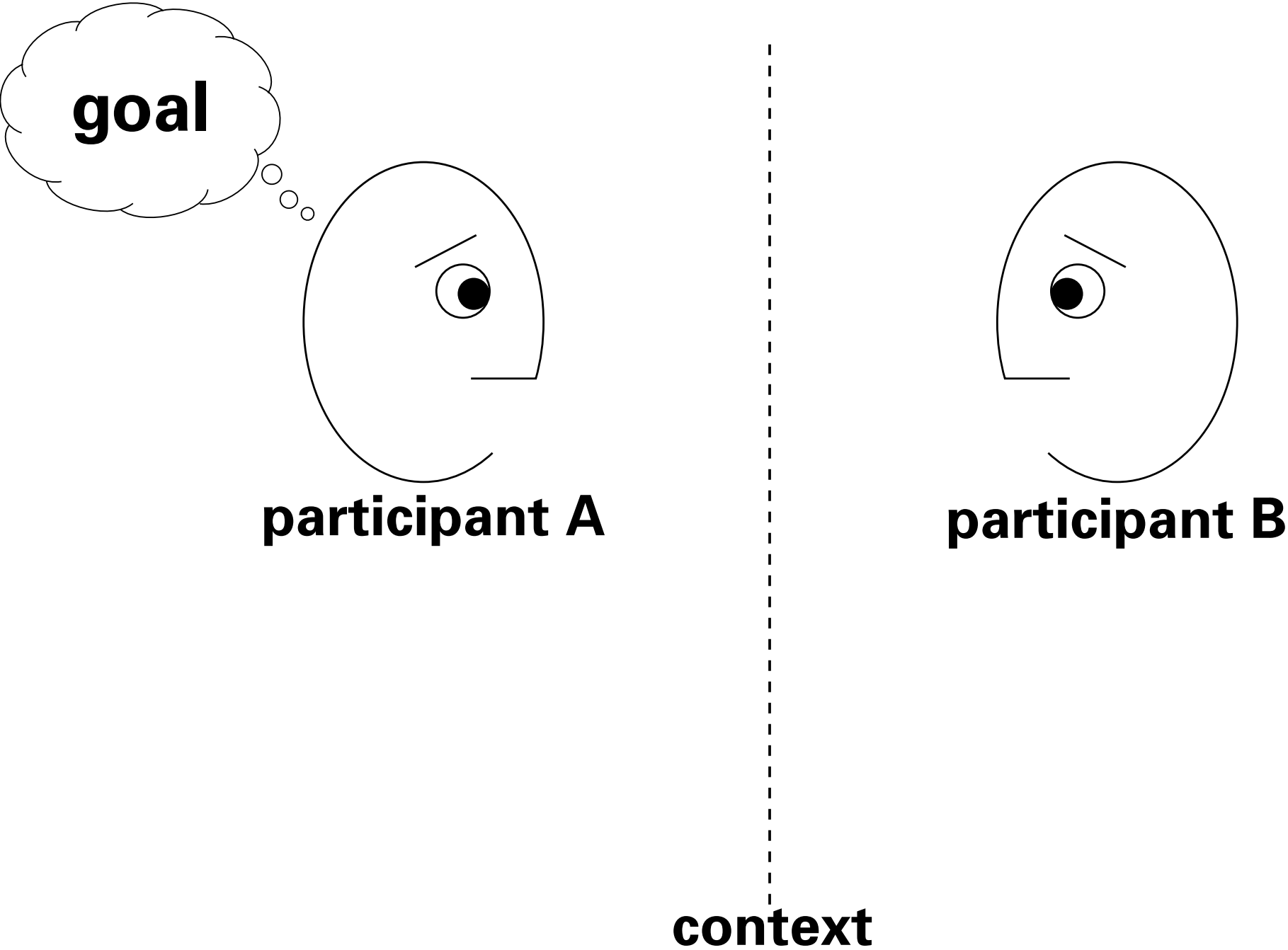
After Dubberly Design & Paul Pangaro

A participant has a goal.



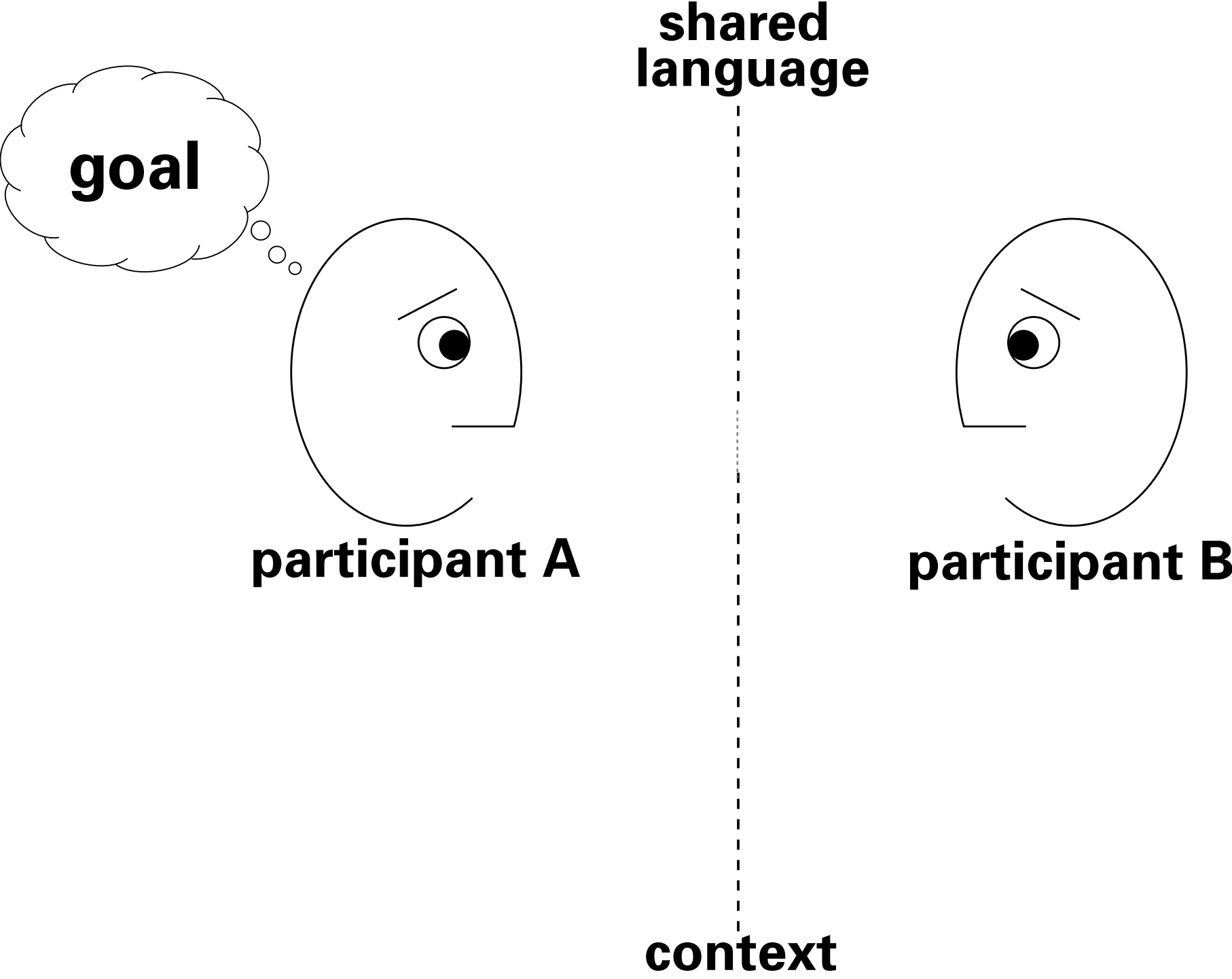
After Dubberly Design & Paul Pangaro

Chooses a context.



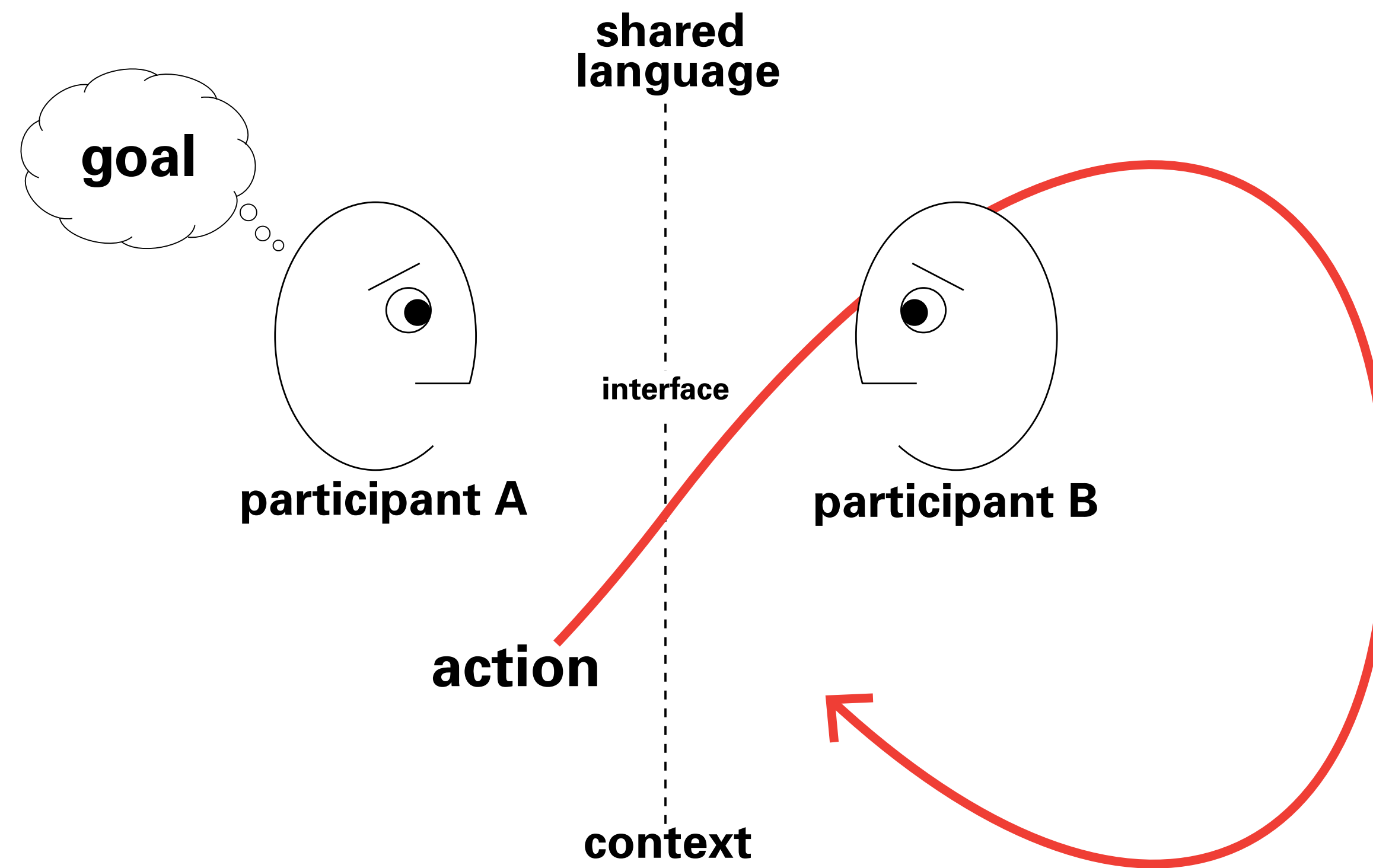
After Dubberly Design & Paul Pangaro

Chooses a language.



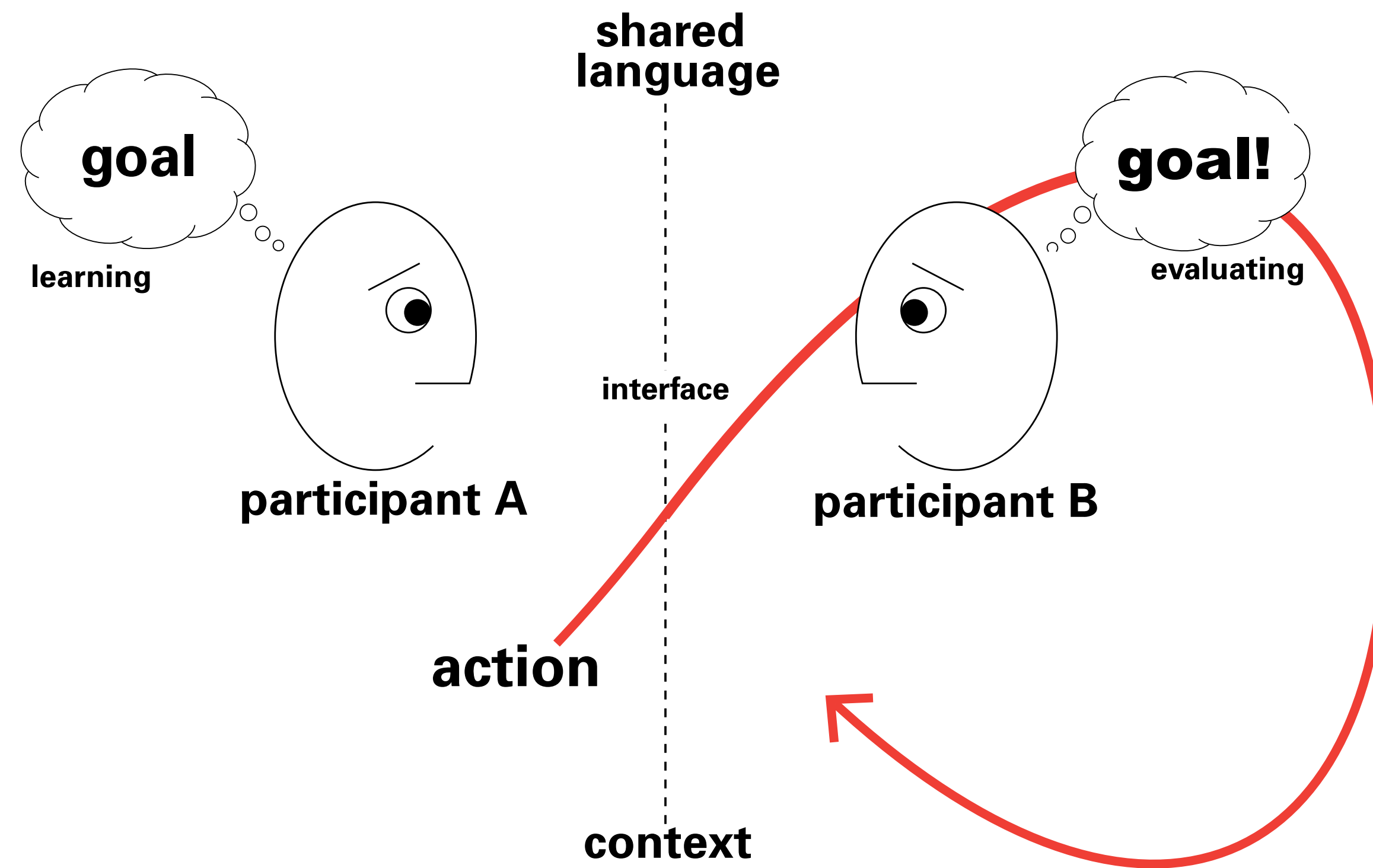
After Dubberly Design & Paul Pangaro

Begins an exchange.



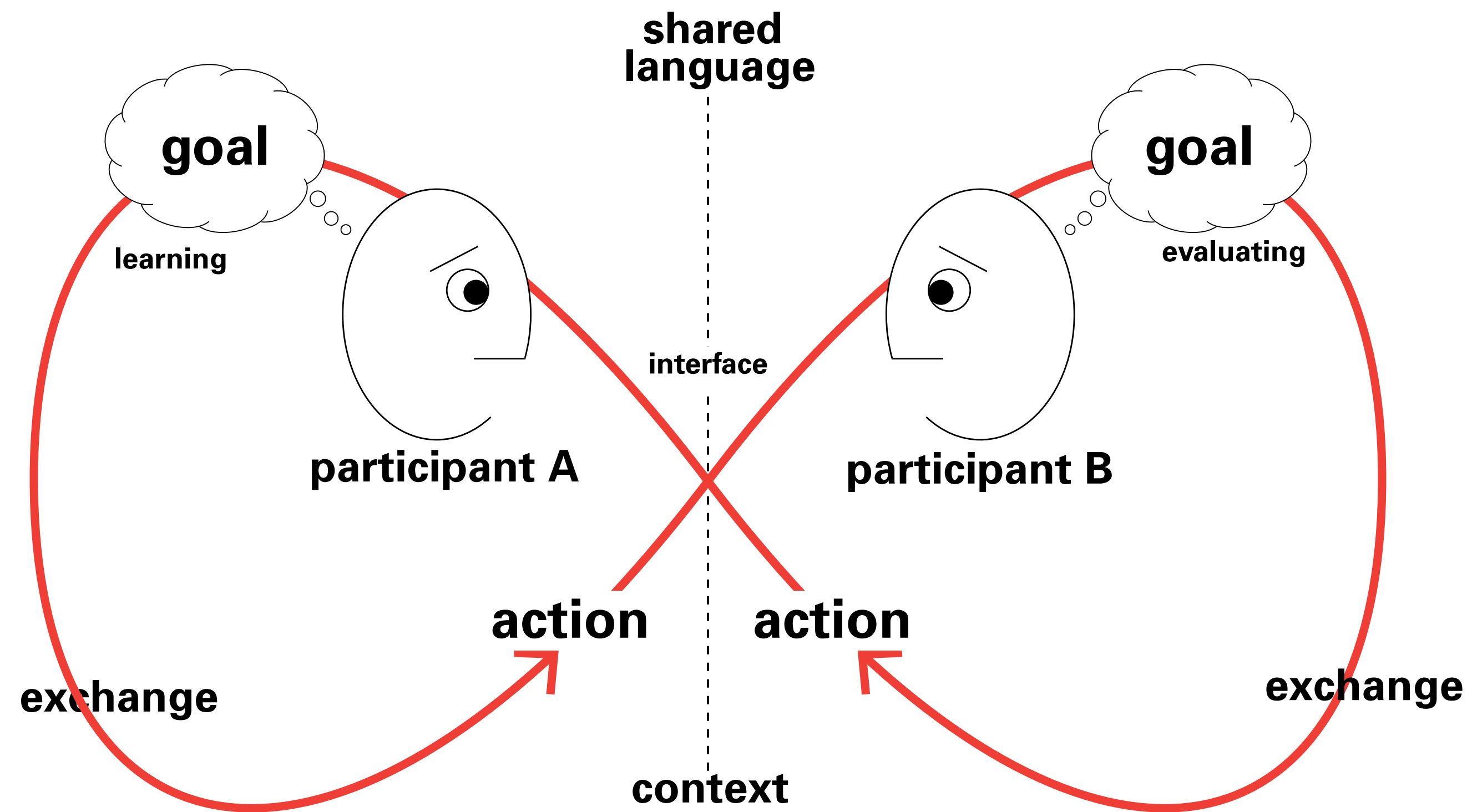
After Dubberly Design & Paul Pangaro

May evoke a response...



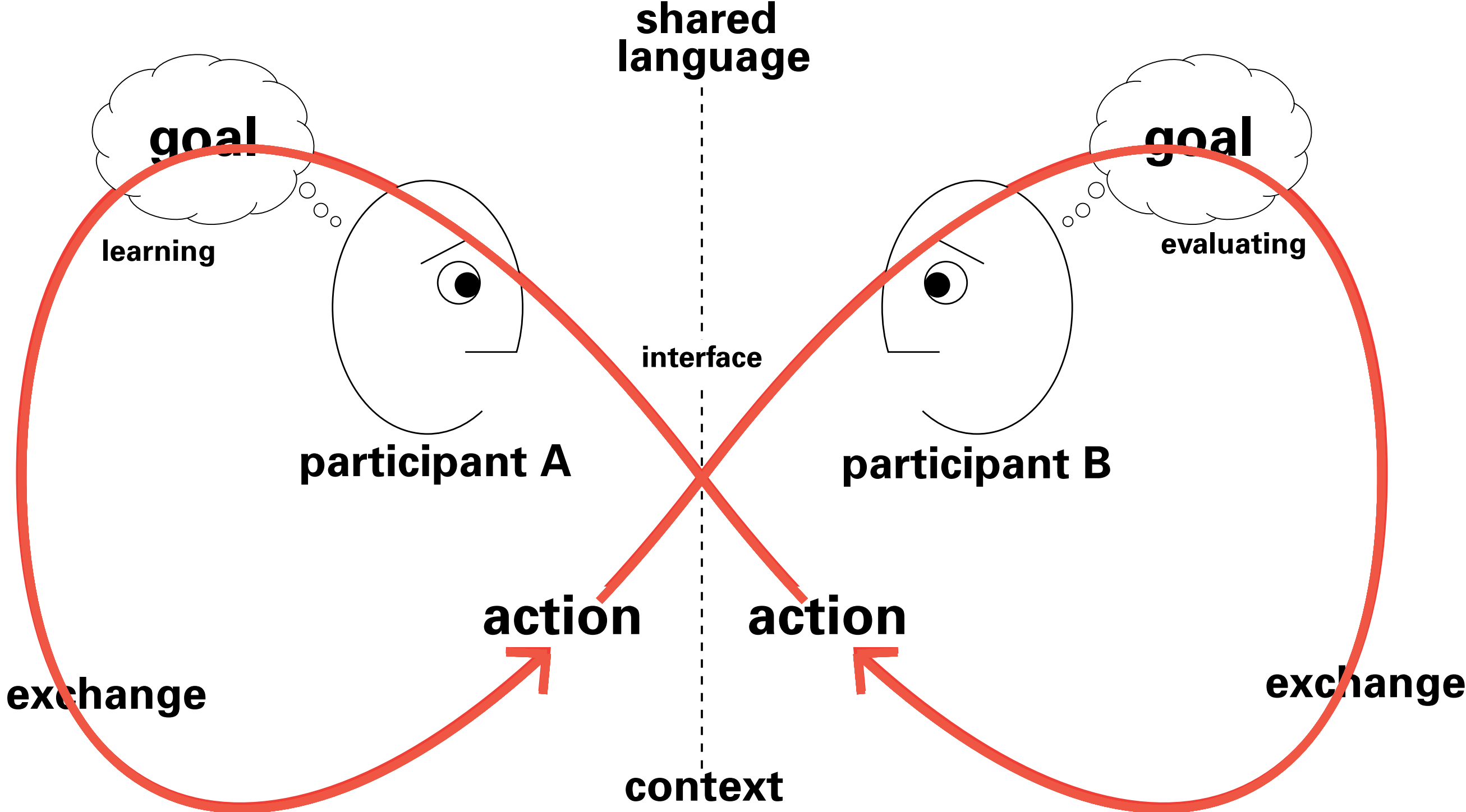
After Dubberly Design & Paul Pangaro

... and a reaction that evokes a reaction...



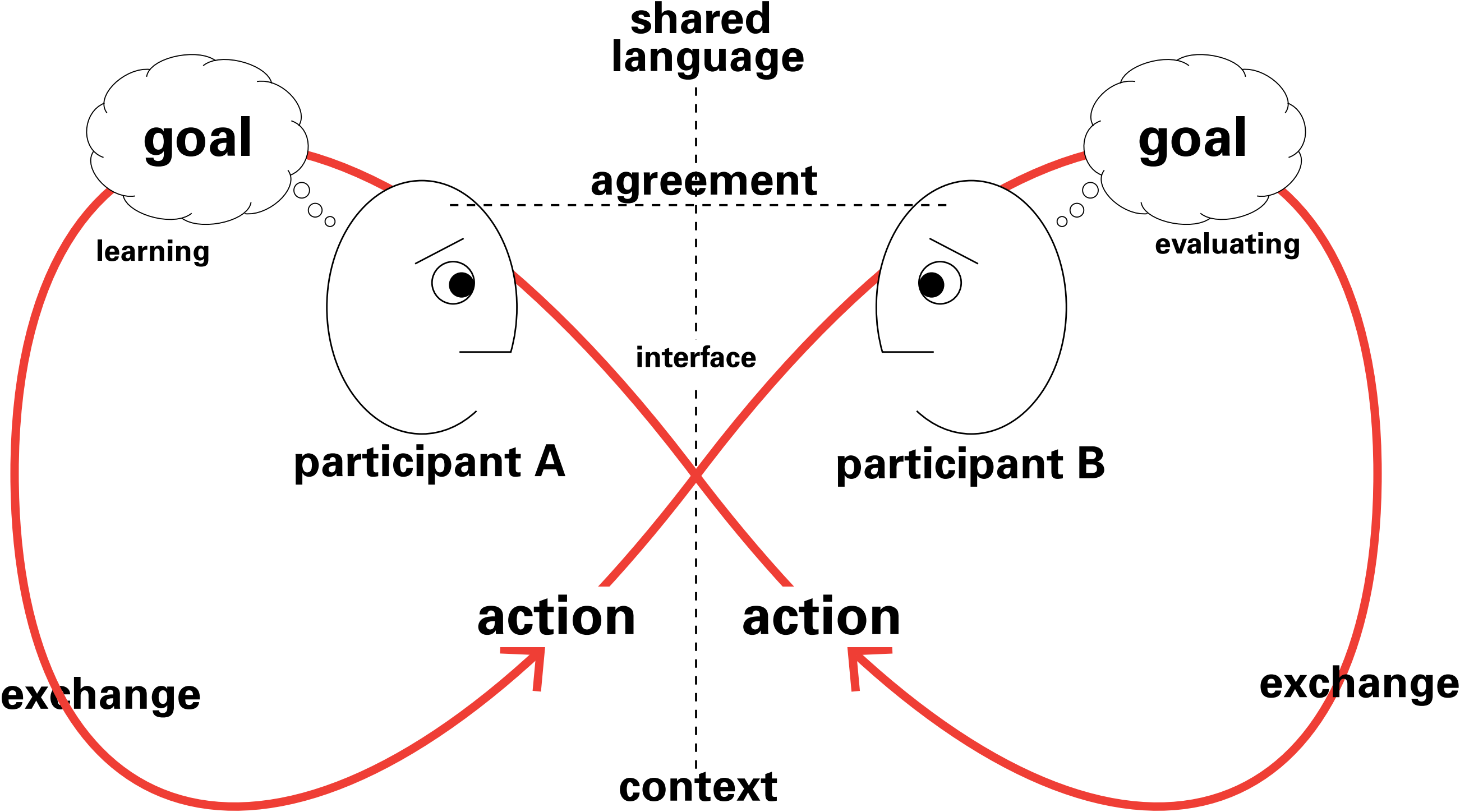
After Dubberly Design & Paul Pangaro

The engagement may continue.



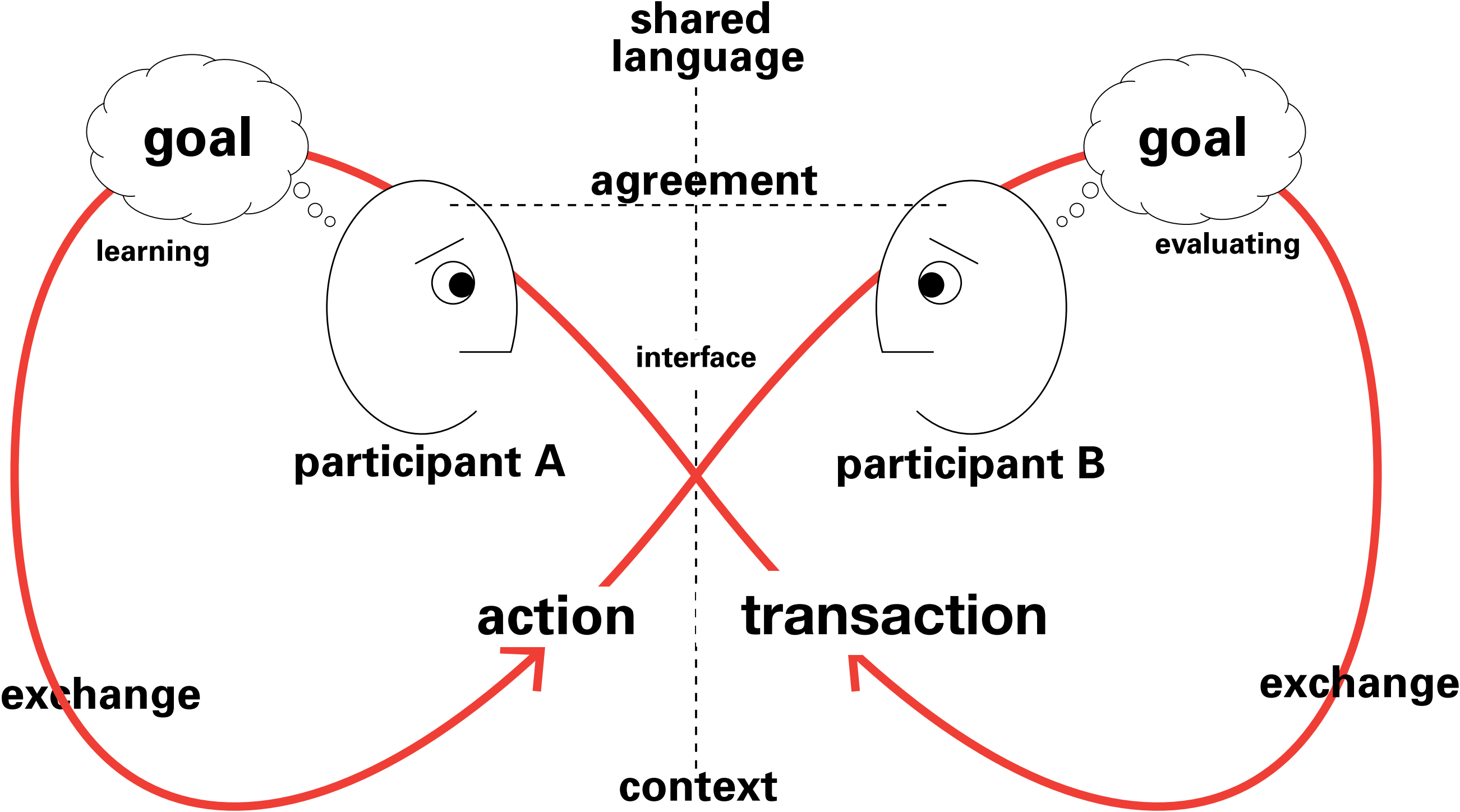
After Dubberly Design & Paul Pangaro

An agreement may be reached.



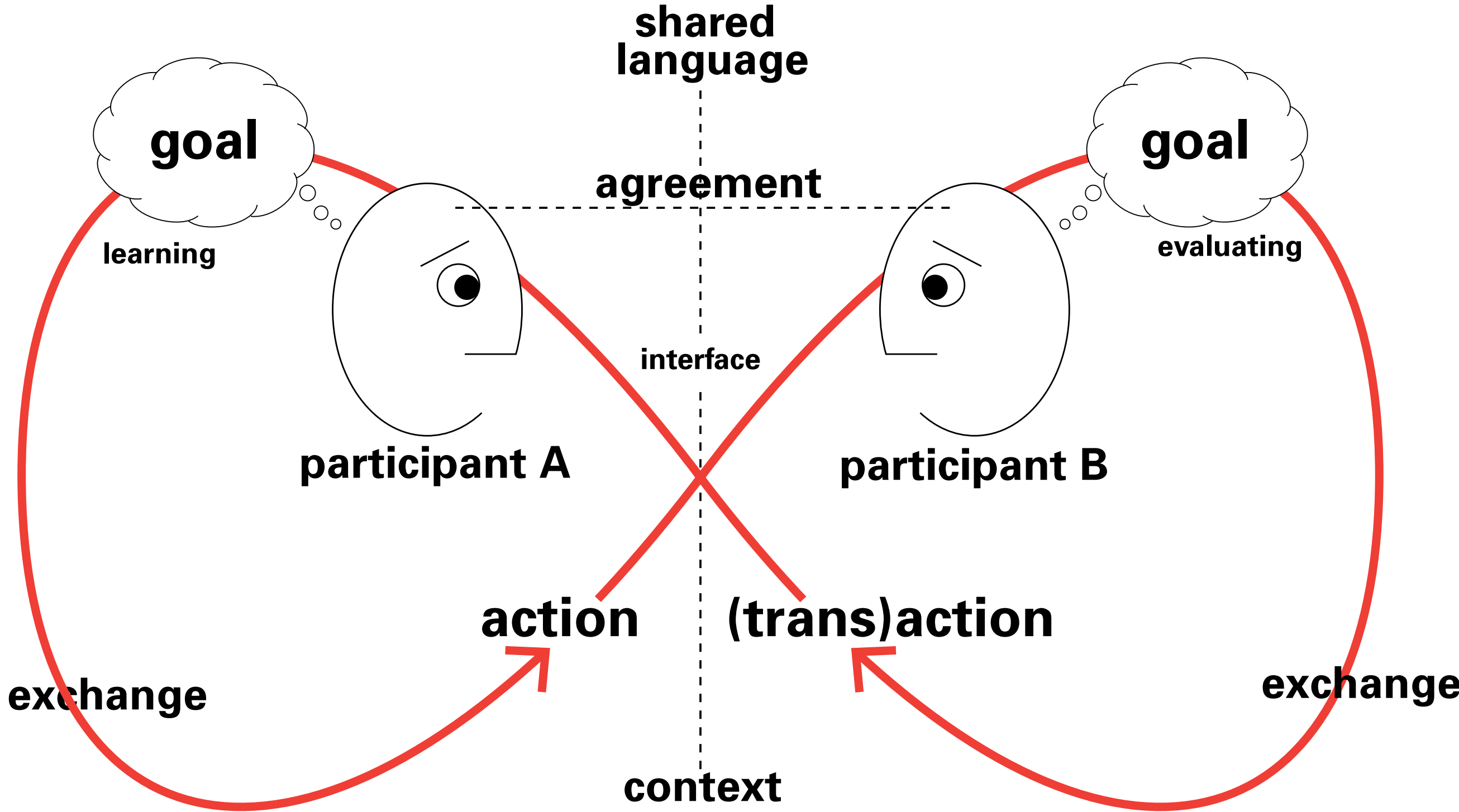
After Dubberly Design & Paul Pangaro

A transaction may occur.



After Dubberly Design & Paul Pangaro

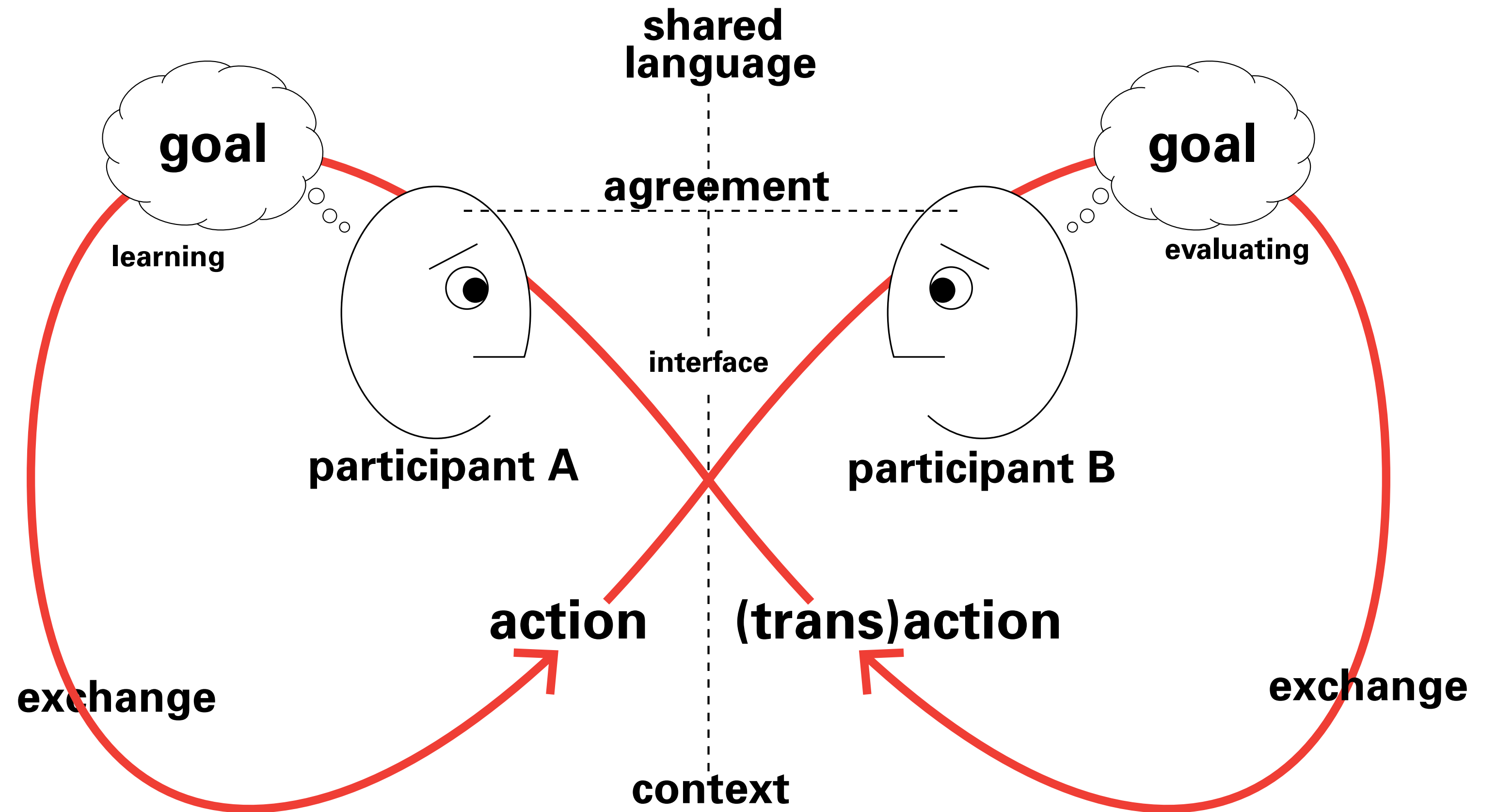
Conversation Model



See also Pangaro: Economy of Insight

Conversation Model—C-L-E-A-T

C – Context
L – Language
E – Engagement
A – Agreement
T – (Trans)Action



Types of Conversation

What is **effective** conversation?

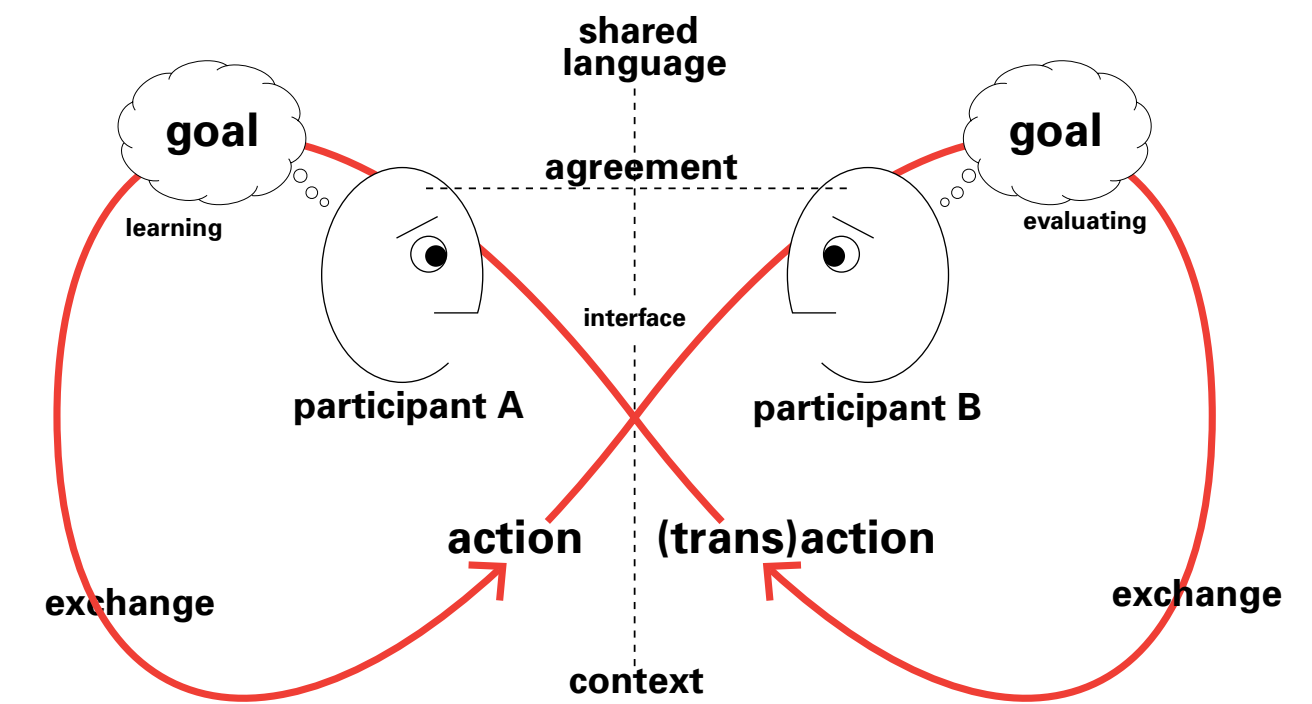
A conversation in which something changes* and brings (lasting) value to one or more participants.

*changes may be informational, transactional, rational, emotional...

Click for “What is conversation? Can we design for effective conversation?” – Dubberly and Pangaro, 2009

Matters of Conversation

Why does conversation matter?

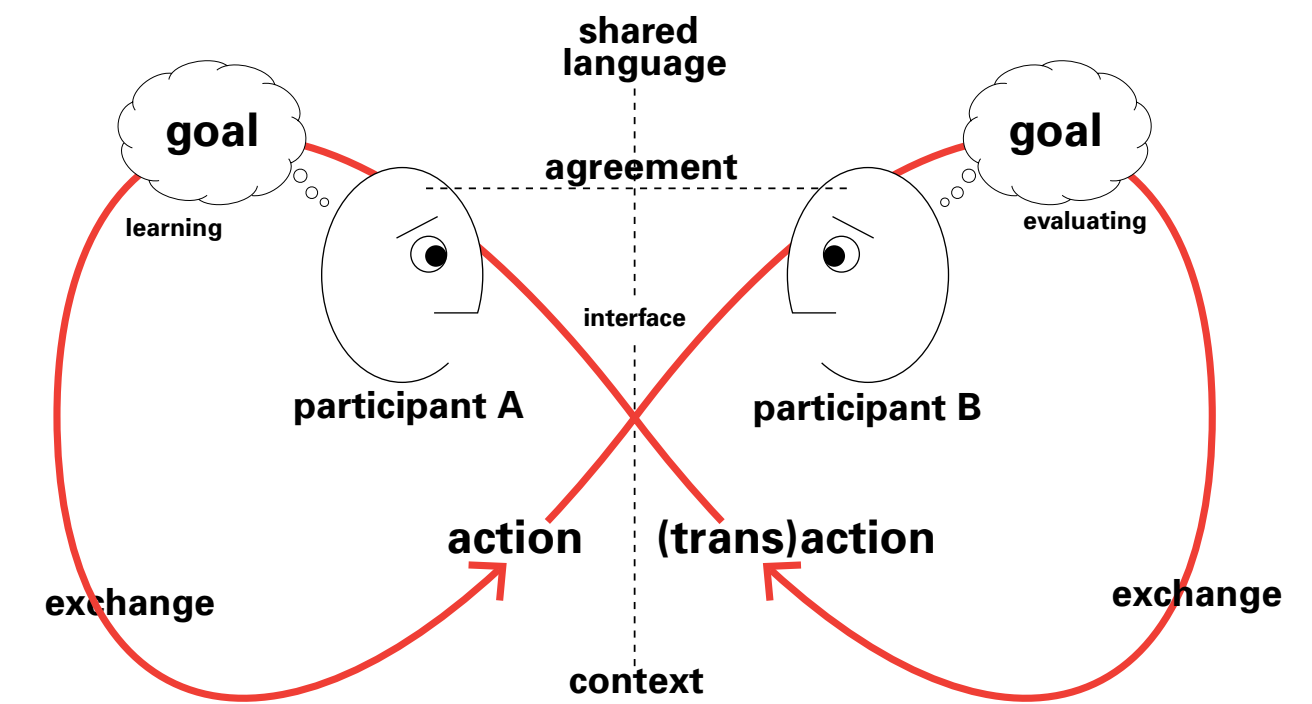


- *to act together, we must reach agreement*
- *to reach agreement, we must have an exchange*
- *to hold an exchange, we must have shared language.*

To cooperate and collaborate requires conversation.

Benefits of Conversation

What may follow from conversation?

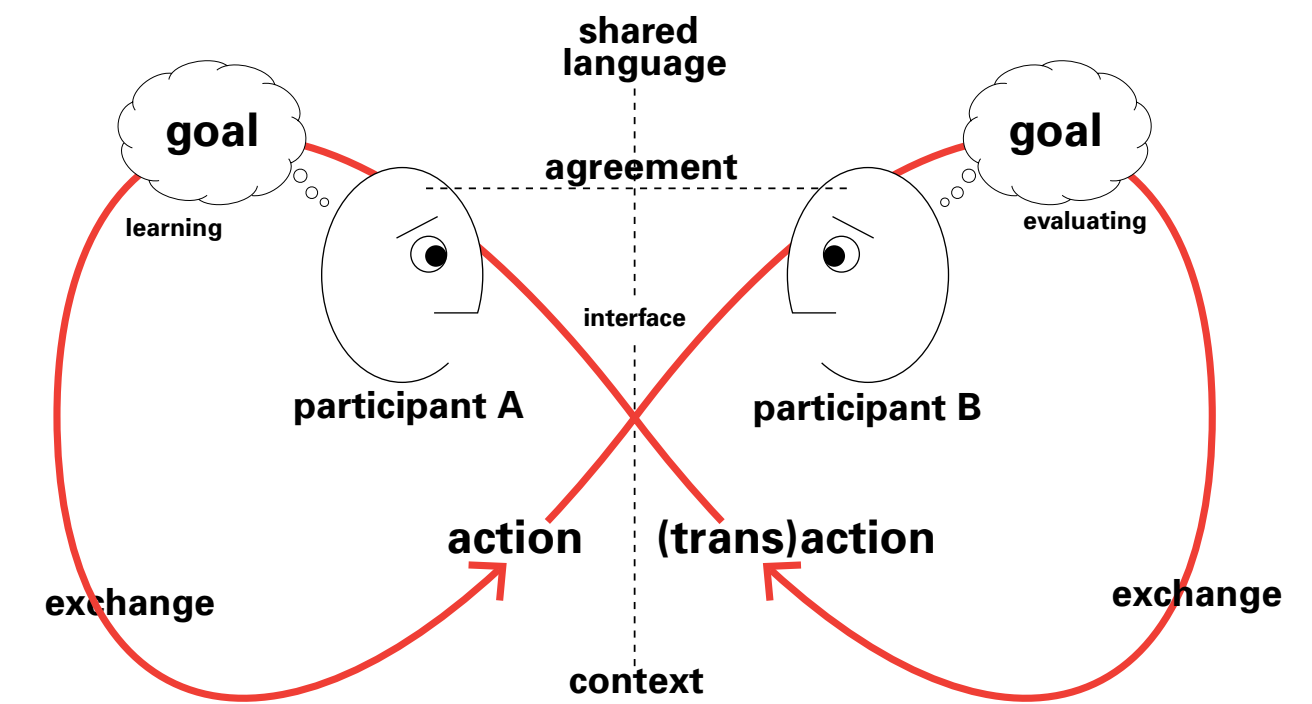


- *shared history*
- *relationship*
- *trust*
- *respect*
- *unity.*

All these require conversation.

Results of Conversation

What does conversation enable?



- *community*
- *commerce*
- *culture*
- *government*
- *society.*

All these **demand** conversation.

Siri, what's an interaction at an interface?



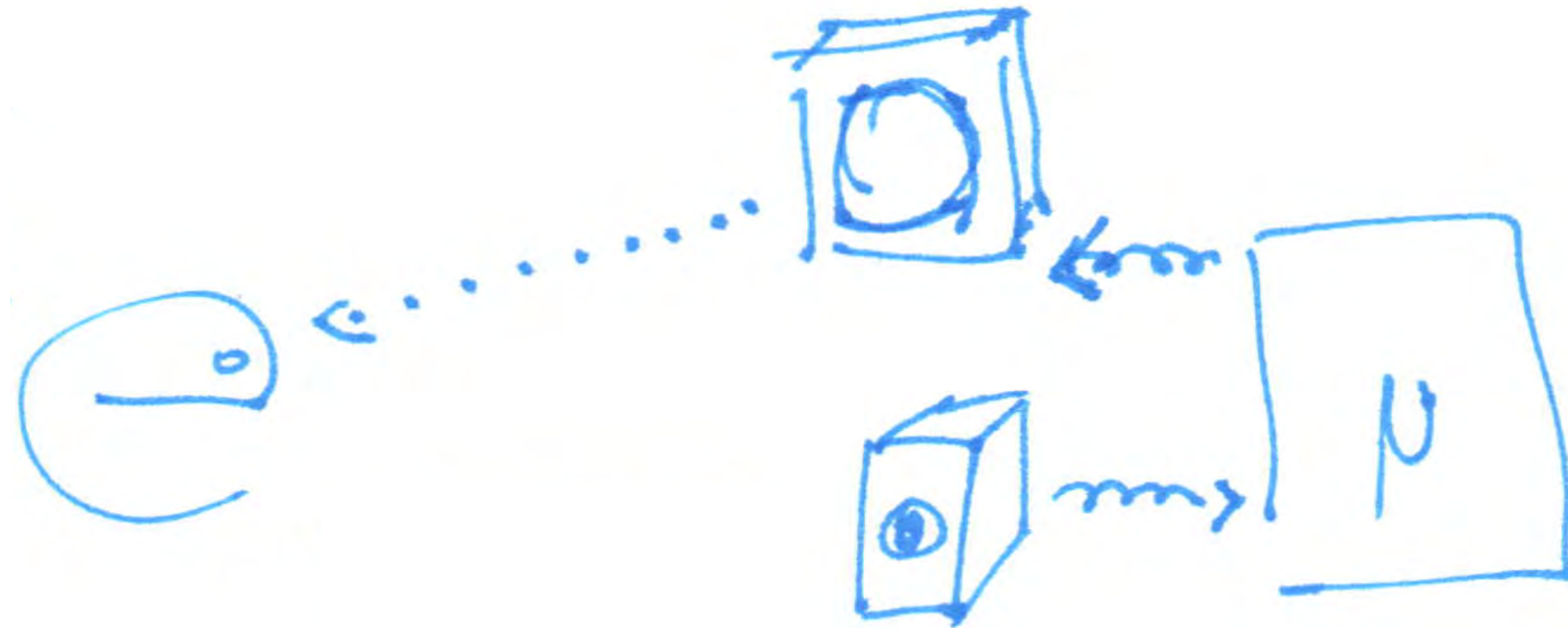
Click for "Can we design machines to be more humane?"



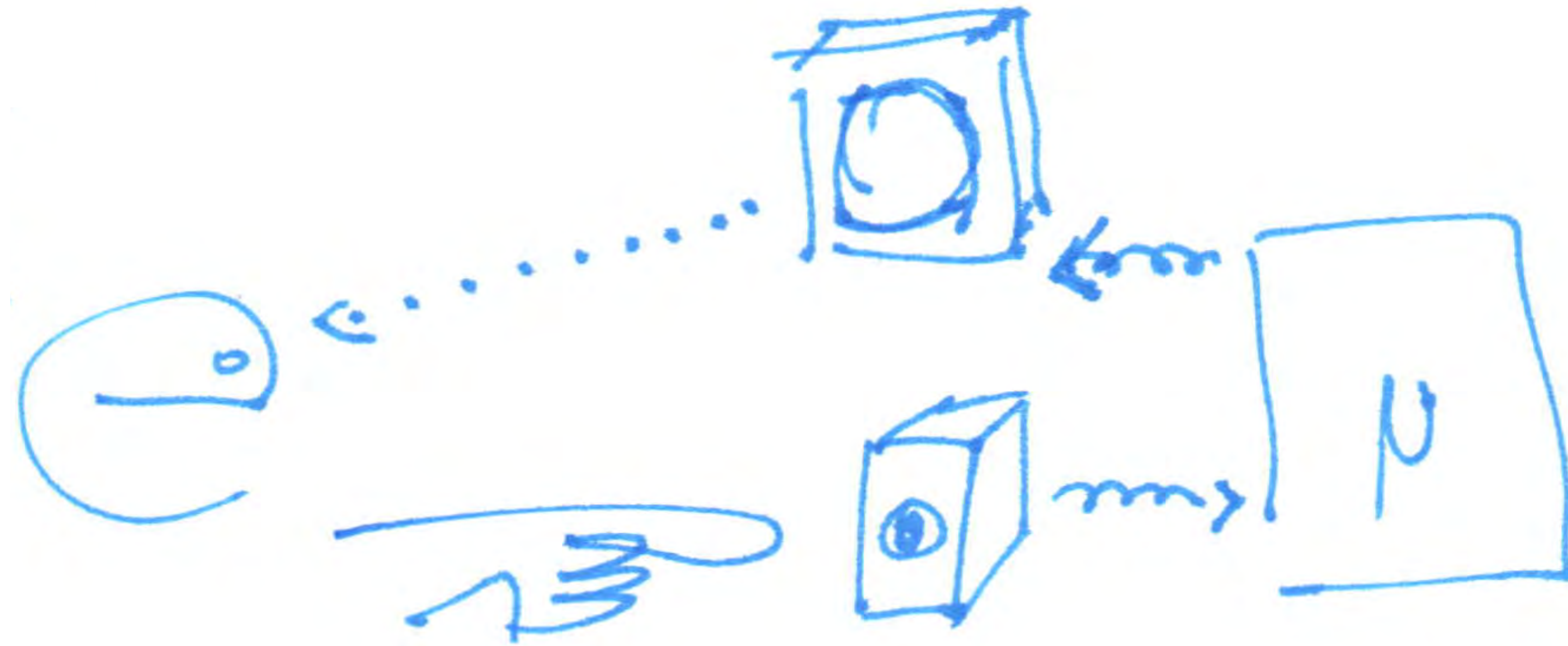
Click for "Can we design machines to be more humane?"



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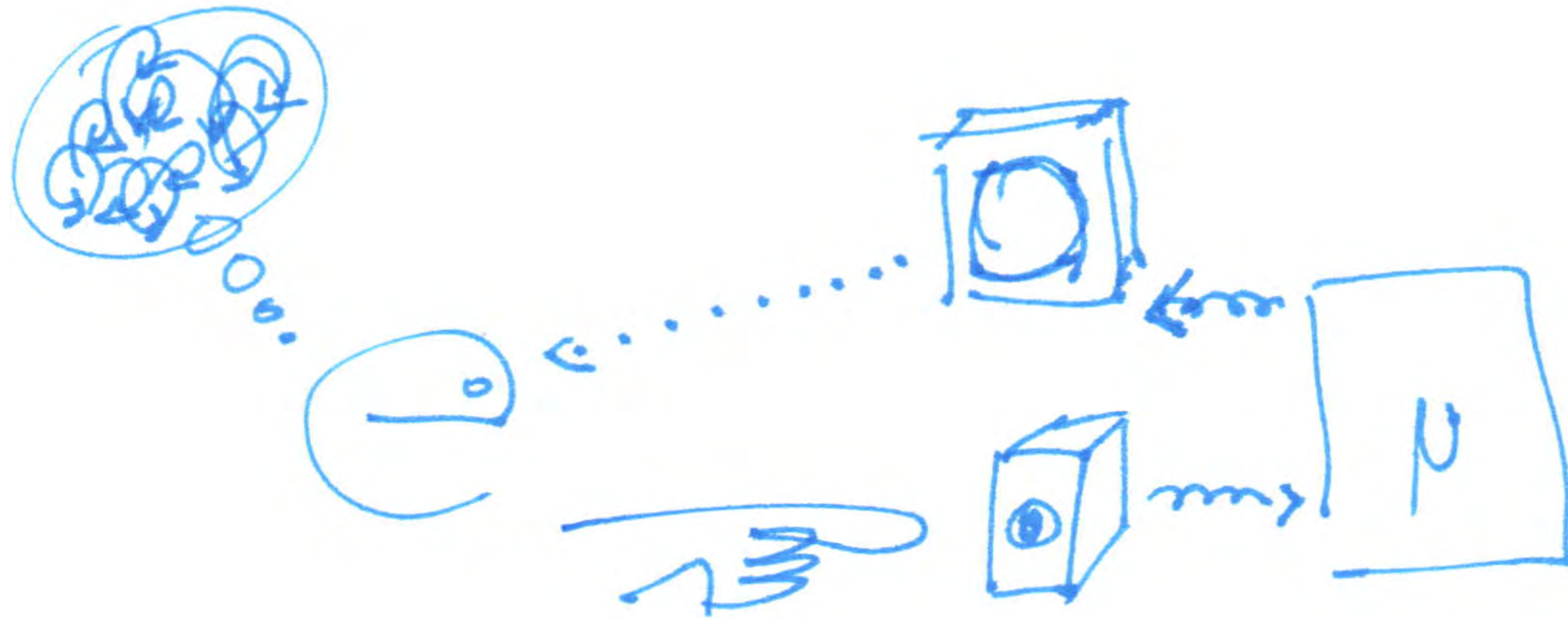


Click for "Can we design machines to be more humane?"

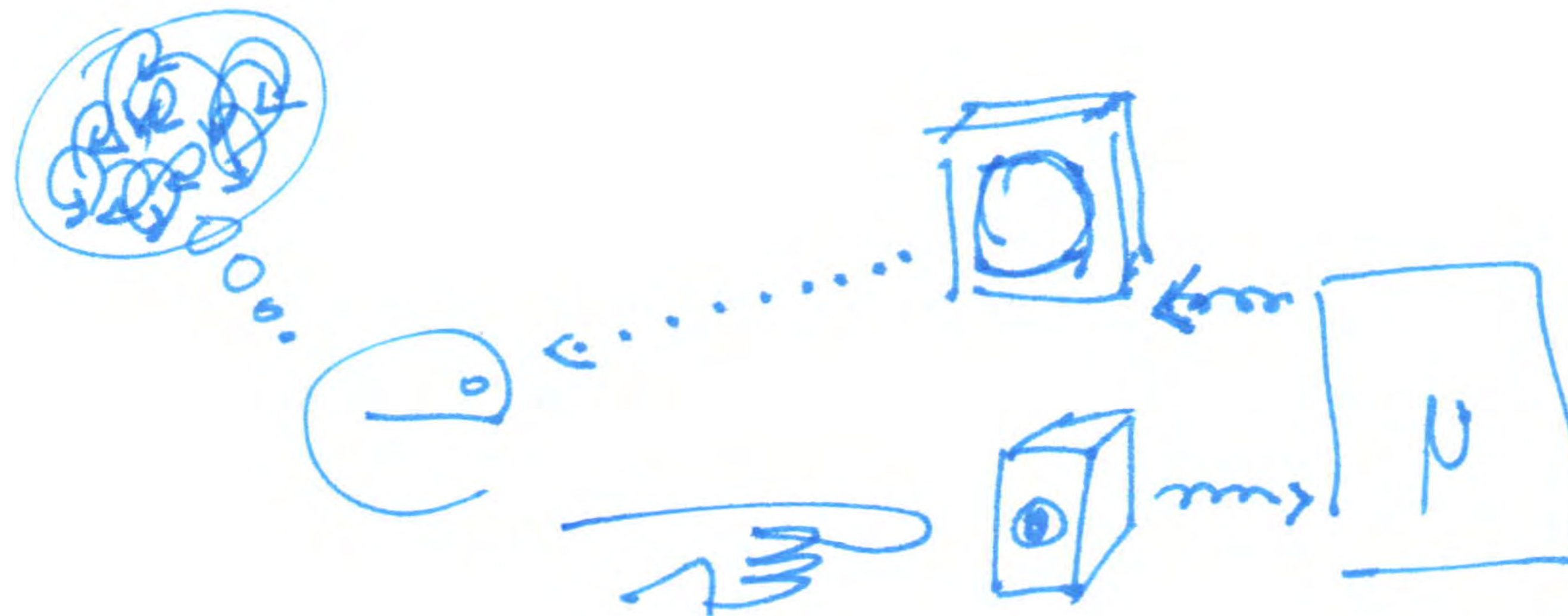
Siri, what's the interaction about?



Click for "Can we design machines to be more humane?"



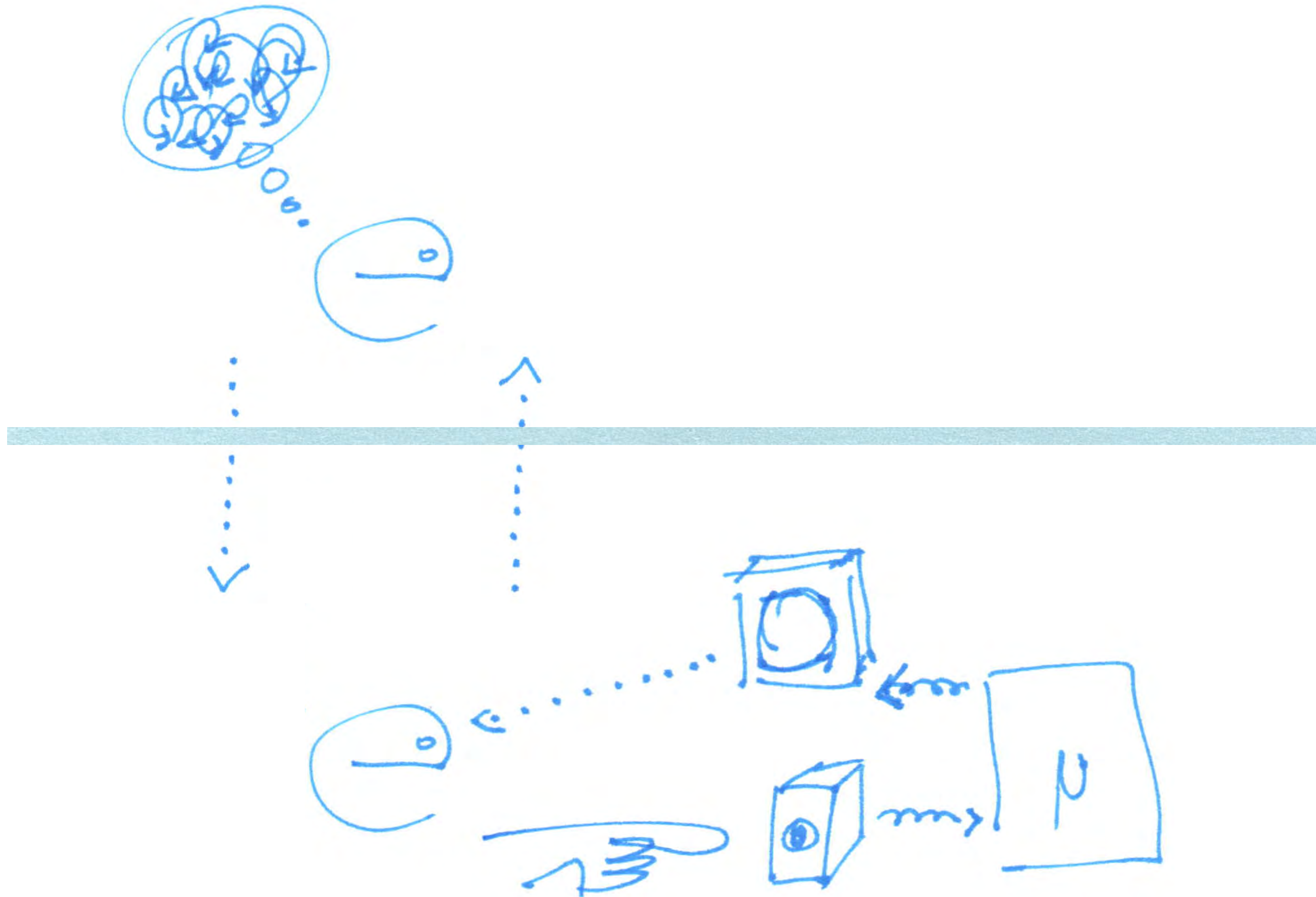
Click for "Can we design machines to be more humane?"



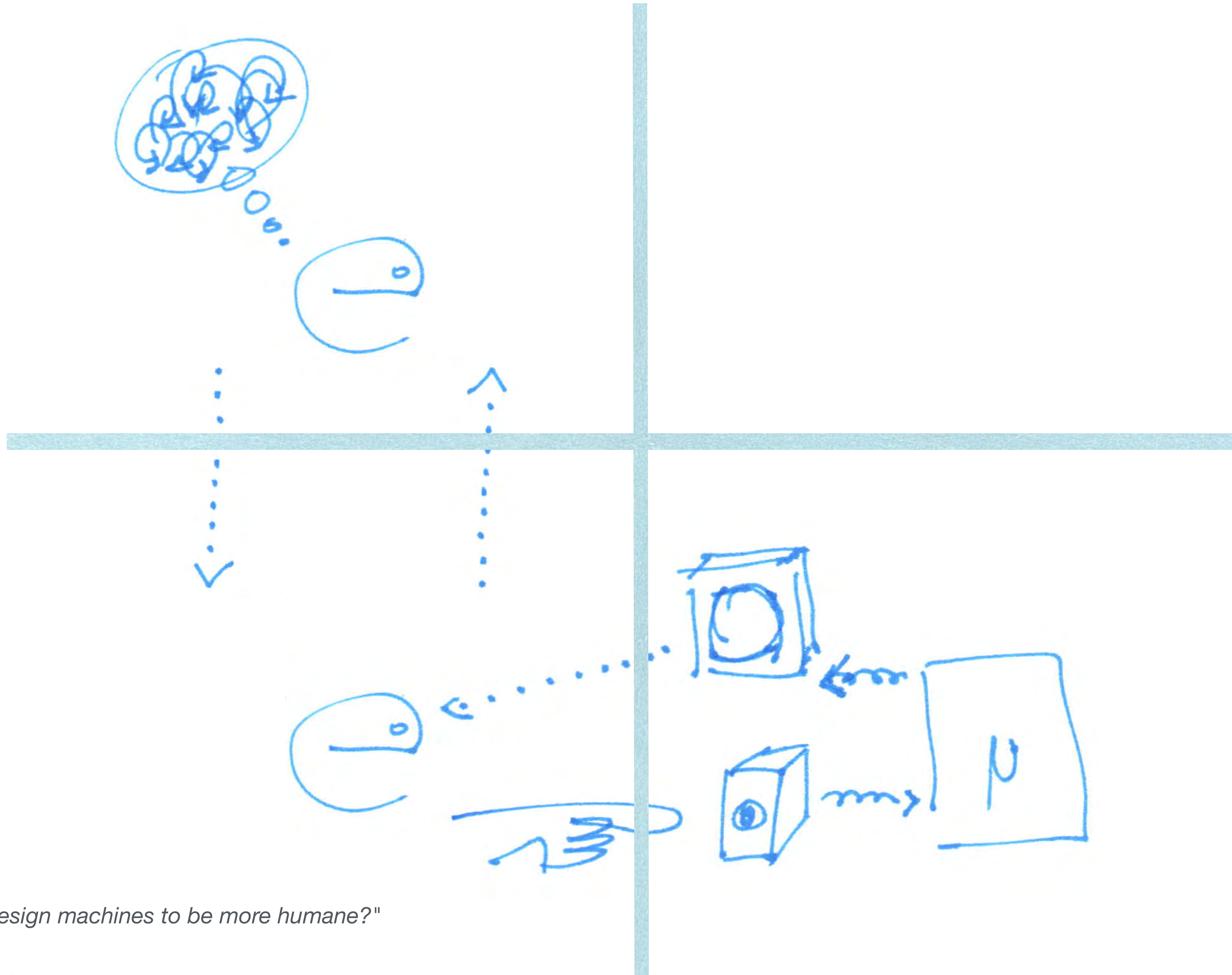
Click for "Can we design machines to be more humane?"



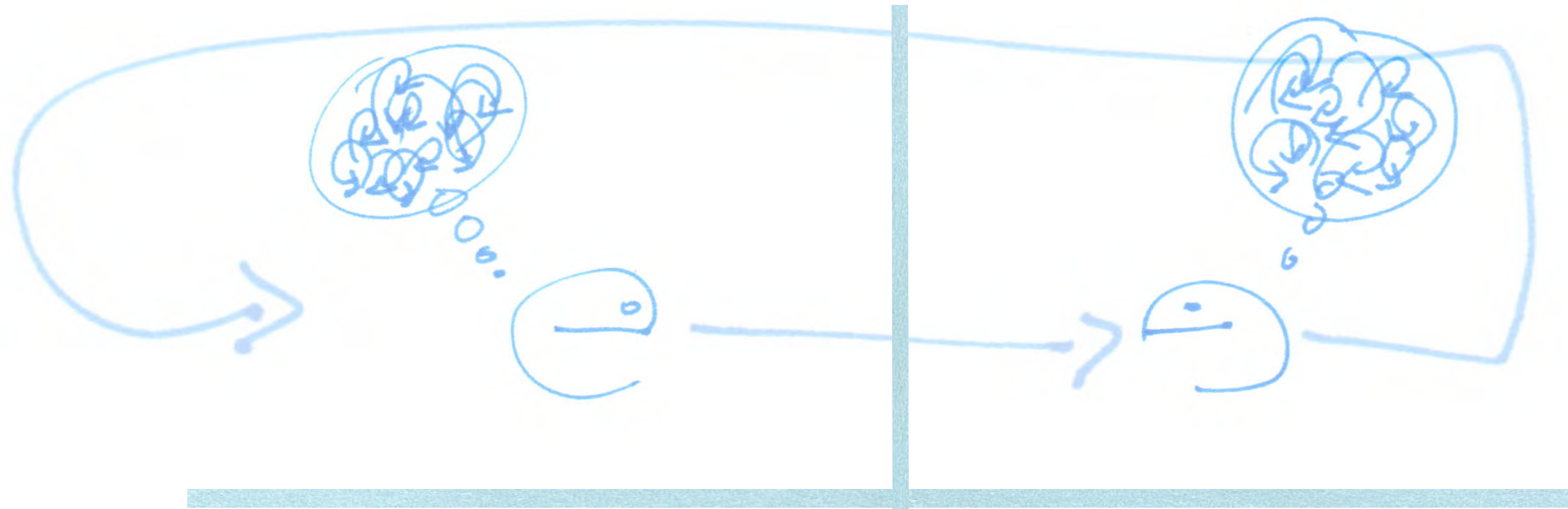
Click for "Can we design machines to be more humane?"



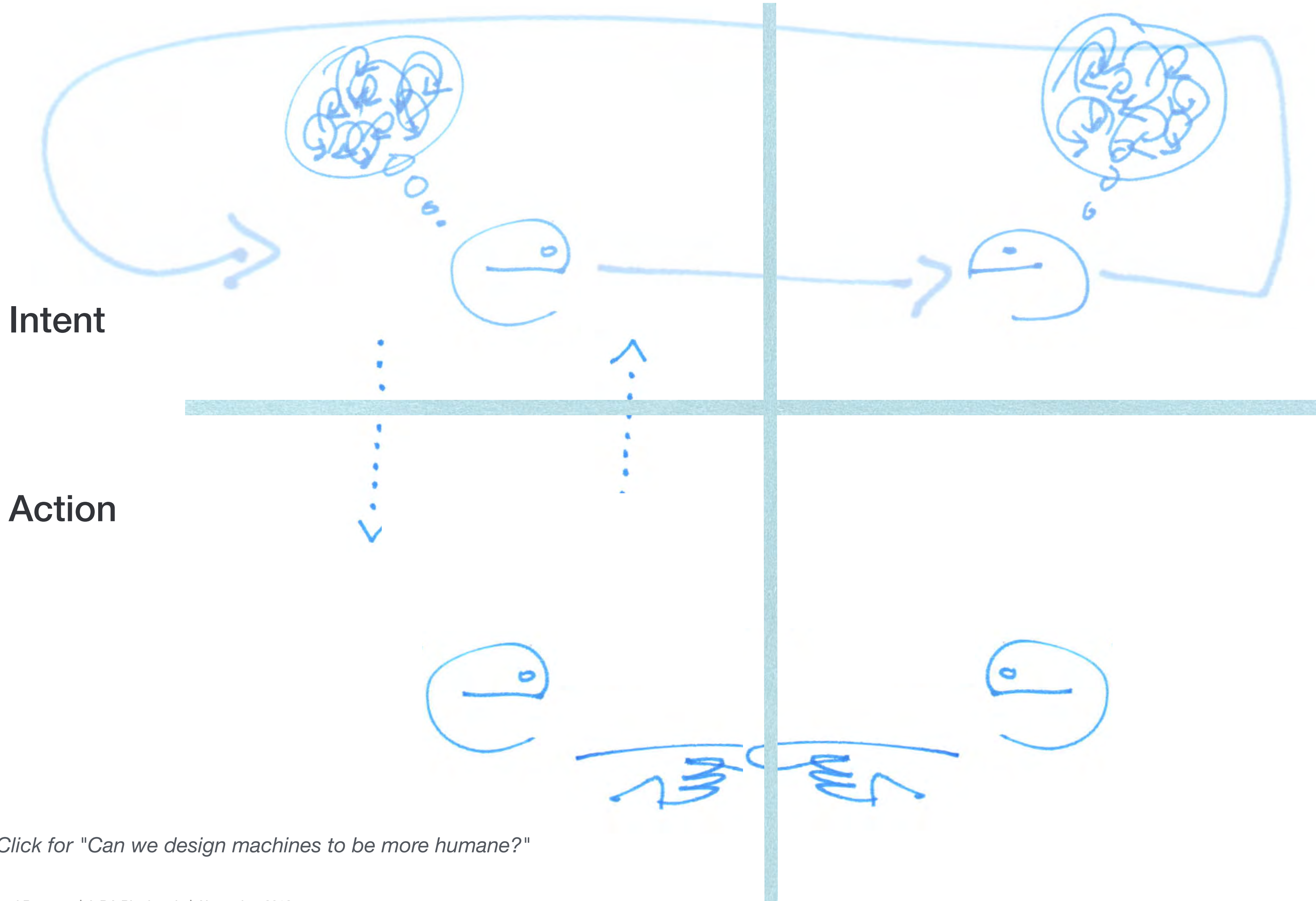
Click for "Can we design machines to be more humane?"



Click for "Can we design machines to be more humane?"



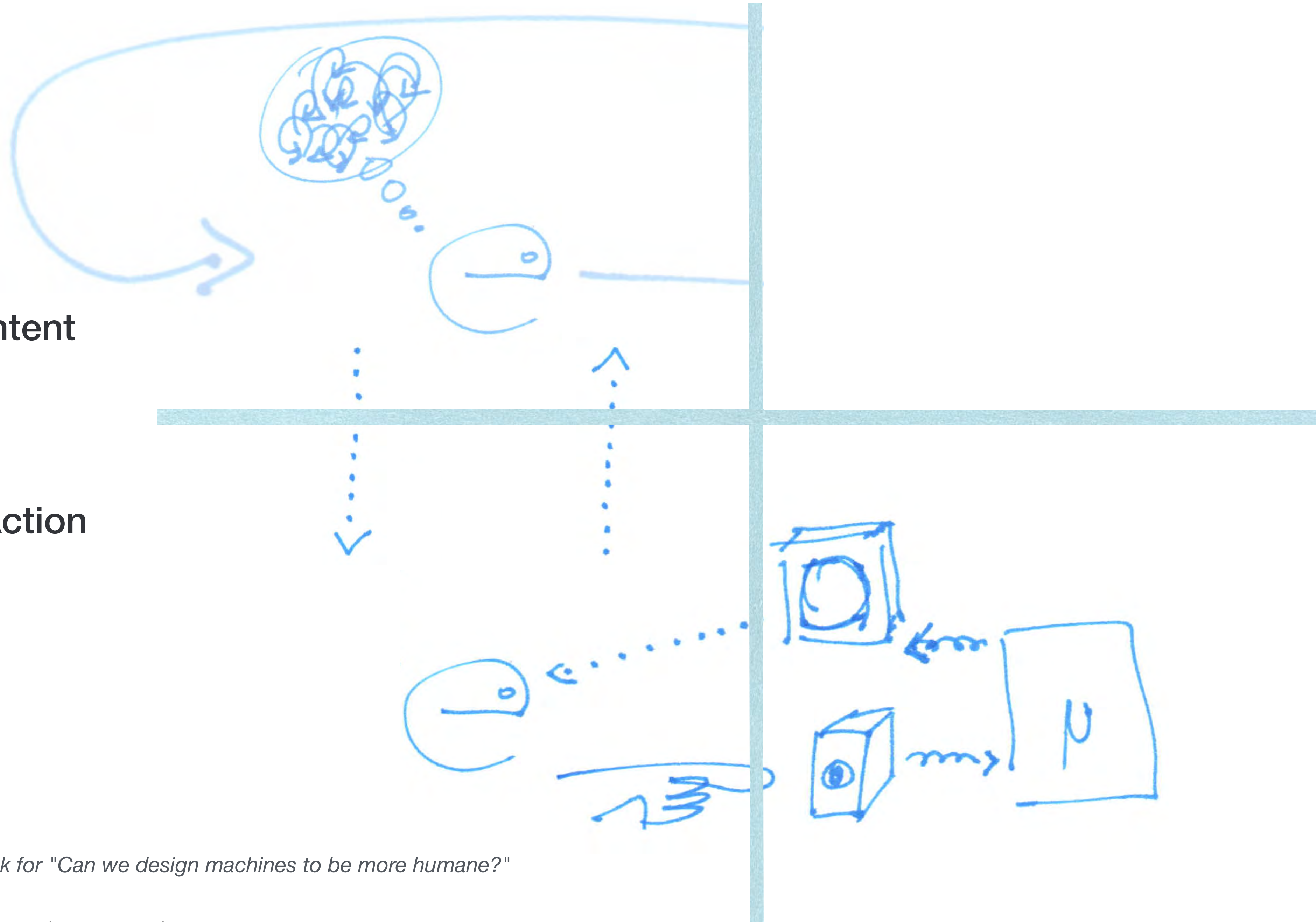
Click for "Can we design machines to be more humane?"



Click for "Can we design machines to be more humane?"

Intent

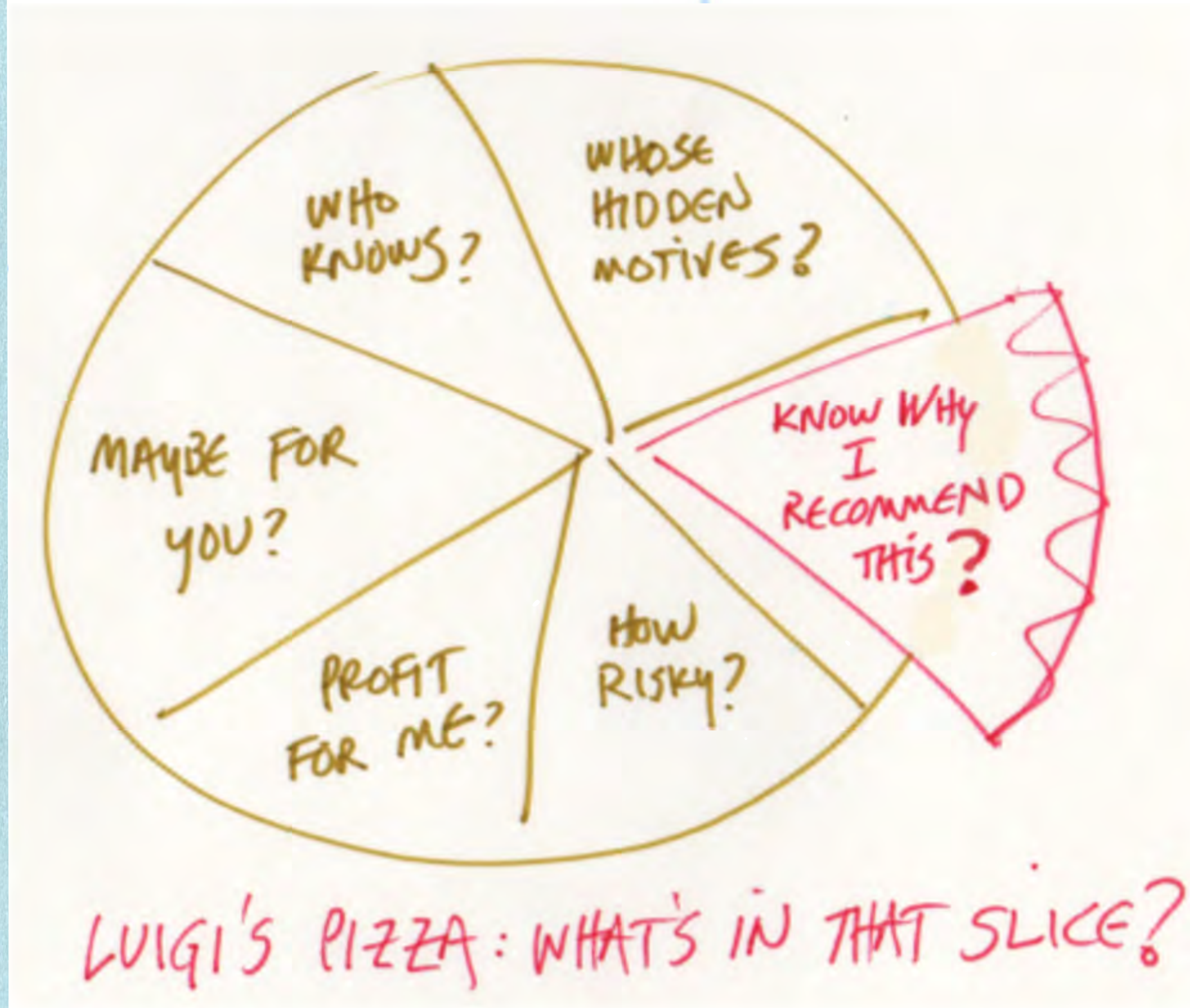
Action



Click for "Can we design machines to be more humane?"

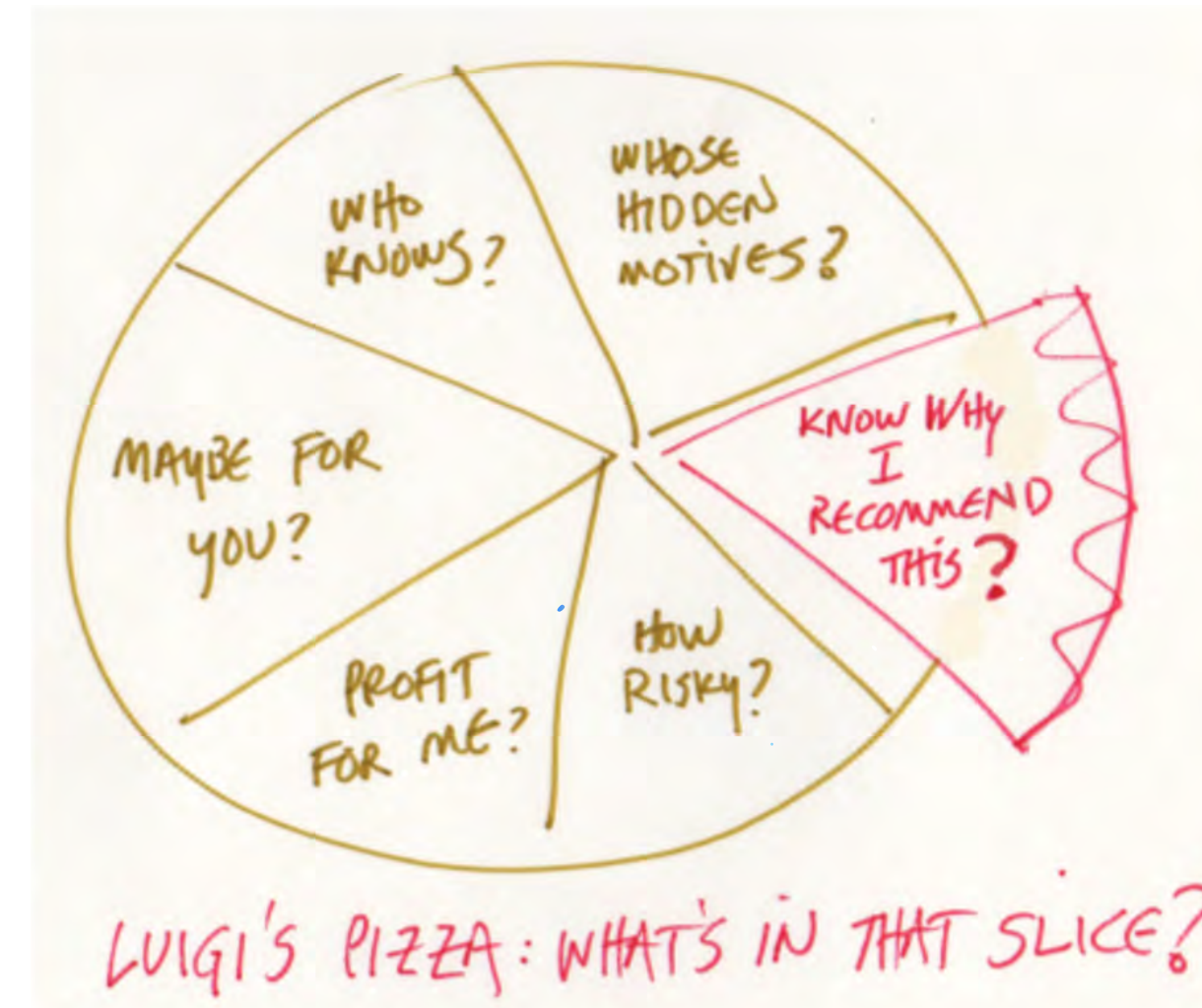
Intent

Action



Click for "Can we design machines to be more humane?"

Intent



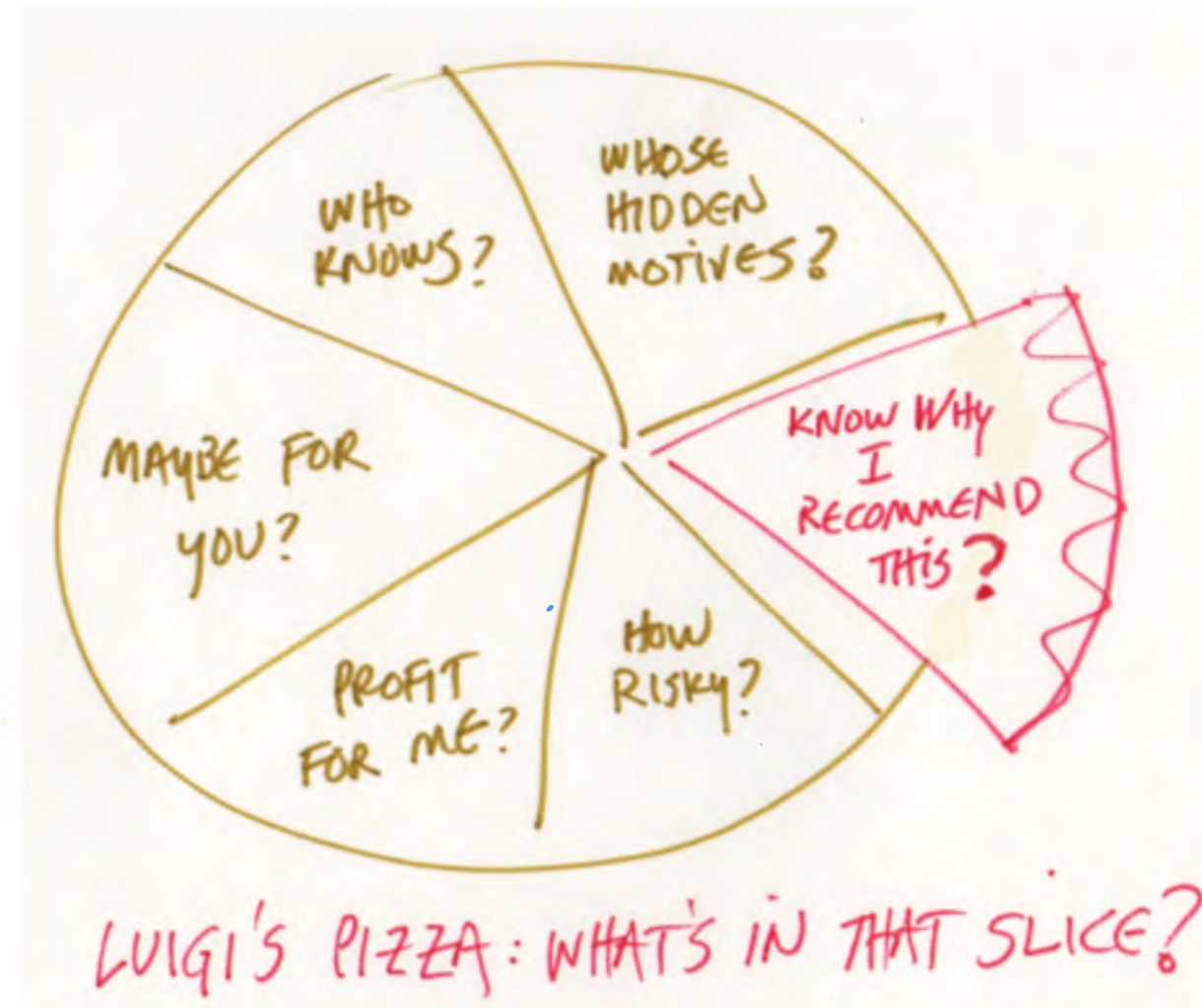
Action



“Luigi’s Pizza is the best!”

Click for "Can we design machines to be more humane?"

Intent



Action



“Screw you!...
I’m not going
to tell you why!”

Click for "Can we design machines to be more humane?"

Intent



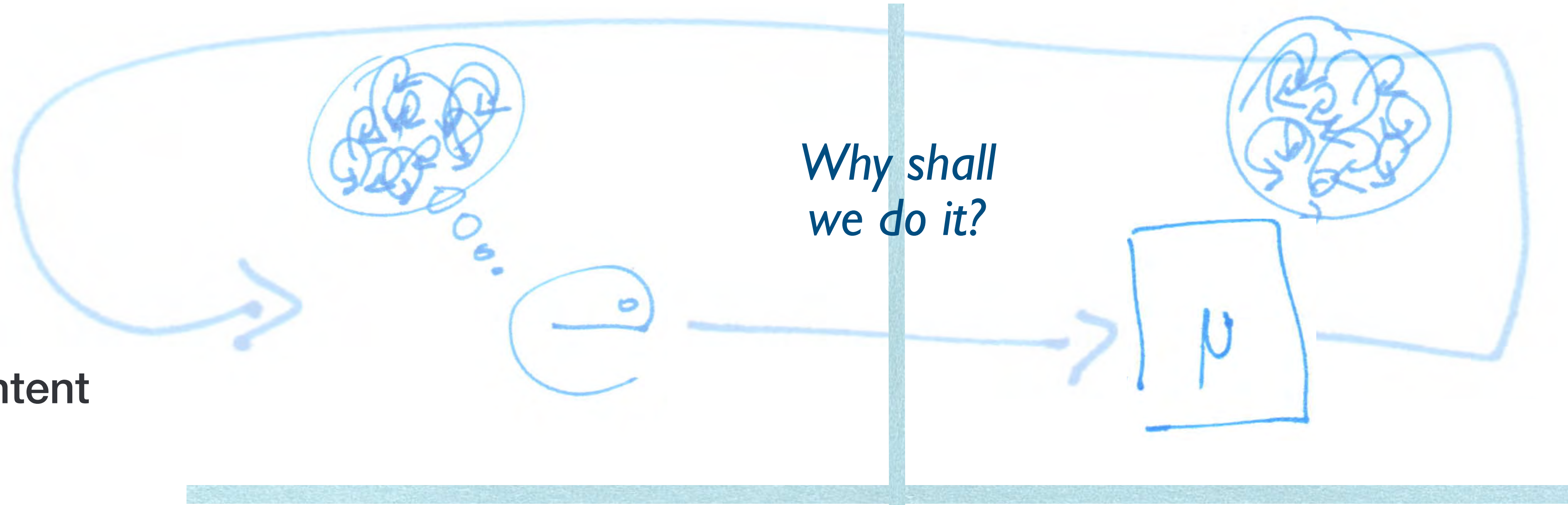
Action



“It matches your preferences,
it’s consistent in quality,
they treat their staff well,
it’s inexpensive...”

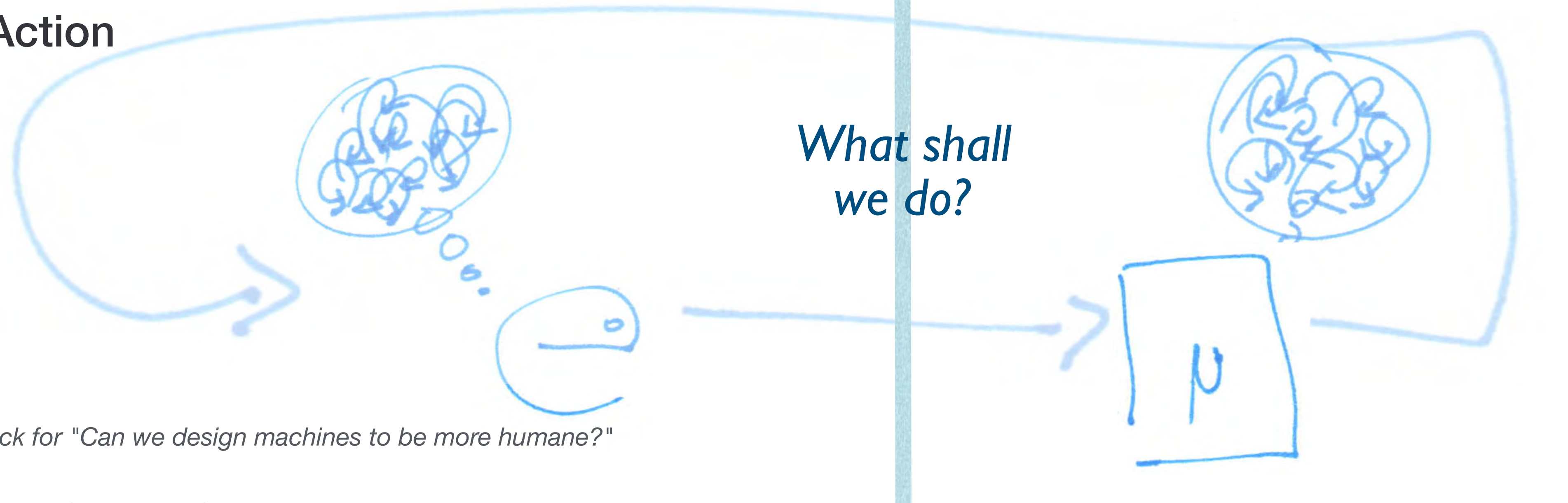
Click for "Can we design machines to be more humane?"

Intent



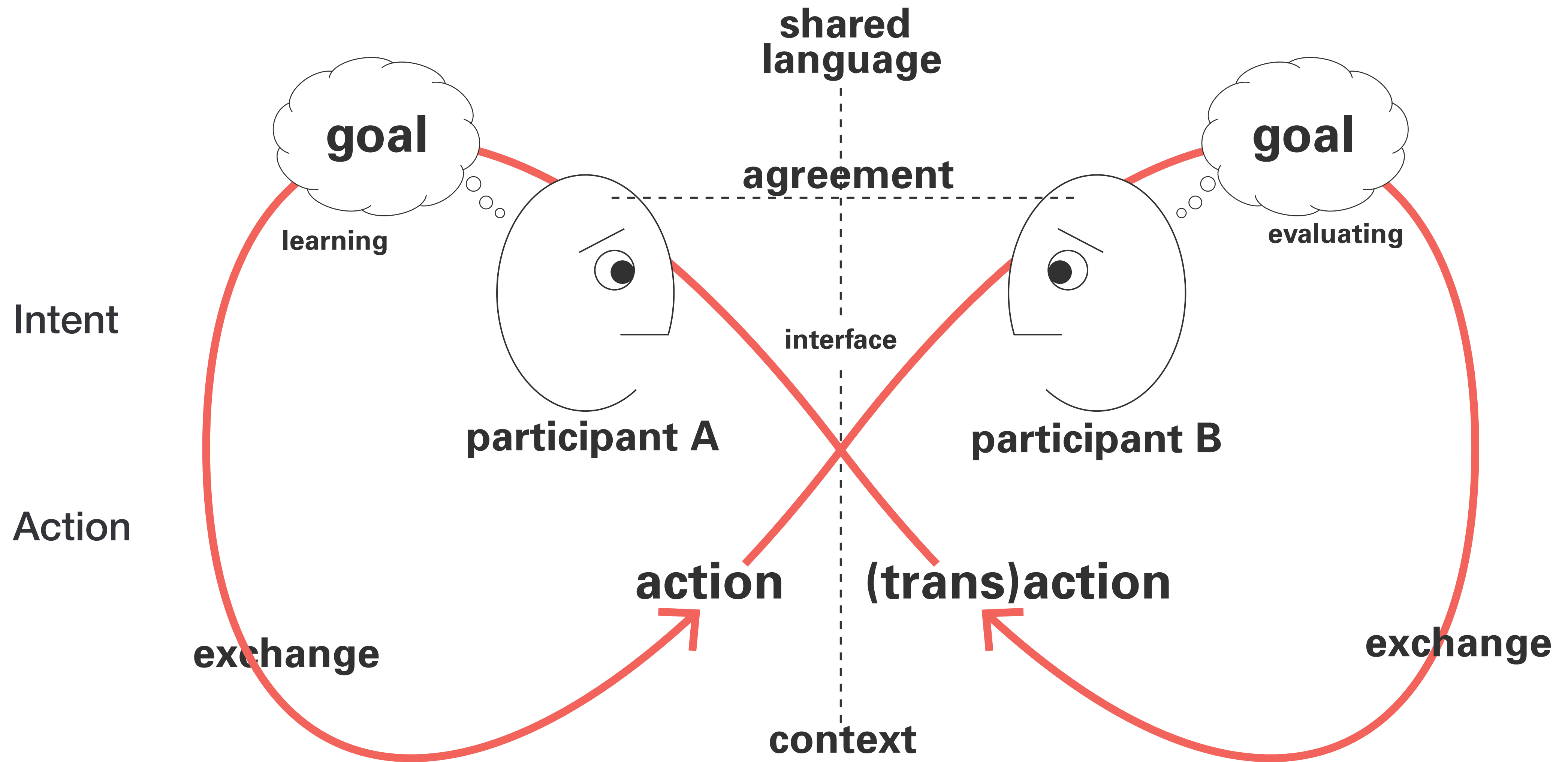
Why shall we do it?

Action

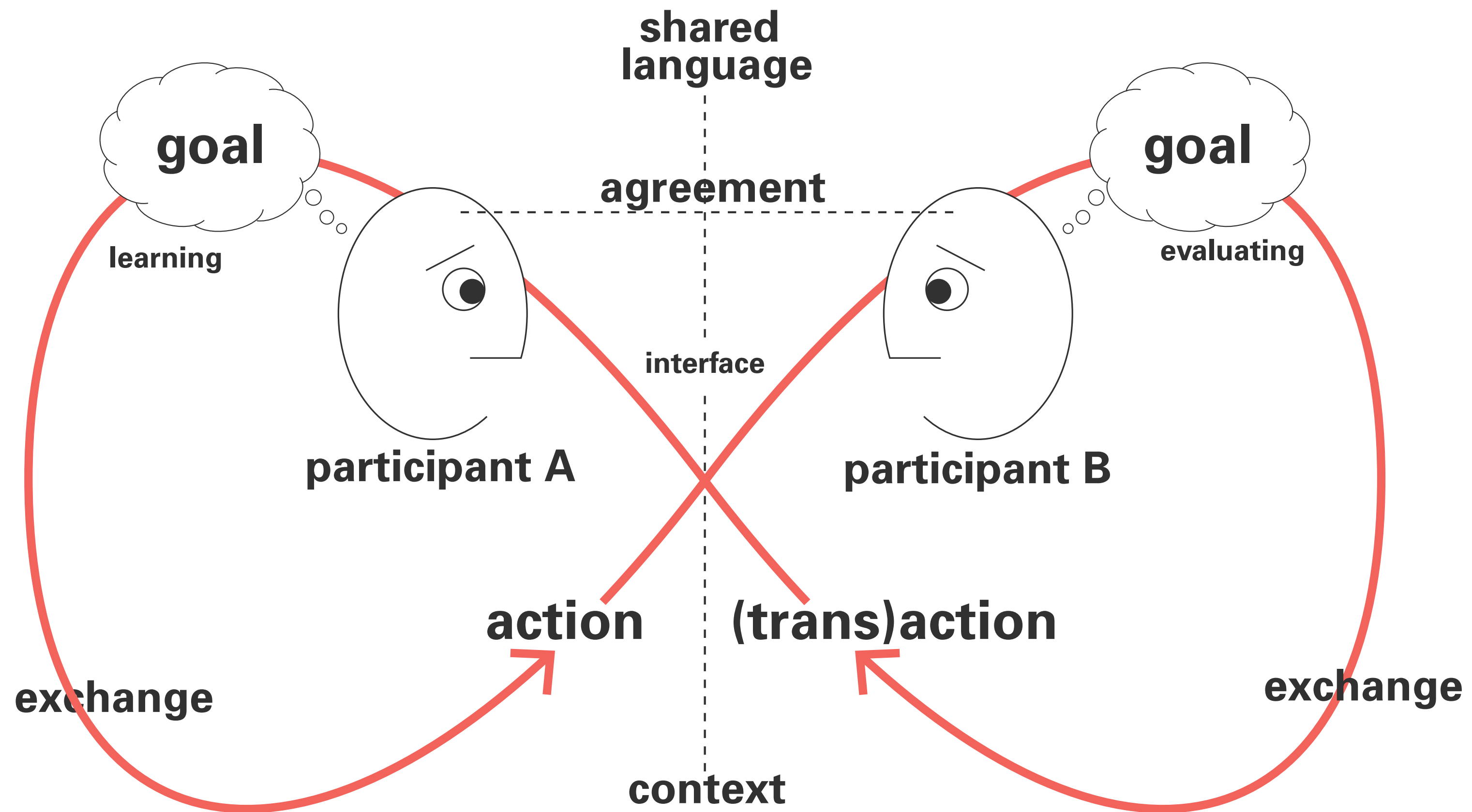


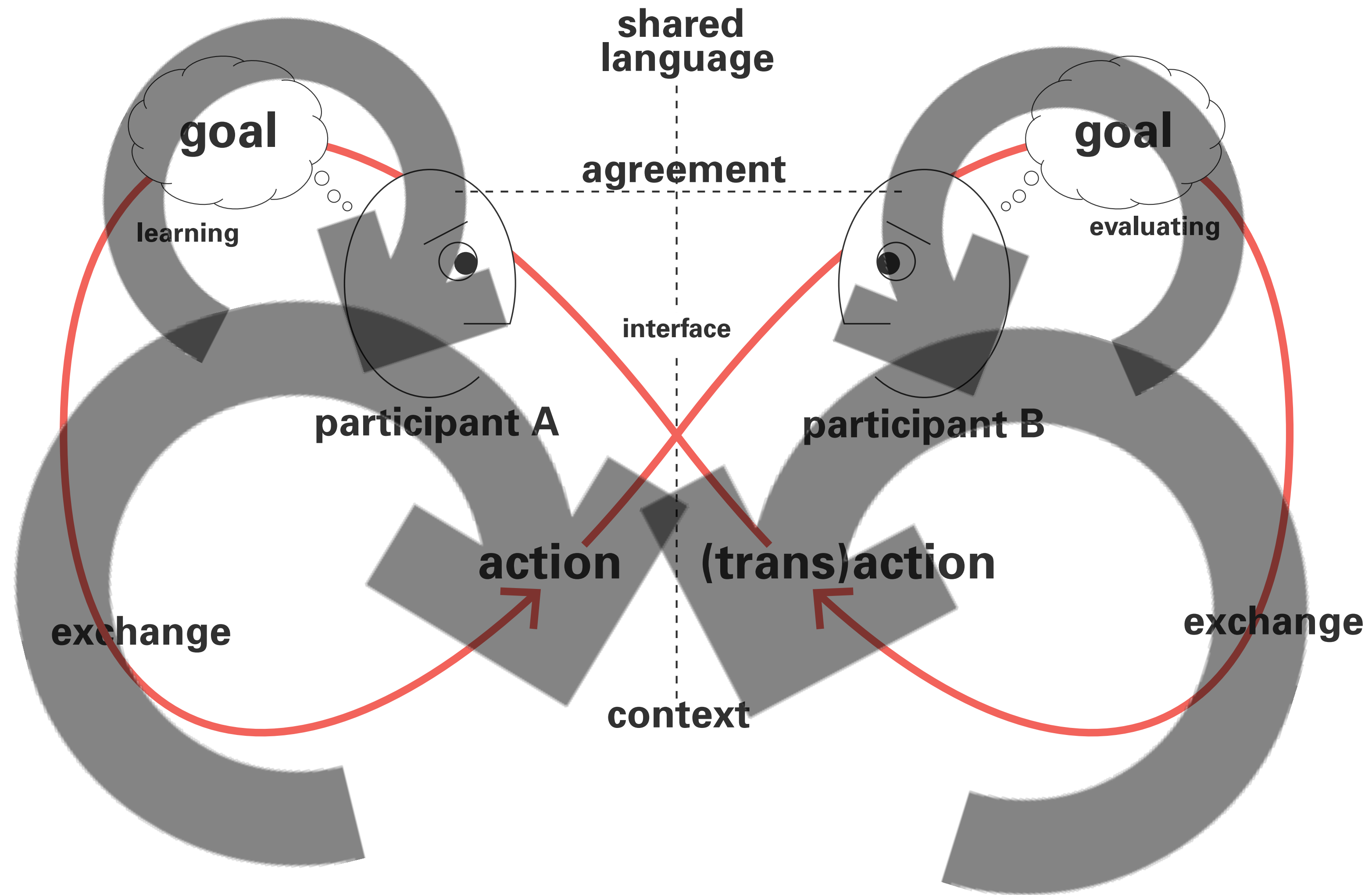
What shall we do?

Click for "Can we design machines to be more humane?"



Click for "Can we design machines to be more humane?"

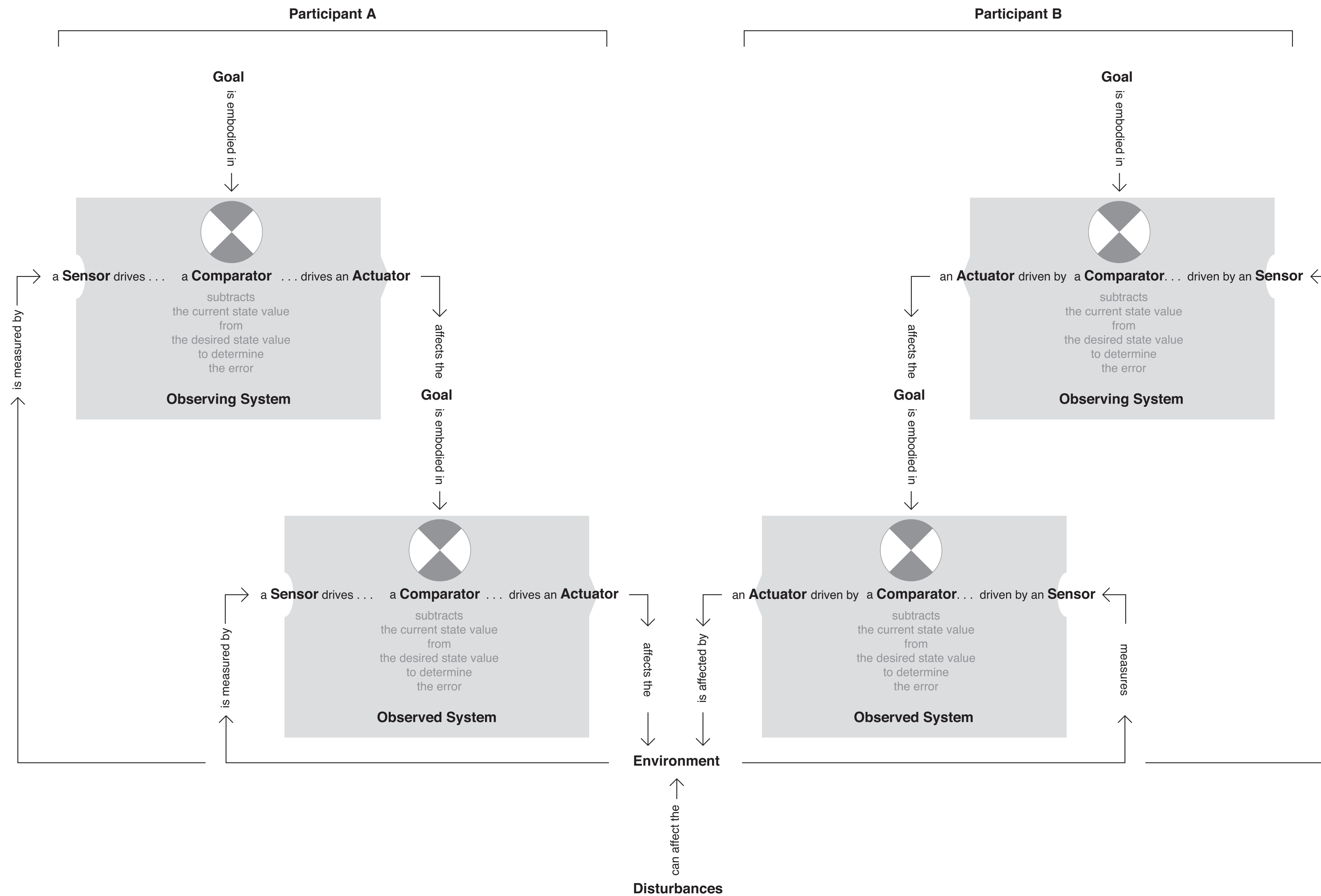




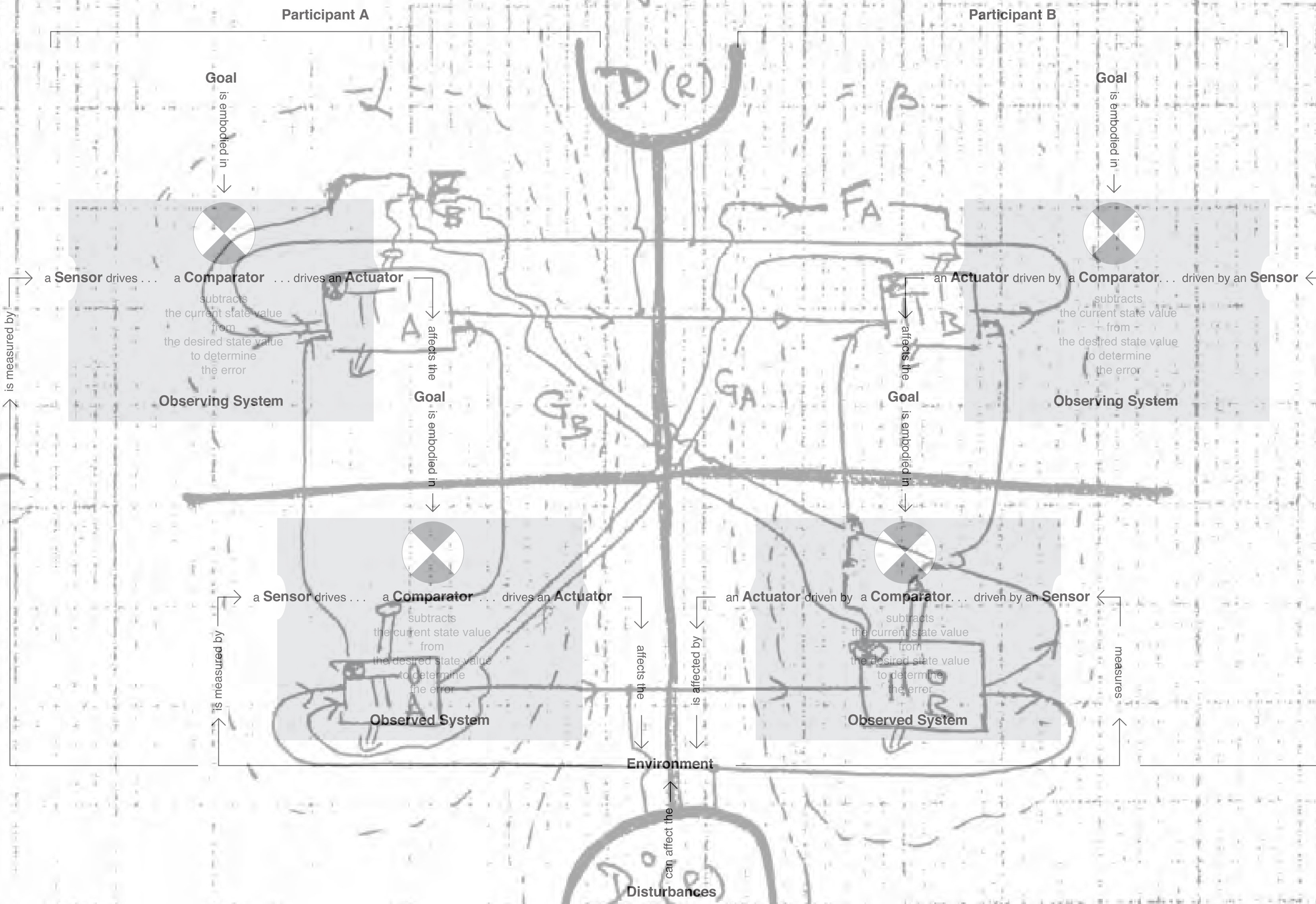
Conversation: Formal Mechanism



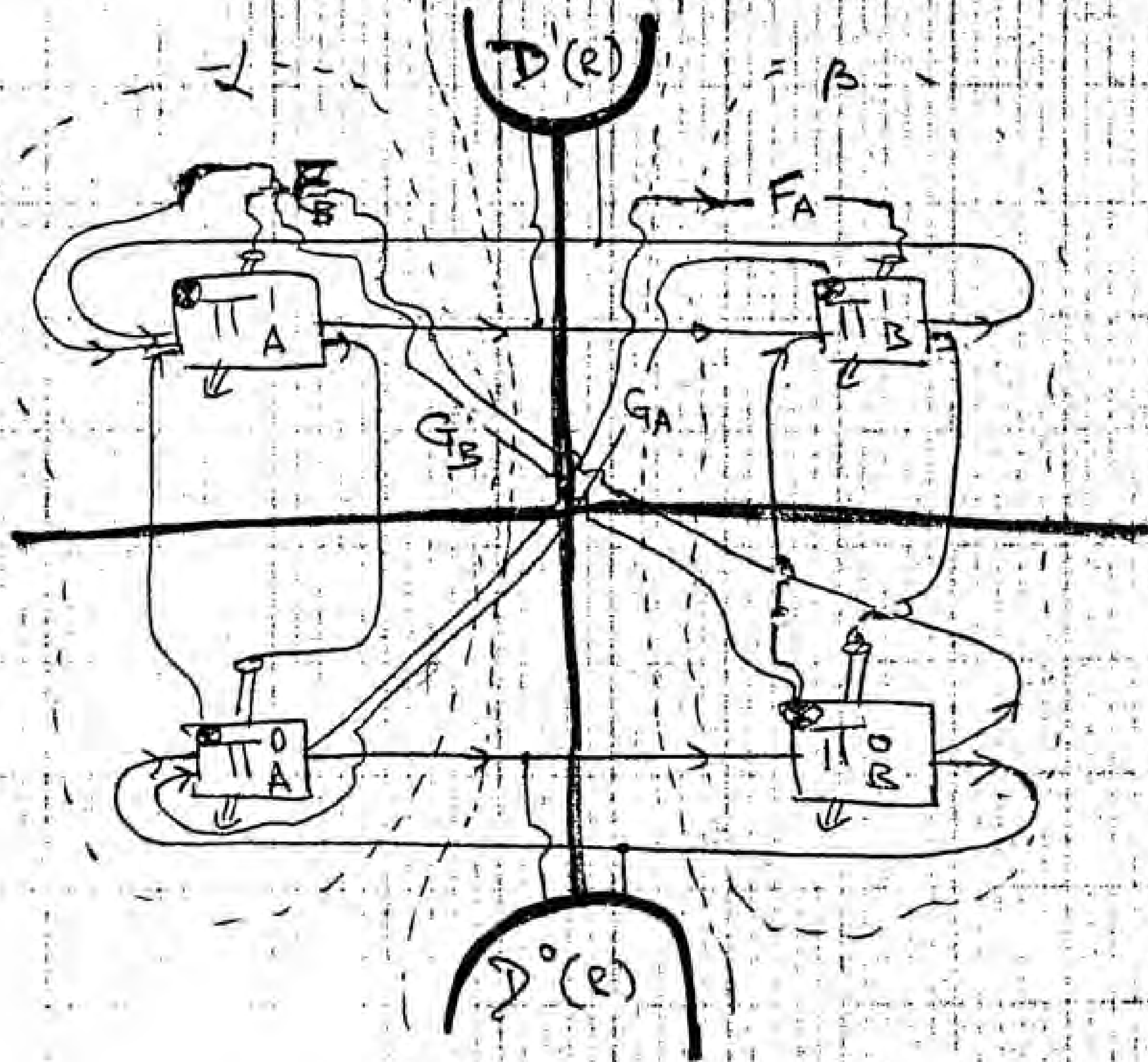
Conversation: Formal Mechanism



Conversation: Formal Mechanism



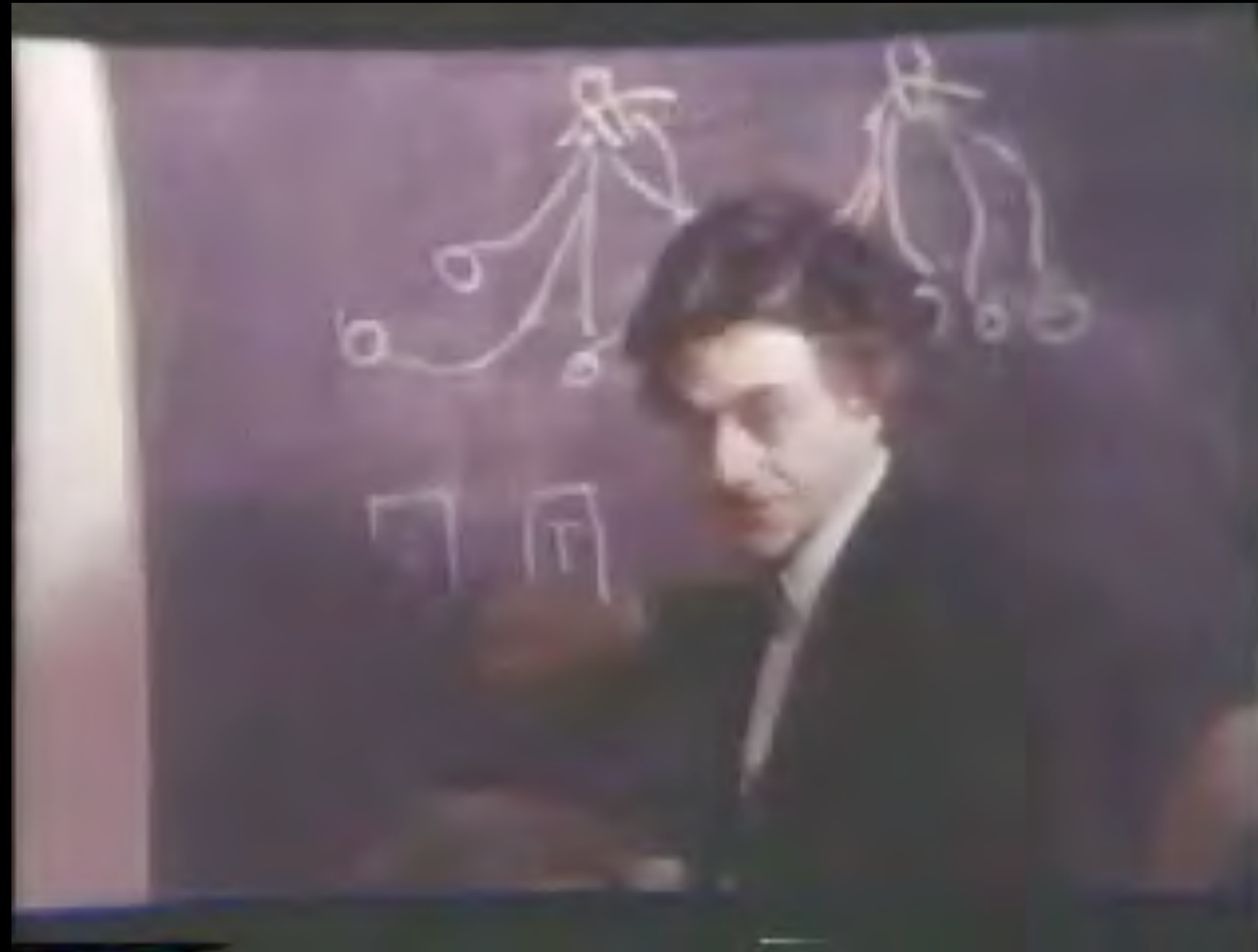
Open
Interface



Gordon Pask & Elizabeth Pask
London
Late 1980s

Photo: Paul Pangaro

In 1975 Pask was the subject of an entire episode of the series **The Experimenters** by the BBC.

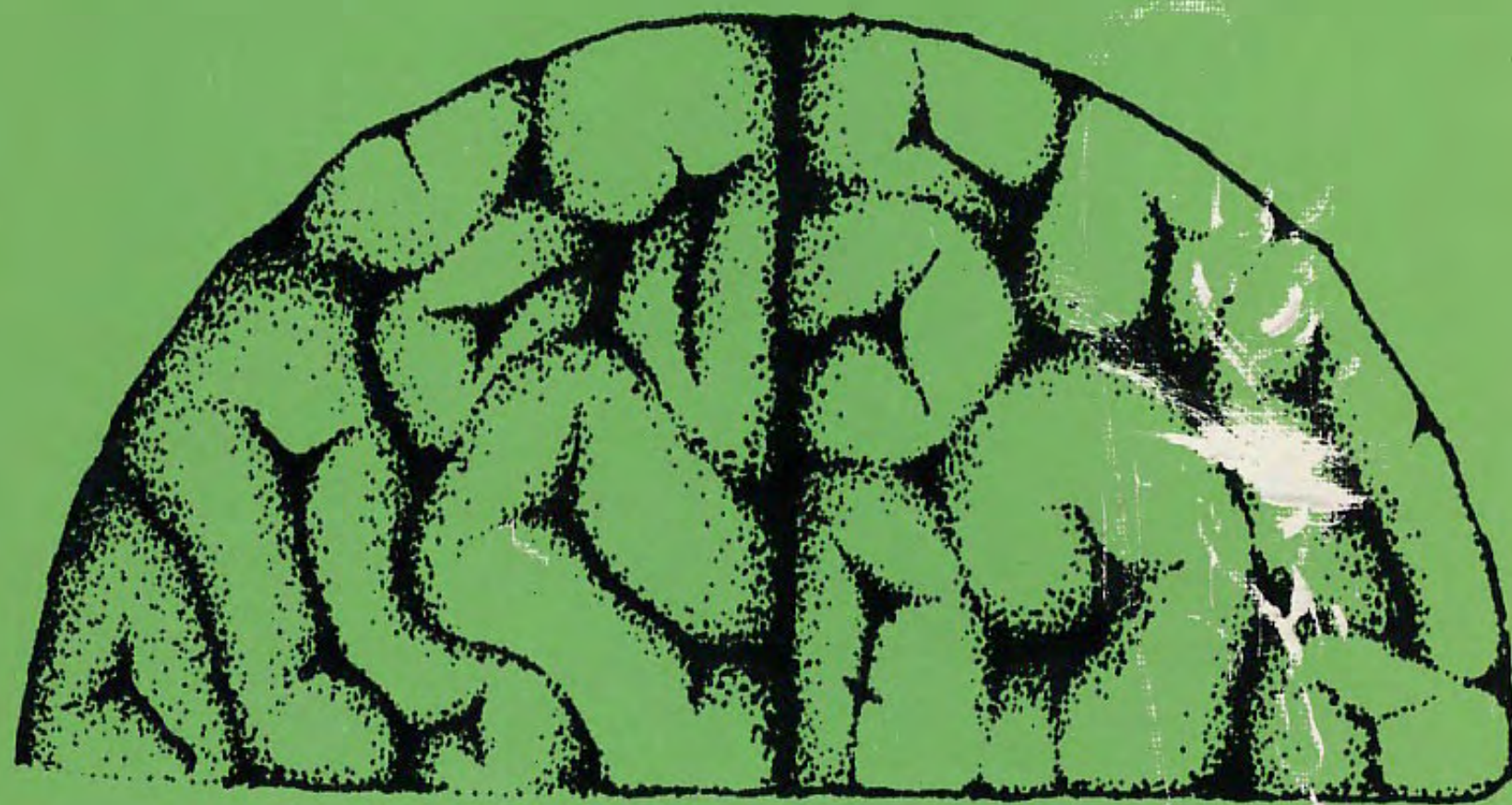


[Click for video](#)

GORDON PASK

CONVERSATION,
COGNITION AND
LEARNING

1975



A CYBERNETIC THEORY-
AND METHODOLOGY

ELSEVIER

GORDON PASK

CONVERSATION
THEORY

1976



APPLICATIONS IN EDUCATION
AND EPISTEMOLOGY

ELSEVIER



Soft

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Nicholas
Negroponte

Soft Architecture Machines

Negroponte

Soft Architecture Machines
Nicholas Negroponte, ed.,
MIT Press, 1976

Book Design: Muriel Cooper



Aspects of Machine Intelligence

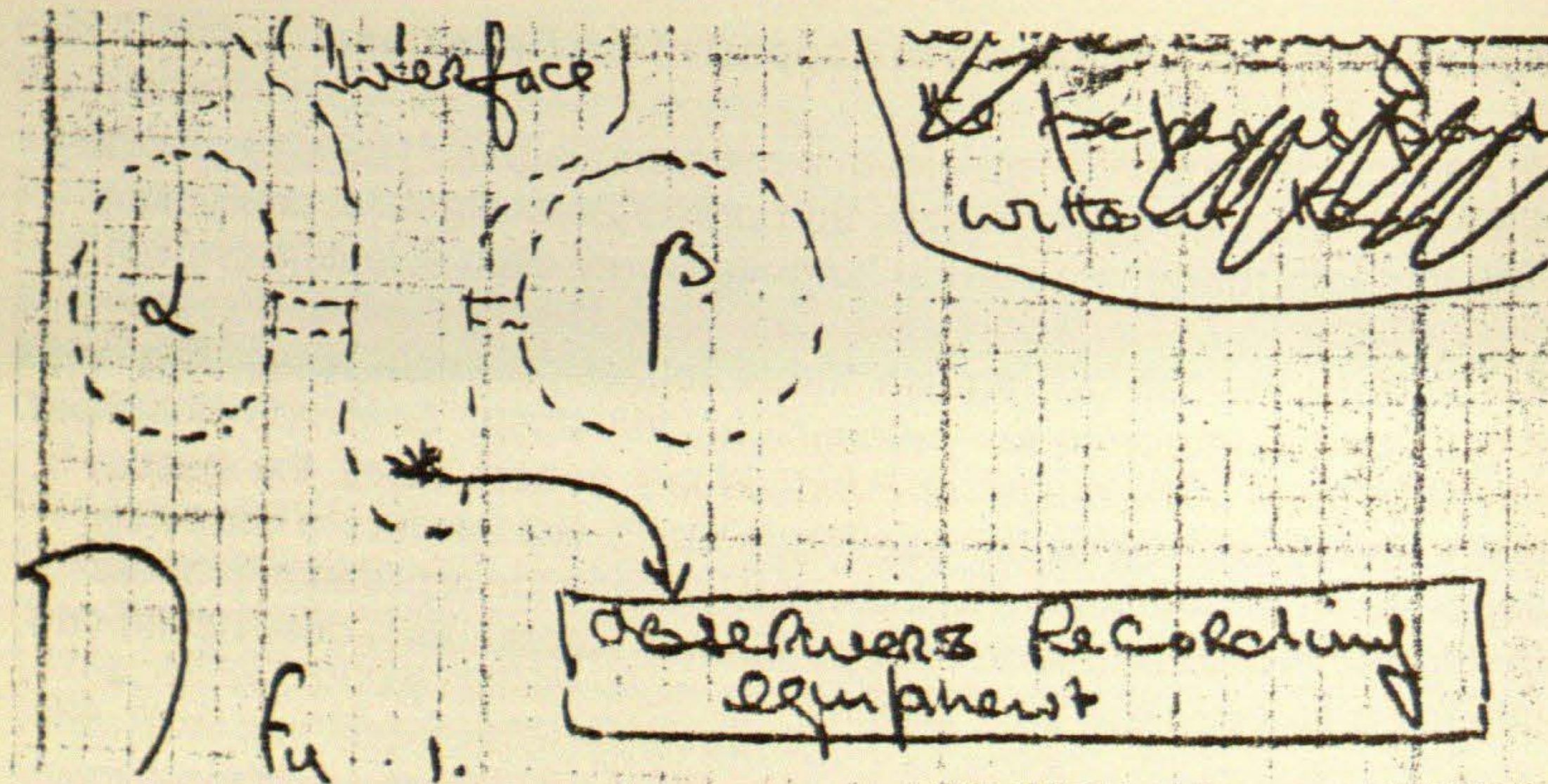
Introduction by Gordon Pask

The current status of mindlike computer programs is summarized, at a philosophical rather than technical level, in the following short but authoritative papers: Minsky (1968), Simon (1966), Turing (1969). Whoever wishes to delve into this subject in greater depth may read the books where these papers are published in their entirety, augmenting them, to obtain comprehensive background, by Ernst and Newell (1969); Ashby (1960); Cohen (1966); Fogel, Owens, and Walsh (1966); Von Foerster and Zopf (1962); Uttley (1959); Von Foerster et al. (1968); McCulloch (1965); Oestreicher and Moore (1968); Amarel (1969); Rose (1970); Minsky and Papert (1969); Feigenbaum and Feldman (1963); Banerji (1969); and Garvin (1970). It is also worth perusing all volumes of the journal *Artificial Intelligence*.

Henceforward, it is assumed either that the reader knows the *kind* of symbolic operations performed by computer programs and other artifacts, that he will study the matter at leisure, or that he will take these operations for granted. With this supposition in mind I shall give a personal and possibly idiosyncratic view of the conditions under which *artificially intelligent* is a properly used term and offer an interpretation of these conditions with respect to *use* of the *architecture machine*. Apart from the pictograms or ikons developed in the text, the only special symbols used are the special brackets \langle and \rangle which enclose *ordered* collections of objects; the equality sign $=$; and \triangleq , which is read as "*defined as equal to*."

Overview

The contention is as follows: Intelligence is a property that is ascribed by an *external observer* to a *conversation* between *participants* if, and



2.1.3. It is crucial to the argument that *all* observations occur at such a spatio-temporally localized interface; the observer's measuring and recording equipment is, in the last resort, bound to it. But the interface is neutral regarding the type of interaction, if any, that takes place across it.

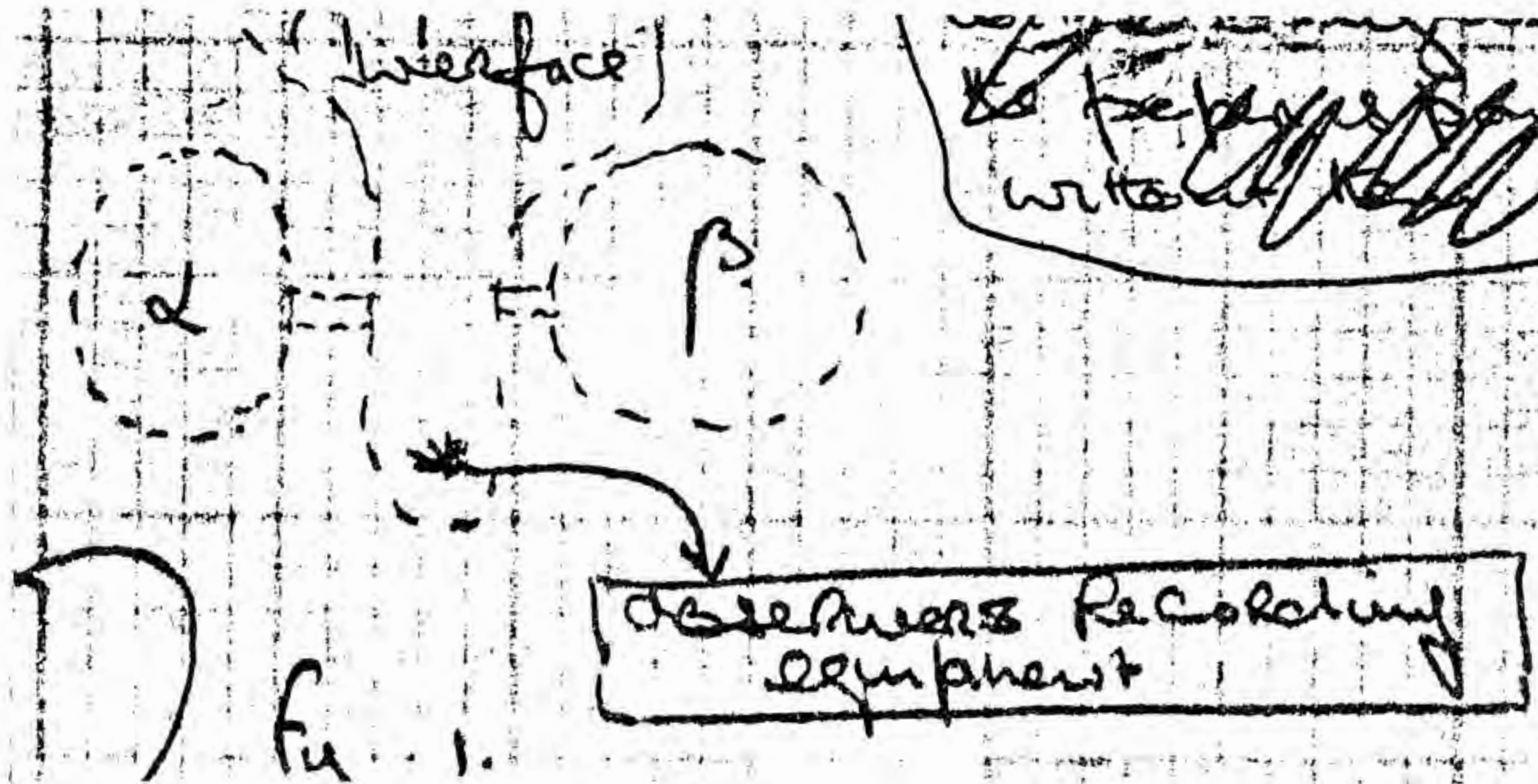
In Figure 1, which introduces the notation for distinguishing *M Individuals*, α may be a user of the architecture machine regarded as a biological unit and β the architecture machine regarded as a chunk of metal and semiconductor material. But α may also be a rat and β its experimental environment.

2.2. A *P Individual* is distinguished as a self-replicating and (usually) evolving *organization*. It is respectably and precisely defined in terms of an object language *L* and a relational domain *R* described in *L* by a description *D(R)* with respect to which it *is* self-replicating. Here, self-replication is intended in the abstract sense of the theory of reproductive automata, as originally conceived by von Neumann (1968) and as recently developed by Loefgren (1972).

2.2.1. Though, in general, the domain may be allowed to grow systematically under the control of the given *P Individual*, we confine our attention to cases in which *R* is fixed. Under these circumstances, it is possible to specify domains with the property that if a given *P Individual* is viable (that is, is able to reproduce) on occasion *n*, then it is also viable at any later occasion $n + r$ (*r* finite) for *R*, in *R*.²

2.2.2. It is assumed that a *P Individual* is active or that any conversation in which it is a participant does in fact proceed, that is, for each occasion, some topic relation *R* (a part of *R* or all of it) is actually ostended for

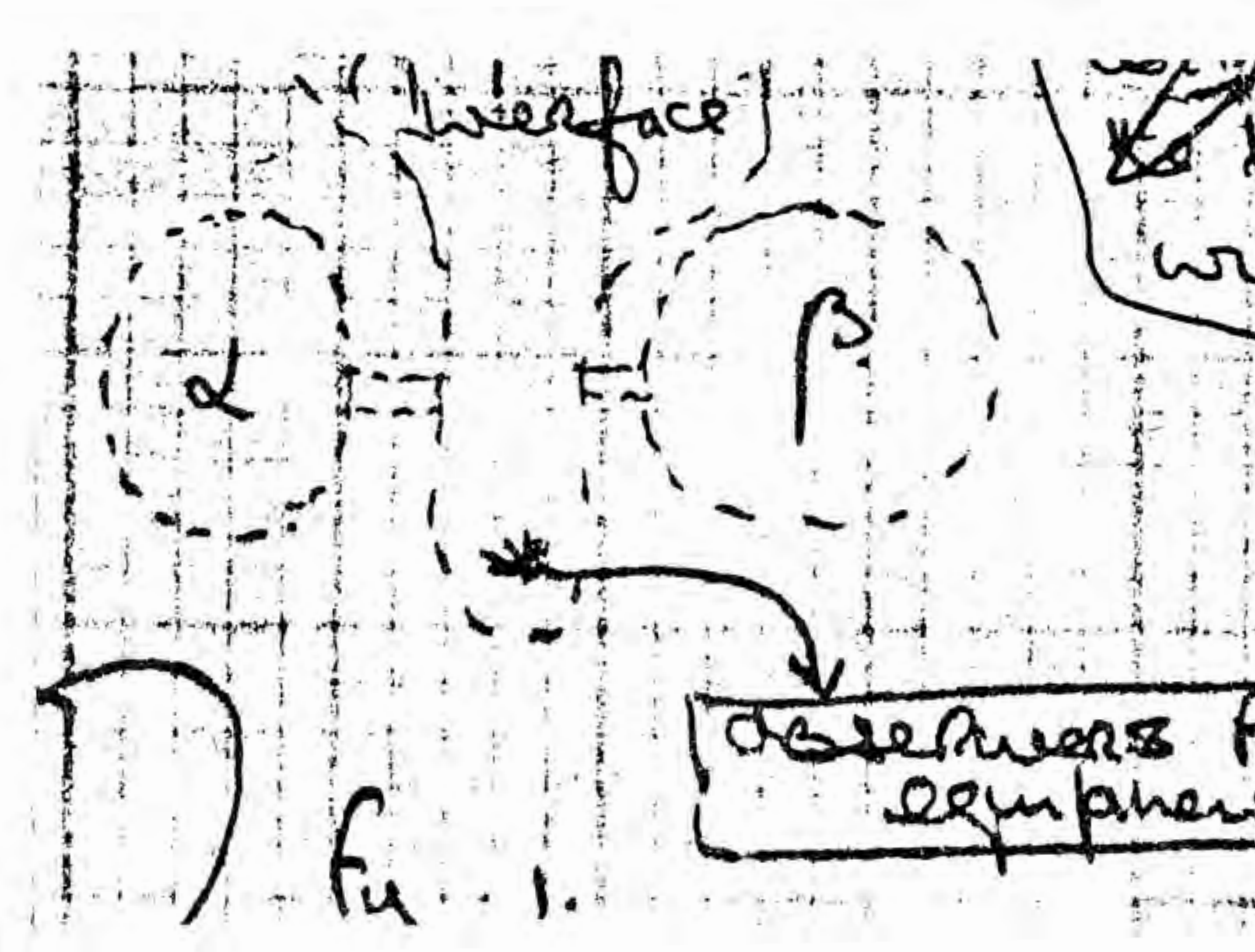
Interactions occur through an interface.



Gordon Pask.
"Aspects of Machine Intelligence"
In *Soft Architecture Machines*,
Nicholas Negroponte, ed., MIT Press
1976.

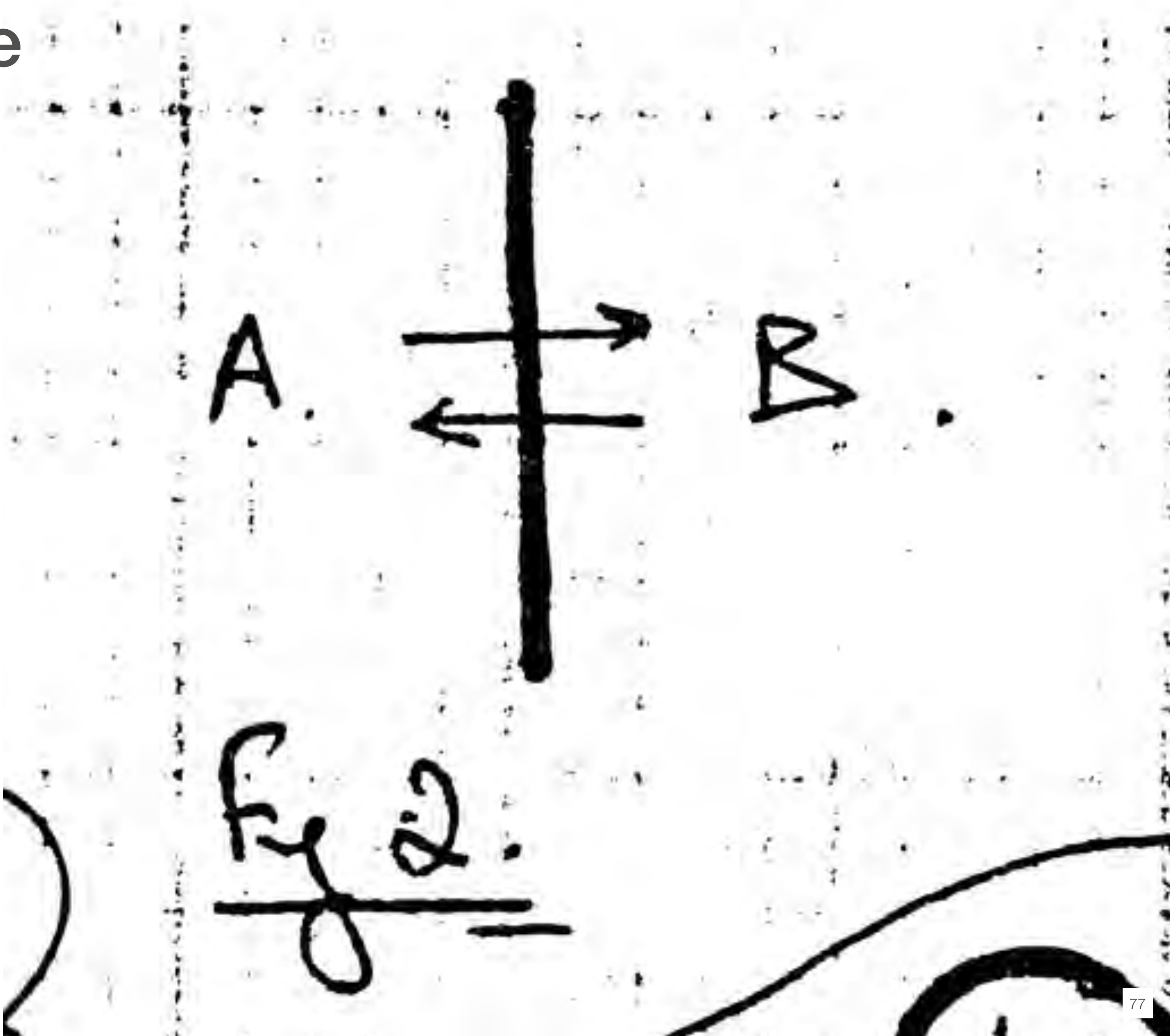
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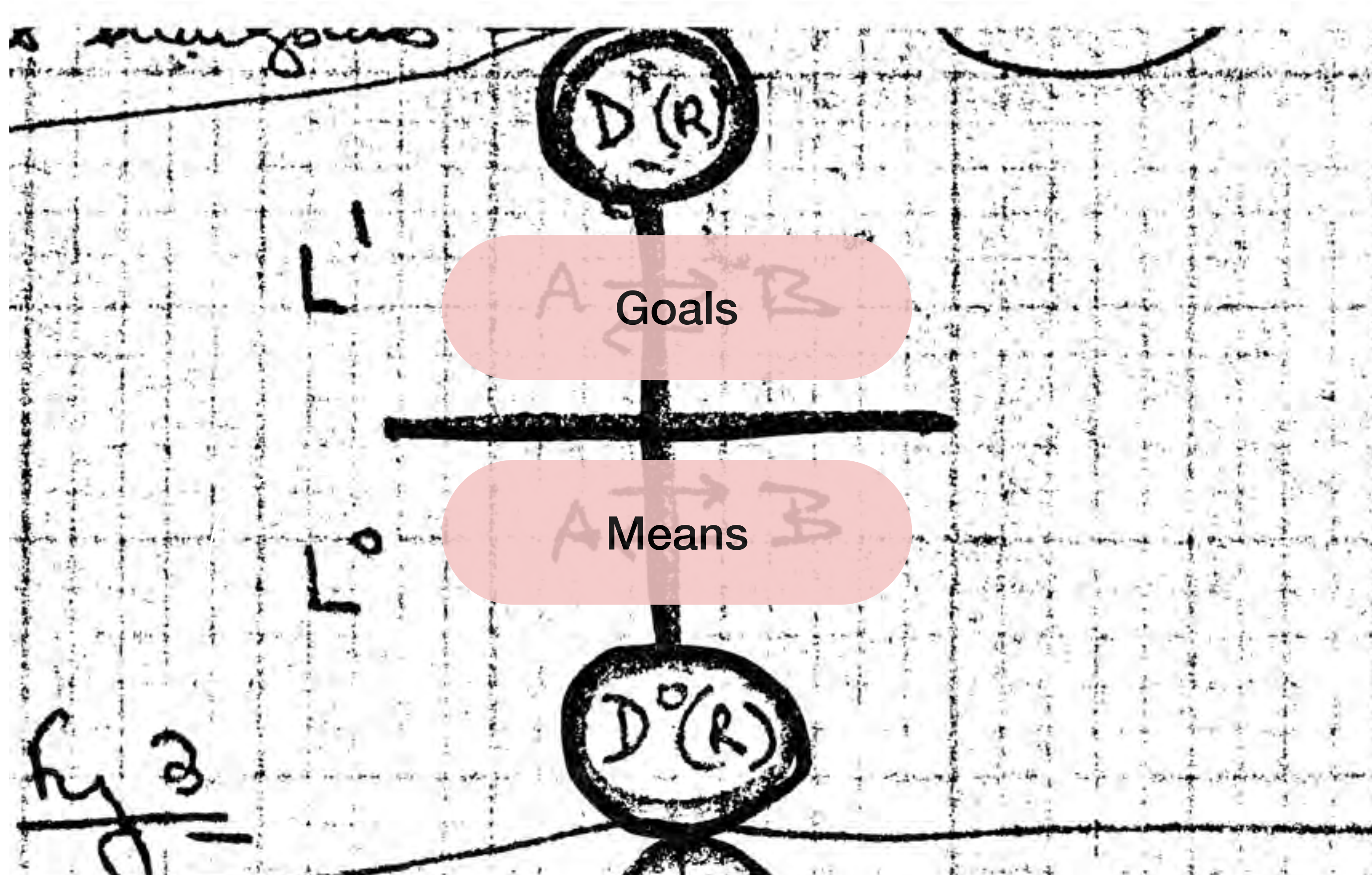


Conversations comprise interactions among participants

Gordon Pask
“Aspects of Machine Intelligence”
In *Soft Architecture Machines*,
Nicholas Negroponte, ed., MIT Press
1976.

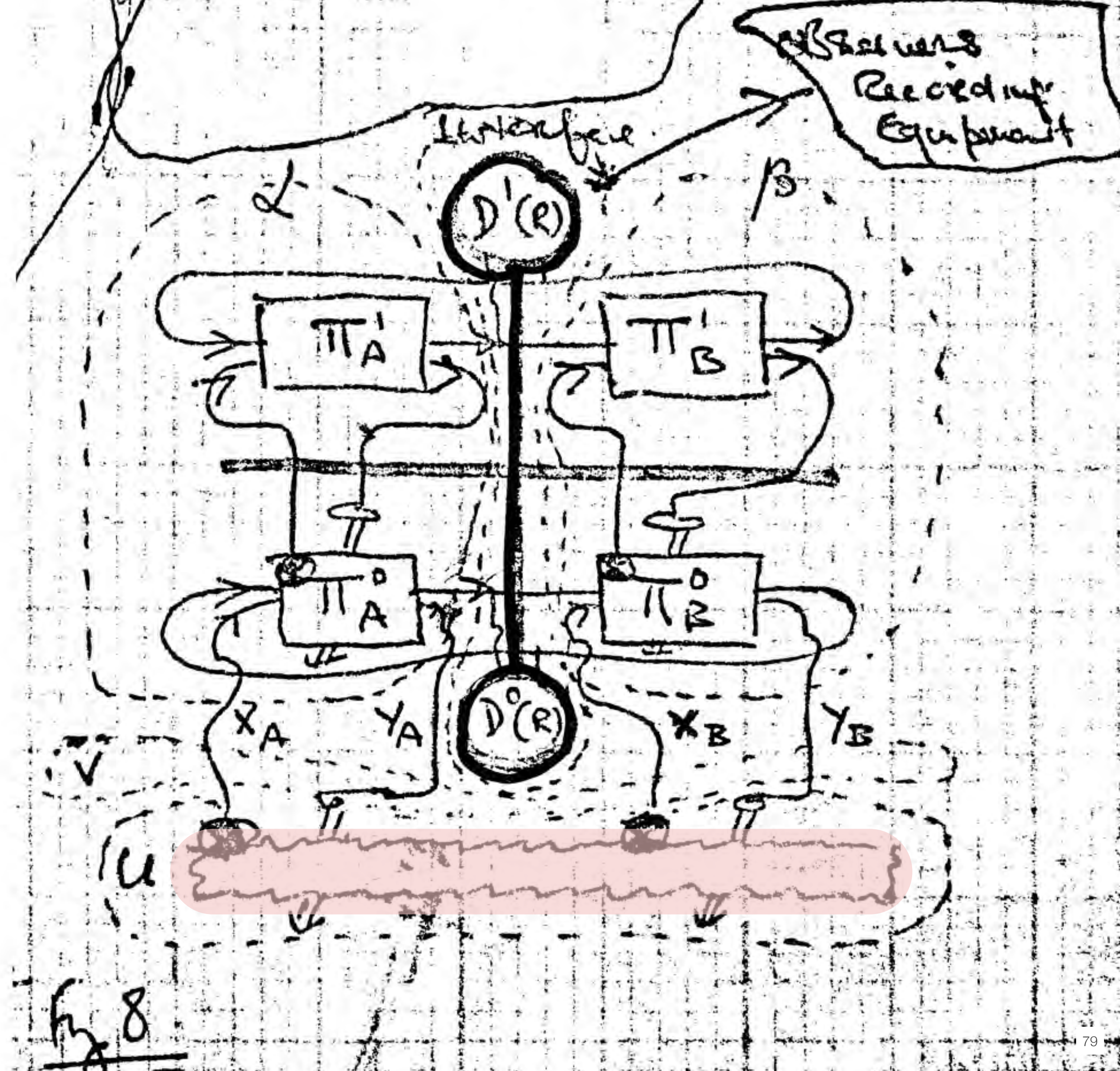


Interactions in a conversation can be observed to have levels of *goals* – and corresponding levels of *means* to achieve them.



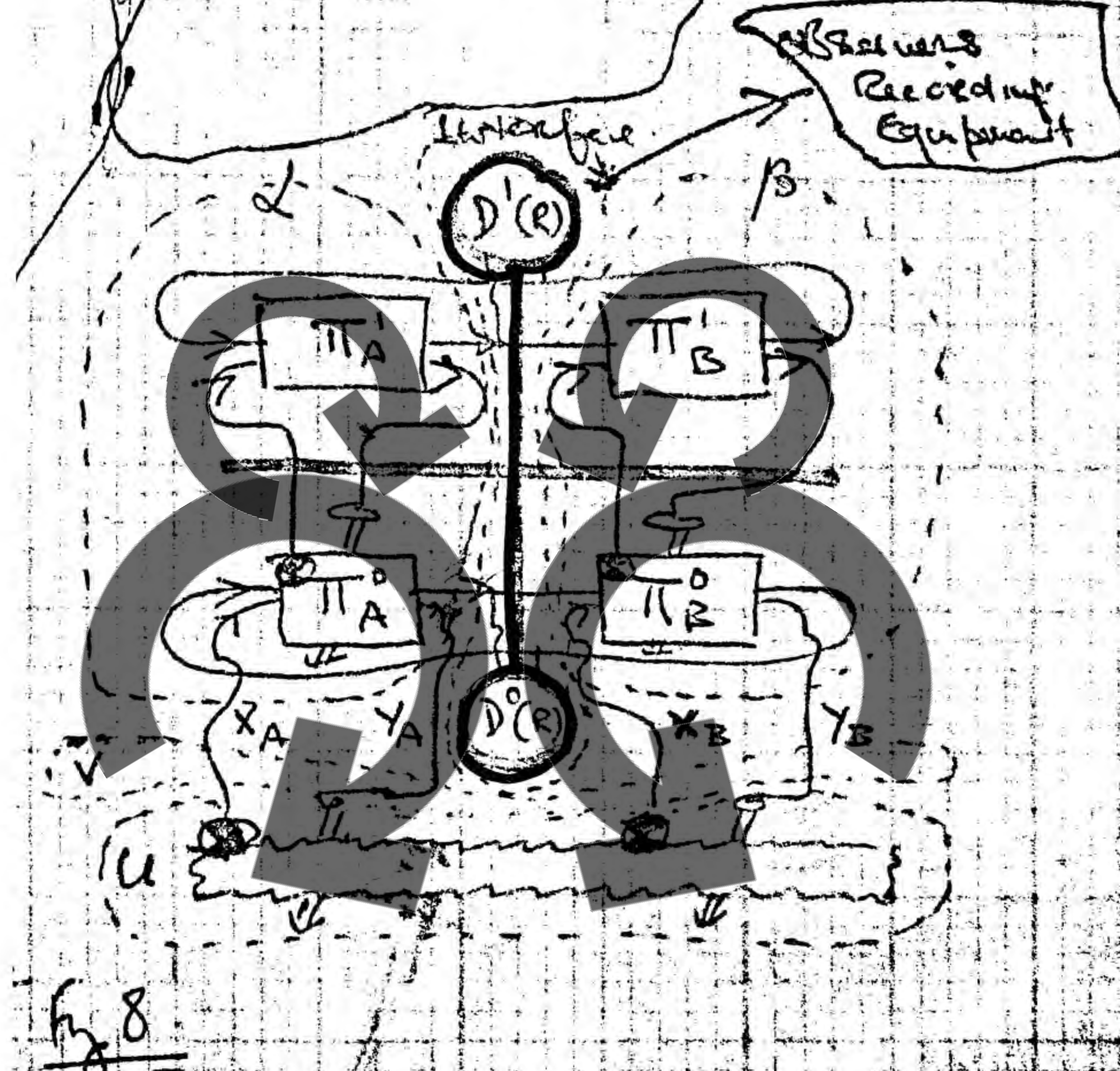
Gordon Pask
“Aspects of Machine Intelligence”
In *Soft Architecture Machines*,
Nicholas Negroponte, ed., MIT Press
1976.

Conversations may result in actions taken in an environment.



Gordon Pask
"Aspects of Machine Intelligence"
In *Soft Architecture Machines*,
Nicholas Negroponte, ed., MIT Press
1976.

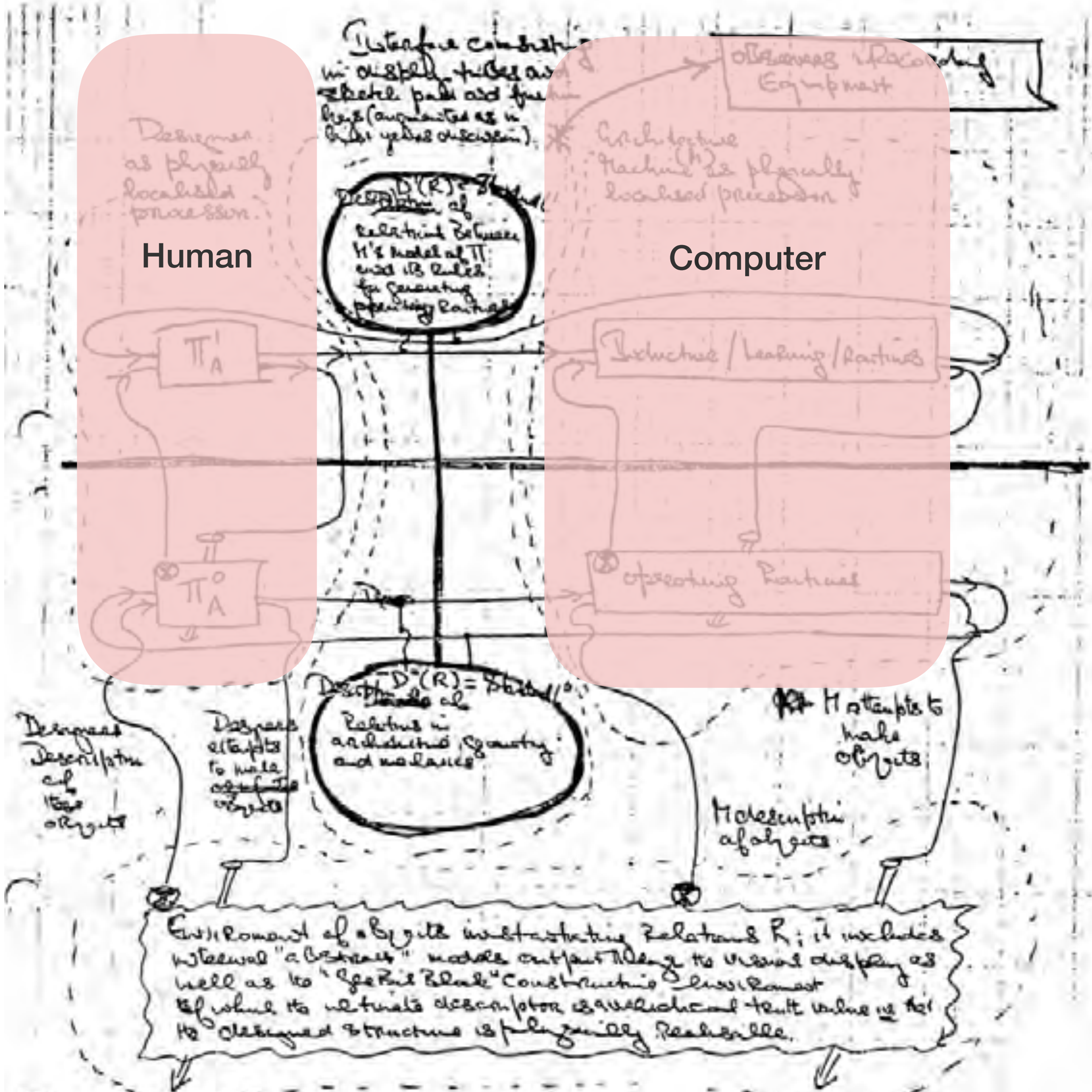
Conversations may become a dance of unified goals, means and actions.



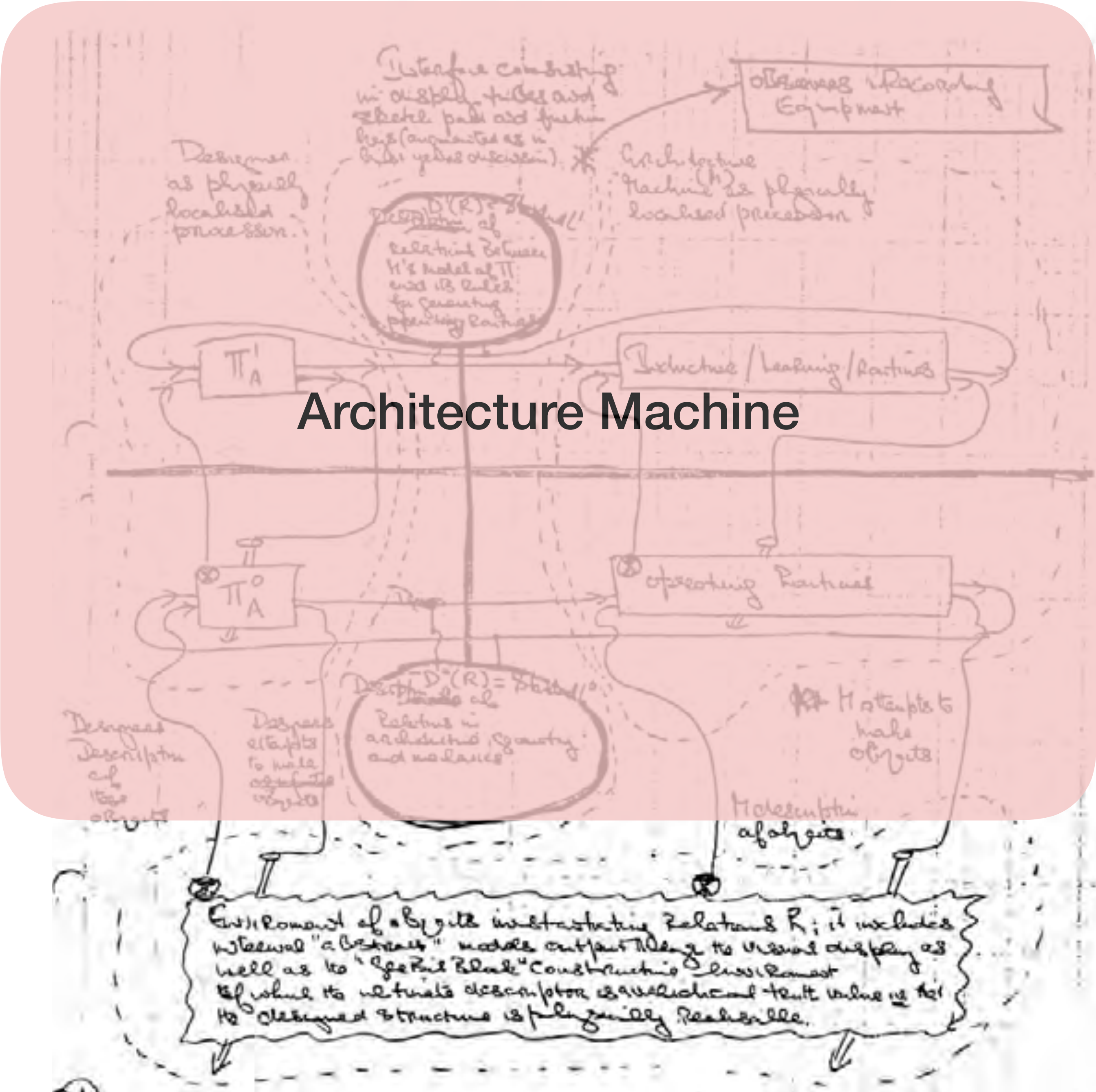
Gordon Pask
"Aspects of Machine Intelligence"
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A computer can partner with a human in a conversation for design.

Gordon Pask
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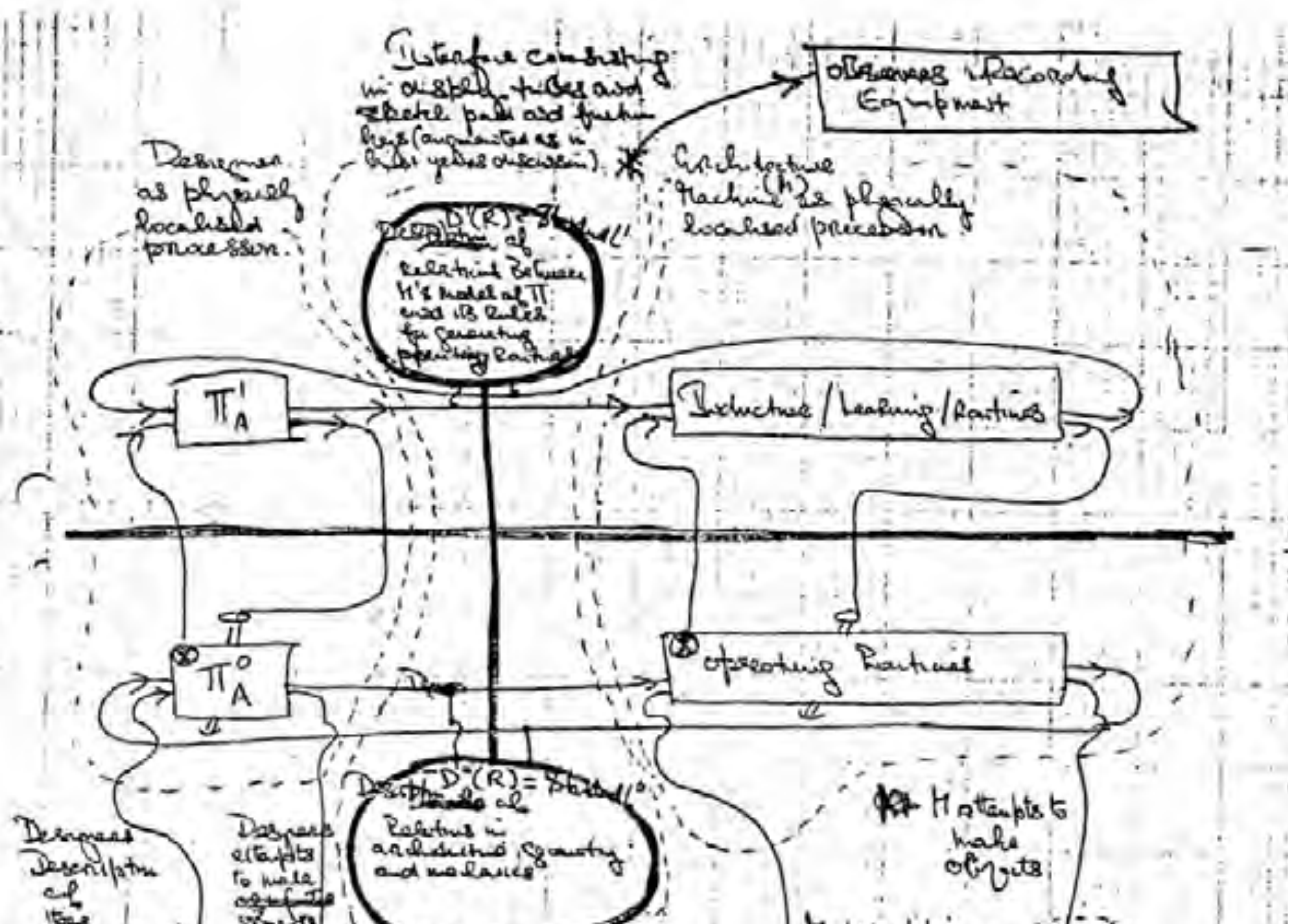
A computer can partner with a human in a conversation for design.



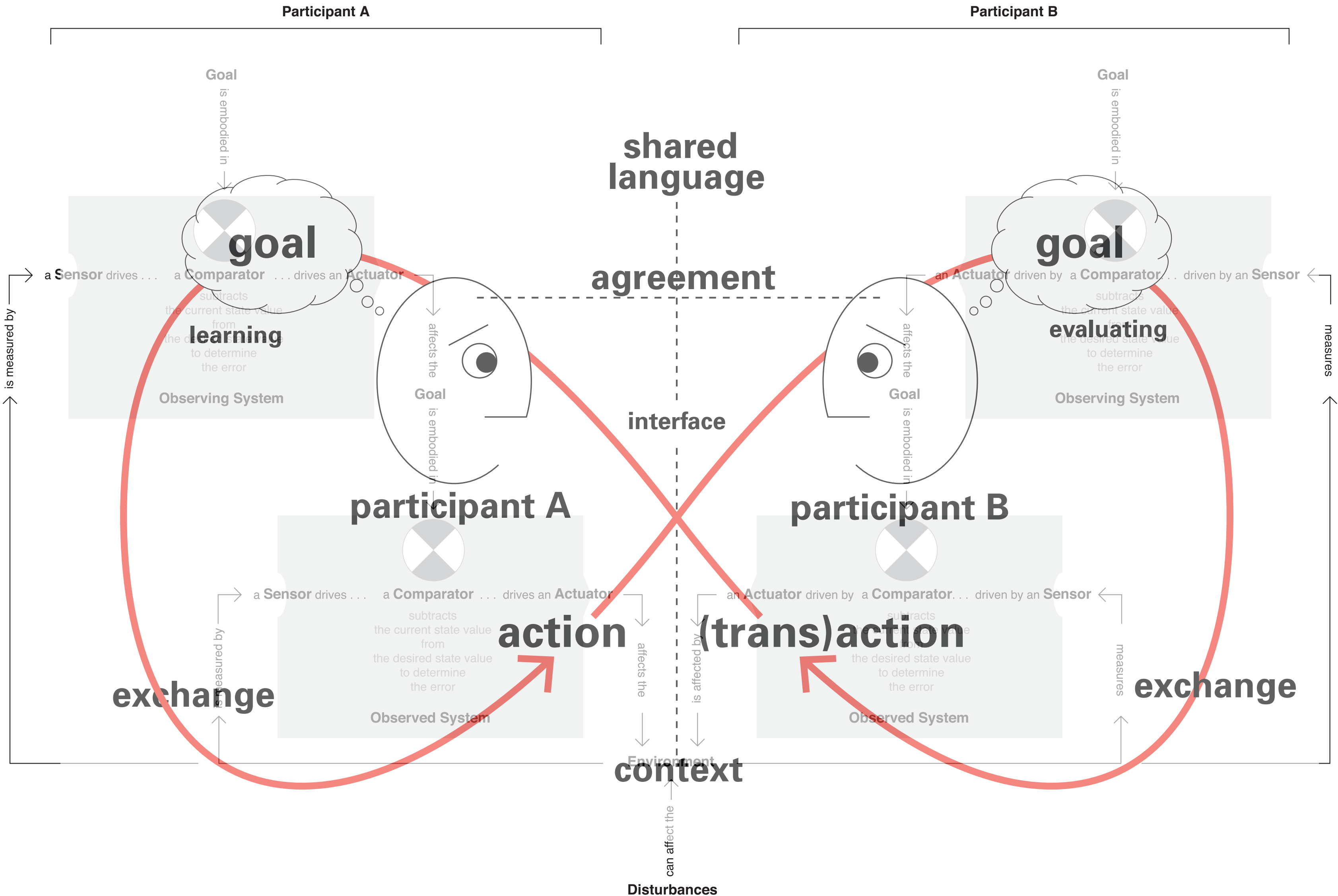
Gordon Pask
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 1976.

Conver

is measured by
a Sensor



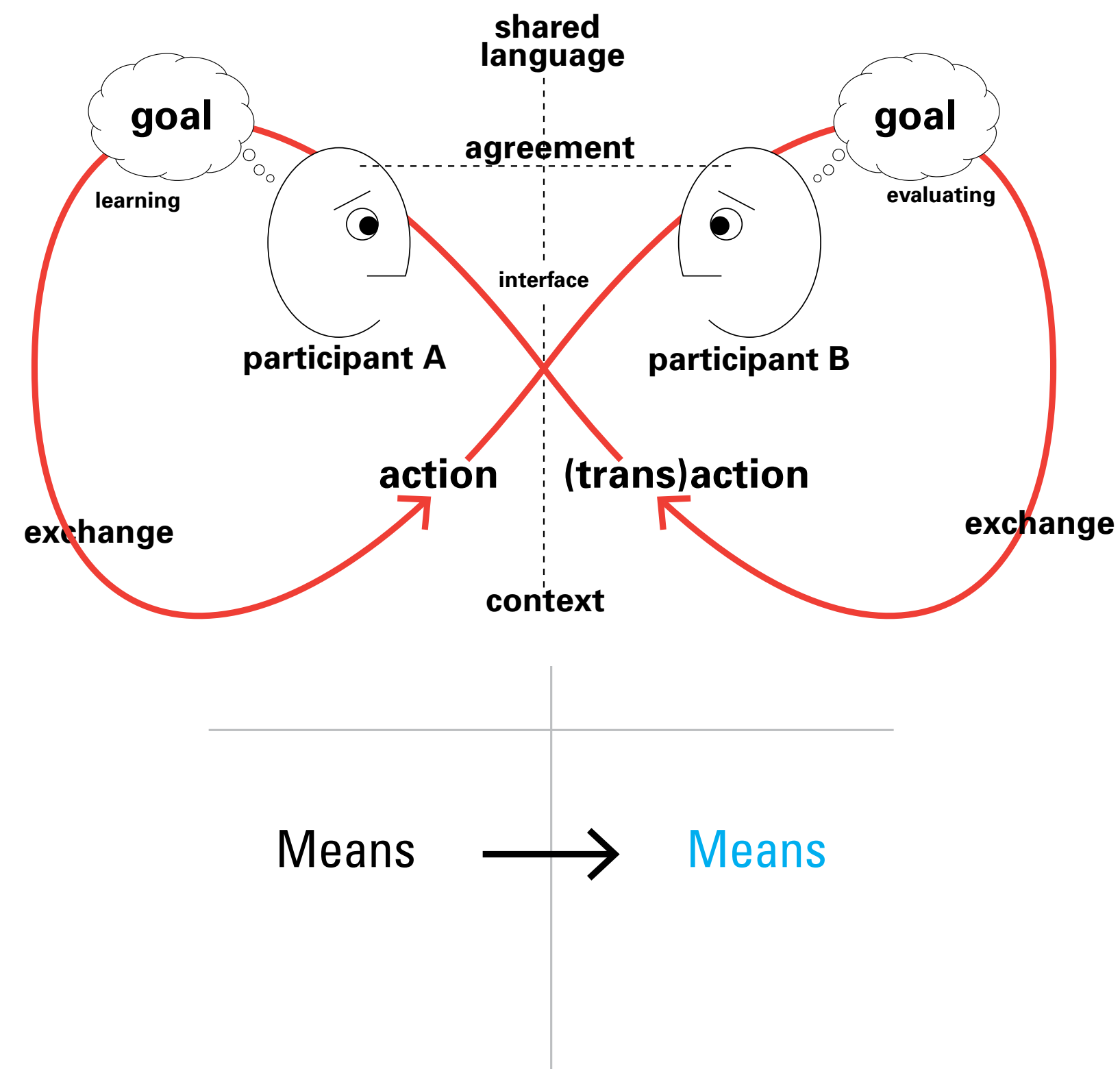
Conversation: Formal Mechanism



Architecture of Conversation

A and B may talk about goals, means, or both

“What is the goal? And how

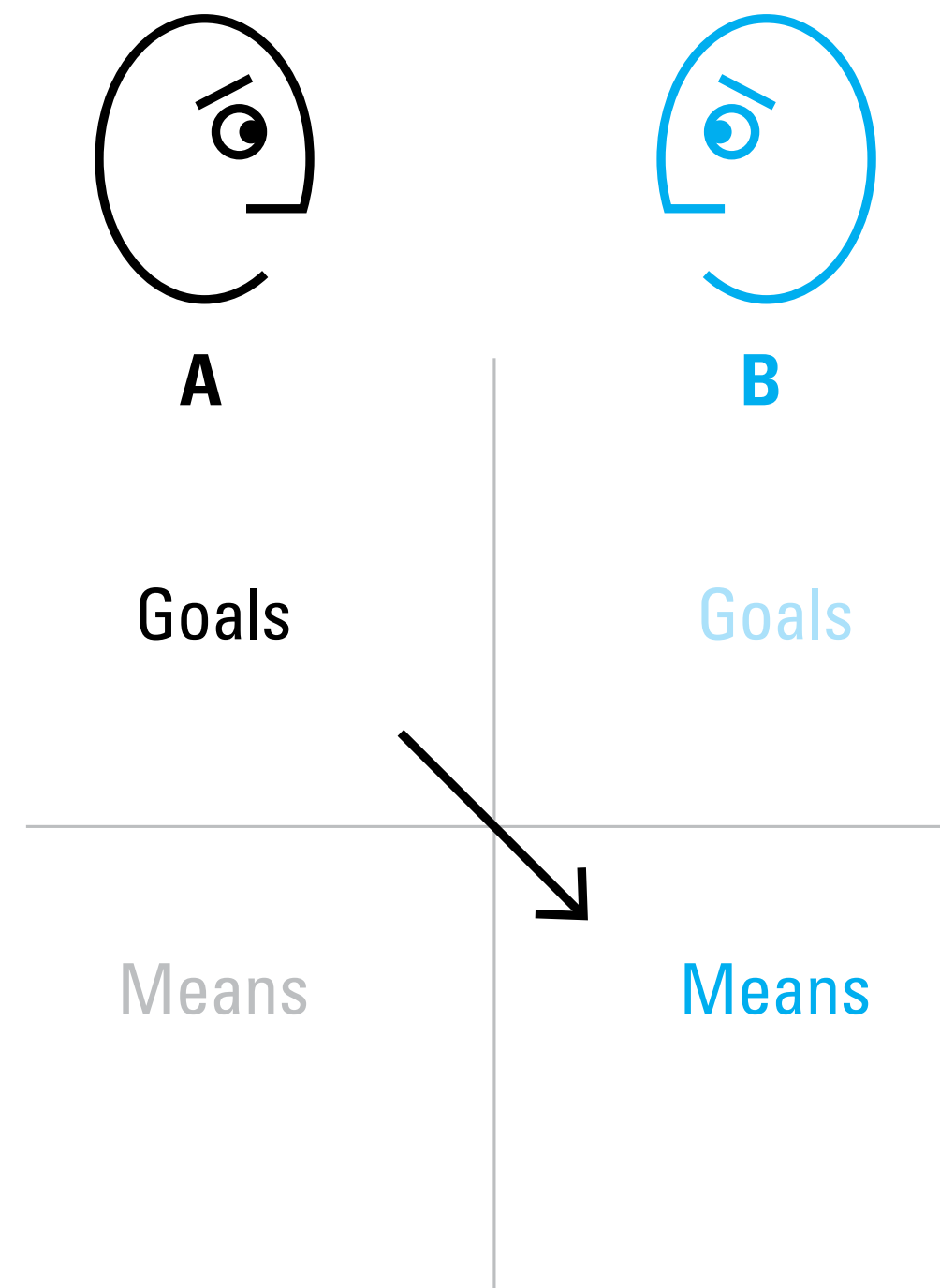


— adopted from Hugh Dubberly
after Paul Pangaro and Gordon Pask

Controlling

A tells B what to do and how to do it

“Alexa, give me some news from NPR.”—does this one

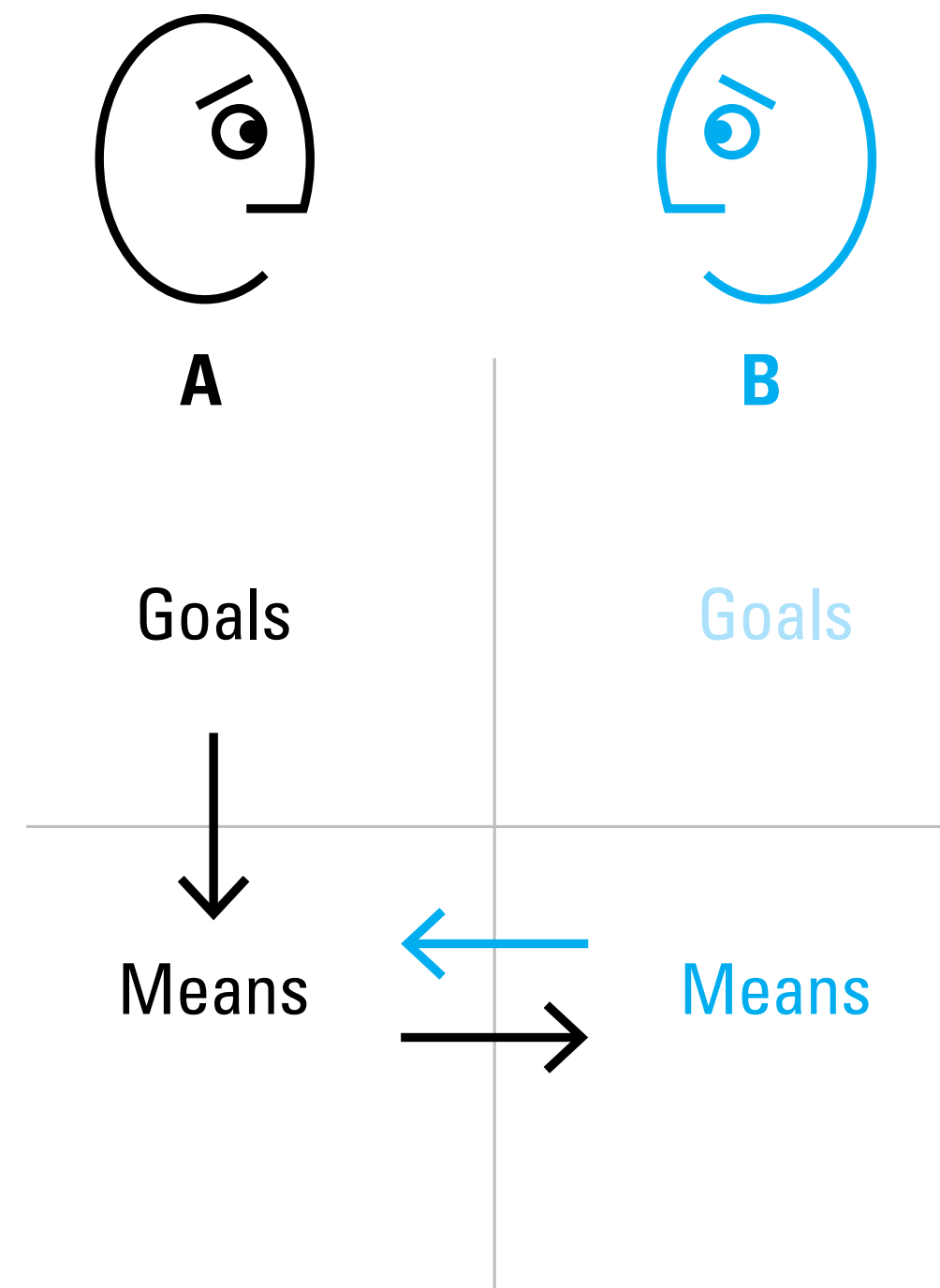


— adopted from Hugh Dubberly
after Paul Pangaro and Gordon Pask

Guiding

A sets goal but discusses means with B

“Alexa, I want to listen to news, what are my options?”

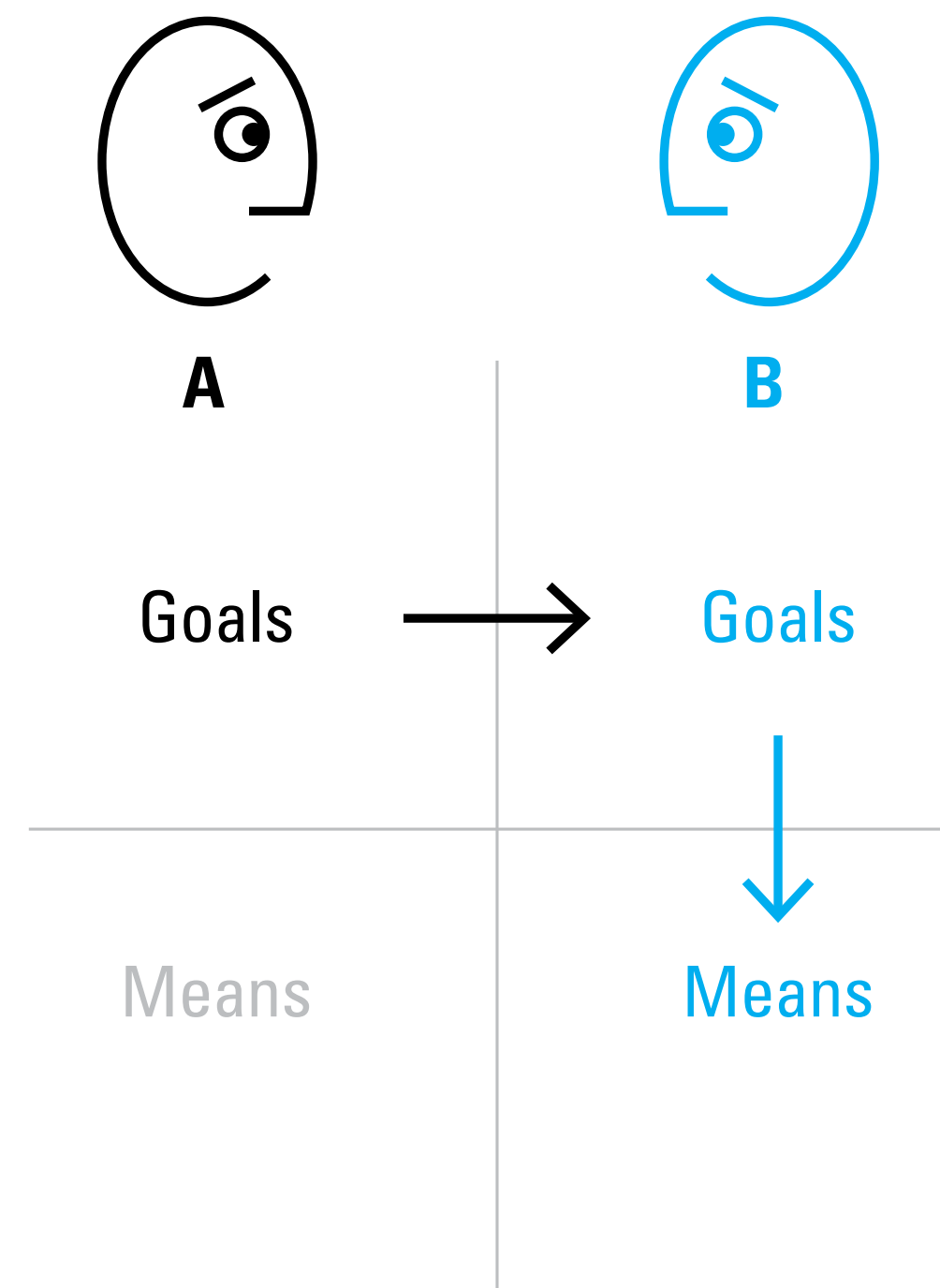


— adopted from Hugh Dubberly
after Paul Pangaro and Gordon Pask

Delegating

A sets the goal but lets B decide the means to reach it

“Alexa, some news please.”—does this one

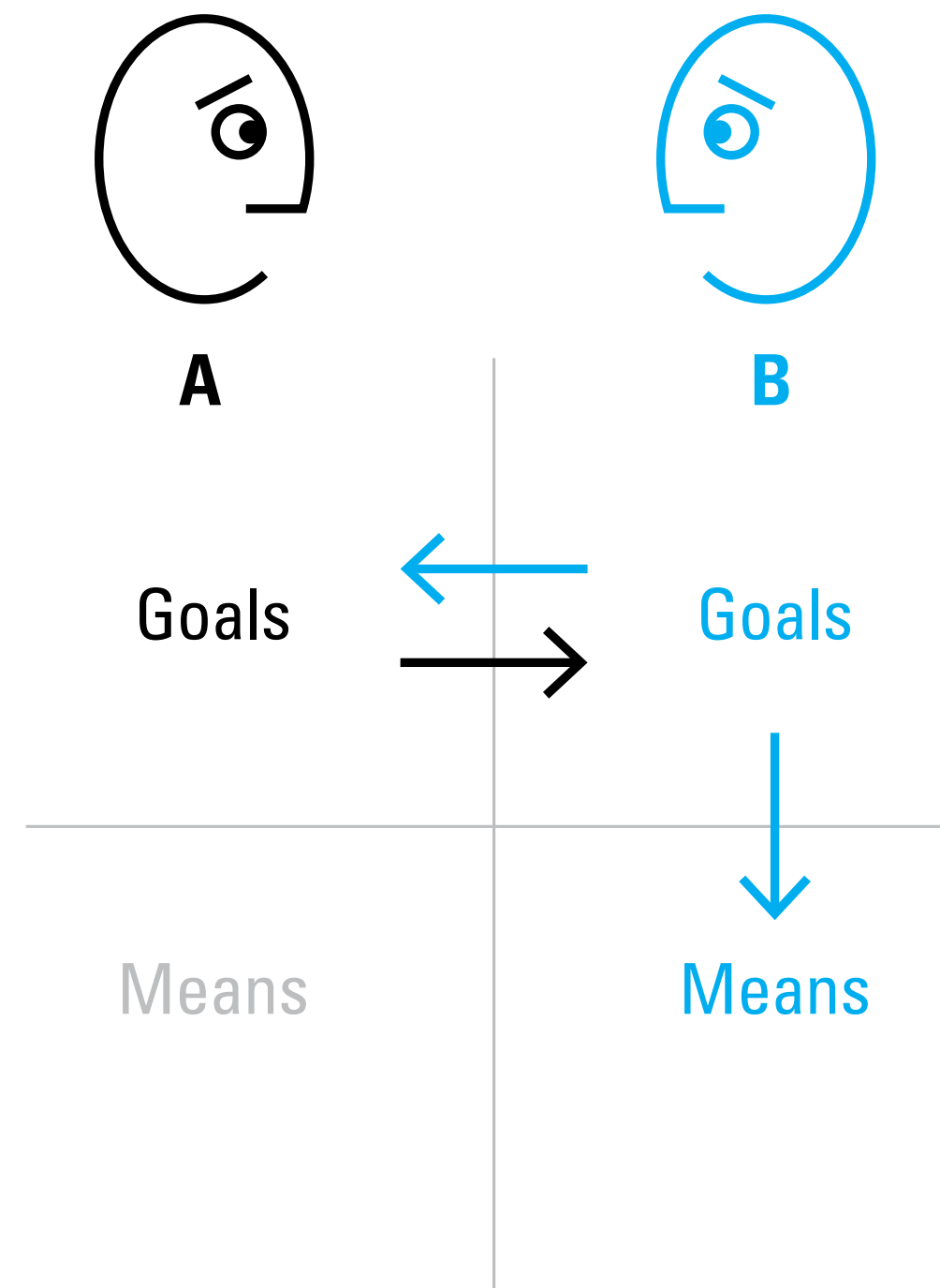


— adopted from Hugh Dubberly
after Paul Pangaro and Gordon Pask

Collaborating

A and B decide together on goals

“Alexa, how about I listen to something?”



— adopted from Hugh Dubberly
after Paul Pangaro and Gordon Pask

Conversational Interfaces

Alexa, define a “**good conversation**”?

- *stays sensitive to your context & language*
- *engages you — keeps continuity in the exchange*
- *leads to agreements — even agreements-to-disagree*
- *enables coordination — acting together with others.*

Alexa, how well does AI + today’s “Conversation Interfaces” do these things?

Conversational Interfaces

Cortana, define a “**great conversation**”?

- *tells you things you enjoy learning – delights you*
- *is surprising – energizes you*
- *goes places you didn't expect to go – is generative*
- *evolves in ways you couldn't evolve on your own.*

Cortana, why can't AI + today's “Conversation Interfaces” do these things?

Conversational Interfaces

Siri, what makes a “*great conversational partner*”?

- *asks great questions*
- *offers different ways to achieve your goal*
- *collaborates with you to define new goals*
- *helps you to be what you want to be... or **to become.***

Siri, will Conversational Interfaces become great conversational partners?

Ethical Intentions — Conversational Interfaces

Intention #1 — Build cooperative interfaces

Conversation is a cooperative interface when sequences of **coherent interactions** enable participants to **evolve points-of-view** such that **understanding and agreement** are ongoing.

Intentions of Interactions for Conversation v4 — November 2019

Ethical Intentions — Conversational Interfaces

Intention #2 — Build ethical interfaces

Conversation is an ethical interface when there is reliable transparency of action + intent (what + why), such that trust may build and be maintained over time.

Intentions of Interactions for Conversation v4 — November 2019

There are many different ways you can use our services – to search for and share information, to communicate with other people or to create new content. When you share information with us, for example by creating a [Google Account](#), we can make those services even better – to show you more relevant search results and ads, to help you connect with people or to make sharing with others quicker and easier. As you use our services, we want you to be clear how we're using information and the ways in which you can protect your privacy.

Our Privacy Policy explains:

- What information we collect and why we collect it.
- How we use that information.
- The choices we offer, including how to access and update information.

We've tried to keep it as simple as possible, but if you're not familiar with terms like cookies, IP addresses, pixel tags and browsers, then read about these [key terms](#) first. Your privacy matters to Google so whether you are new to Google or a long-time user, please do take the time to get to know our practices – and if you have any questions [contact us](#).

Information we collect

[Back to top](#)

We collect information to provide better services to all of our users – from figuring out basic stuff like which language you speak, to more complex things like which ads you'll find most useful, the people who matter most to you online, or which YouTube videos you might like.

We collect information in the following ways:

- **Information you give us.** For example, many of our services require you to sign up for a Google Account. When you do, we'll ask for [personal information](#), like your name, email address, telephone number or credit card to store with your account. If you want to take full advantage of the sharing features we offer, we might also ask you to create a publicly visible [Google Profile](#), which may include your name and photo.
- **Information we get from your use of our services.** We collect information about the services that you use and how you use them, like when you watch a video on YouTube, visit a website that uses our advertising services, or view and interact with our ads and content. This information includes:

• Device information

We collect [device-specific information](#) (such as your hardware model, operating system version, [unique device identifiers](#), and mobile network information including phone number). Google may associate your device identifiers or phone number with your Google Account.

• Log information

When you use our services or view content provided by Google, we automatically collect and store certain information in [server logs](#). This includes:

- details of how you used our service, such as your search queries.
- telephony log information like your phone number, calling-party number, forwarding numbers, time and date of calls, duration of calls, SMS routing information and types of calls.

• Internet protocol address.

- device event information such as crashes, system activity, hardware settings, browser type, browser language, the date and time of your request and referral URL.
- cookies that may uniquely identify your browser or your Google Account.

• Location information

When you use Google services, we may collect and process information about your [actual location](#). We use various technologies to determine location, including IP address, GPS, and other sensors that may, for example, provide Google with information on nearby devices, Wi-Fi access points and cell towers.

• Unique application numbers

Certain services include a unique application number. This number and information about your installation (for example, the operating system type and application version number) may be sent to Google when you install or uninstall that service or when that service periodically contacts our servers, such as for automatic updates.

• Local storage

We may collect and store information (including personal information) locally on your device using mechanisms such as [browser web storage](#) (including HTML 5) and [application data caches](#).

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We and our partners use various technologies to collect and store information when you visit a Google service, and this may include using [cookies or similar technologies](#) to identify your browser or device. We also use these technologies to collect and store information when you interact with services we offer to our partners, such as [advertising services](#) or Google features that may appear on other sites. Our Google Analytics product helps businesses and site owners analyze the traffic to their websites and apps. When used in conjunction with our advertising services, such as those using the DoubleClick cookie, Google Analytics information is [linked, by the Google Analytics customer or by Google, using Google technology, with information about visits to multiple sites](#).

Information we collect when you are signed in to Google, in addition to information we

- [Unchoose](#) whether your profile name and profile photo appear in shared endorsements that appear in ads.

You may also set your browser to block all cookies, including cookies associated with our services, or to indicate when a cookie is being set by us. However, it's important to remember that many of our services may not function properly if your cookies are disabled. For example, we may not remember your language preferences.

Information you share

[Back to top](#)

Many of our services let you share information with others. Remember that when you share information publicly, it may be indexable by search engines, including Google. Our services provide you with different options on [sharing and removing your content](#).

Accessing and updating your personal information

[Back to top](#)

Whenever you use our services, we aim to provide you with access to your [personal information](#). If that information is wrong, we strive to give you ways to update it quickly or to delete it – unless we have to keep that information for legitimate business or legal purposes.

We aim to maintain our services in a manner that protects information from accidental or malicious destruction. Because of this, after you delete information from our services, we may not immediately delete residual copies from our active servers and may not remove information from our backup systems.

Information we share

[Back to top](#)

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- **With domain administrators**

If your Google Account is managed for you by a [domain administrator](#) (for example, for G Suite users) then your domain administrator and resellers who provide user support to your organization will have access to your Google Account information (including your email and other data). Your domain administrator may be able to:

- view statistics regarding your account, like statistics regarding applications you install.
- change your account password.
- suspend or terminate your account access.
- access or retain information stored as part of your account.
- receive your account information in order to satisfy applicable law, regulation, legal process or enforceable governmental request.
- restrict your ability to delete or edit information in privacy settings.

Please refer to your domain administrator's policies for more information.

- **For external processing**

We provide personal information to our [affiliates](#) or other trusted businesses or persons to process it for us, based on our instructions and in compliance with our

If other users already have your email, or other information that identifies you, we may show them your publicly visible Google Profile information, such as your name and photo.

If you have a Google Account, we may display your Profile name, Profile photo, and actions you take on Google or on third-party applications connected to your Google Account (such as +1's, reviews you write and comments you post) in our services, including displaying in ads and other commercial contexts. We will respect the choices you make to [limit sharing or visibility settings](#) in your Google Account.

When you contact Google, we keep a record of your communication to help solve any issues you might be facing. We may use your email address to inform you about our services, such as letting you know about upcoming changes or improvements.

We use information collected from cookies and other technologies, like [pixel tags](#), to improve your user experience and the overall quality of our services. One of the products we use to do this on our own services is Google Analytics. For example, by saving your language preferences, we'll be able to have our services appear in the language you prefer. When showing you tailored ads, we will not associate an identifier from cookies or similar technologies with [sensitive categories](#), such as those based on race, religion, sexual orientation or health.

Our automated systems analyze your content (including emails) to provide you personally relevant product features, such as customized search results, tailored advertising, and spam and malware detection.

We may combine personal information from one service with information, including personal information, from other Google services – for example to make it easier to share things with people you know. Depending on [your account settings](#), your activity on other sites and apps may be associated with your personal information in order to improve Google's services and the ads delivered by Google.

We will ask for your consent before using information for a purpose other than those that are set out in this Privacy Policy.

Compliance and cooperation with regulatory authorities

[Back to top](#)

We regularly review our compliance with our Privacy Policy. We also adhere to several [self regulatory frameworks](#), including the EU-US and Swiss-US Privacy Shield Frameworks. When we receive formal written complaints, we will contact the person who made the complaint to follow up. We work with the appropriate regulatory authorities, including local data protection authorities, to resolve any complaints regarding the transfer of personal data that we cannot resolve with our users directly.

Changes

[Back to top](#)

Our Privacy Policy may change from time to time. We will not reduce your rights under this Privacy Policy without your explicit consent. We will post any privacy policy changes on this page and, if the changes are significant, we will provide a more prominent notice (including, for certain services, email notification of privacy policy changes). We will also keep prior versions of this Privacy Policy in an archive for your review.

Specific product practices

[Back to top](#)

The following notices explain specific privacy practices with respect to certain Google products and services that you may use:

- [Chrome and Chrome OS](#)
- [Play Books](#)
- [Payments](#)
- [Fiber](#)
- [Project Fi](#)
- [G Suite for Education](#)
- [YouTube Kids](#)
- [Google Accounts Managed with Family Link](#)

For more information about some of our most popular services, you can visit the [Google Product Privacy Guide](#).

Other useful privacy and security related materials

[Back to top](#)

Further useful privacy and security related materials can be found through Google's [policies and principles pages](#), including:

- Information about our [technologies and principles](#), which includes, among other things, more information on
 - [how Google uses cookies](#).
 - technologies we use for [advertising](#).
 - how we [recognize patterns like faces](#).
- A [page](#) that explains what data is shared with Google when you visit websites that use our advertising, analytics and social products.
- The [Privacy Checkup](#) tool, which makes it easy to review your key privacy settings.
- Google's [safety center](#), which provides information on how to stay safe and secure online.

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- **For legal reasons**

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- enforce applicable Terms of Service, including investigation of potential violations.
- detect, prevent, or otherwise address fraud, security or technical issues.
- protect against harm to the rights, property or safety of Google, our users or the public as required or permitted by law.

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- We encrypt many of our services [using SSL](#).
- We offer you [two step verification](#) when you access your Google Account, and a [Safe Browsing feature](#) in Google Chrome.
- We review our information collection, storage and processing practices, including physical security measures, to guard against unauthorized access to systems.
- We restrict access to personal information to Google employees, contractors and

Ethical Intentions — Conversational Interfaces

Intention #3 — Build humane interfaces

Conversation is a humane interface when any participant may influence its focus and flow such that collaboration is ongoing.

Intentions of Interactions for Conversation v4 — November 2019

The Design of Ethical Interfaces

Ethical Intentions — Conversational Interfaces

- **Cooperative** → **evolving points-of-view** → **agreement**
- **Ethical** → **reliable transparency of what + why** → **trust**
- **Humane** → **shared focus and flow** → **collaboration**

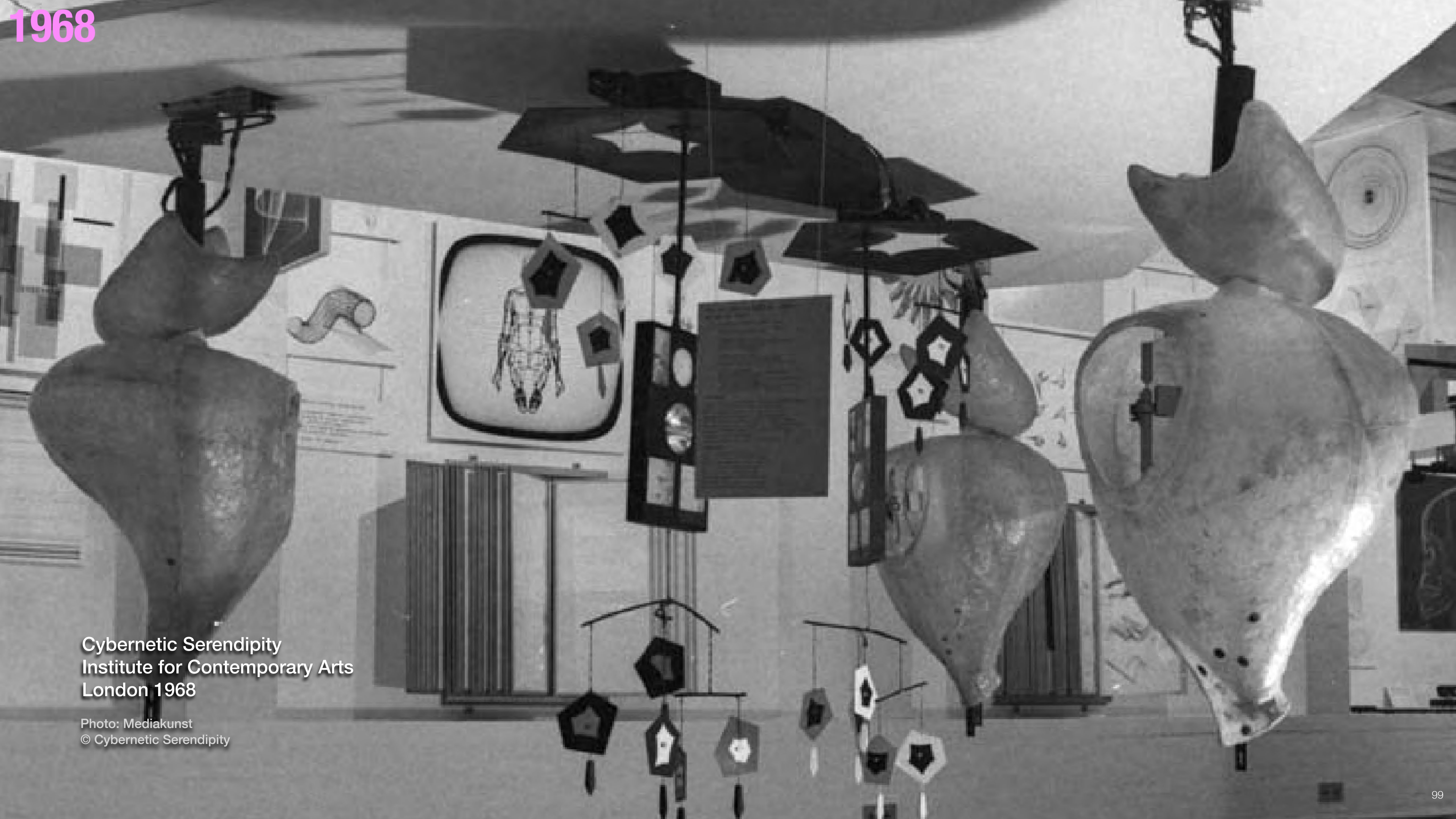
Place Conversation at the Heart of IxD

Designers, can we enable conversation for others?

Can we enable interactions that...

- *are cooperative, humane, and ethical*
- *create conditions for great conversations*
- *increase the number of choices open to all*
- *help us to be what we want to be... or become.*

1968



Cybernetic Serendipity
Institute for Contemporary Arts
London 1968

Photo: Mediakunst
© Cybernetic Serendipity



ColloquyOfMobiles.com
COLLOQUY 2018 Project
College for Creative Studies
Detroit 2018

Conversation is the Heart of Interaction

How do we do better at Interaction Design? I propose we:

- *apply models of human conversation*
- *strive for interfaces that are cooperative, ethical, humane*
- *push for new forms of conversational interfaces.*

These are the offers in my presentation today.

Conversation is the Heart of Interaction



IxDA Pittsburgh

Thank you.& special thanks to:

Simon King

Karen Kornblum Berntsen

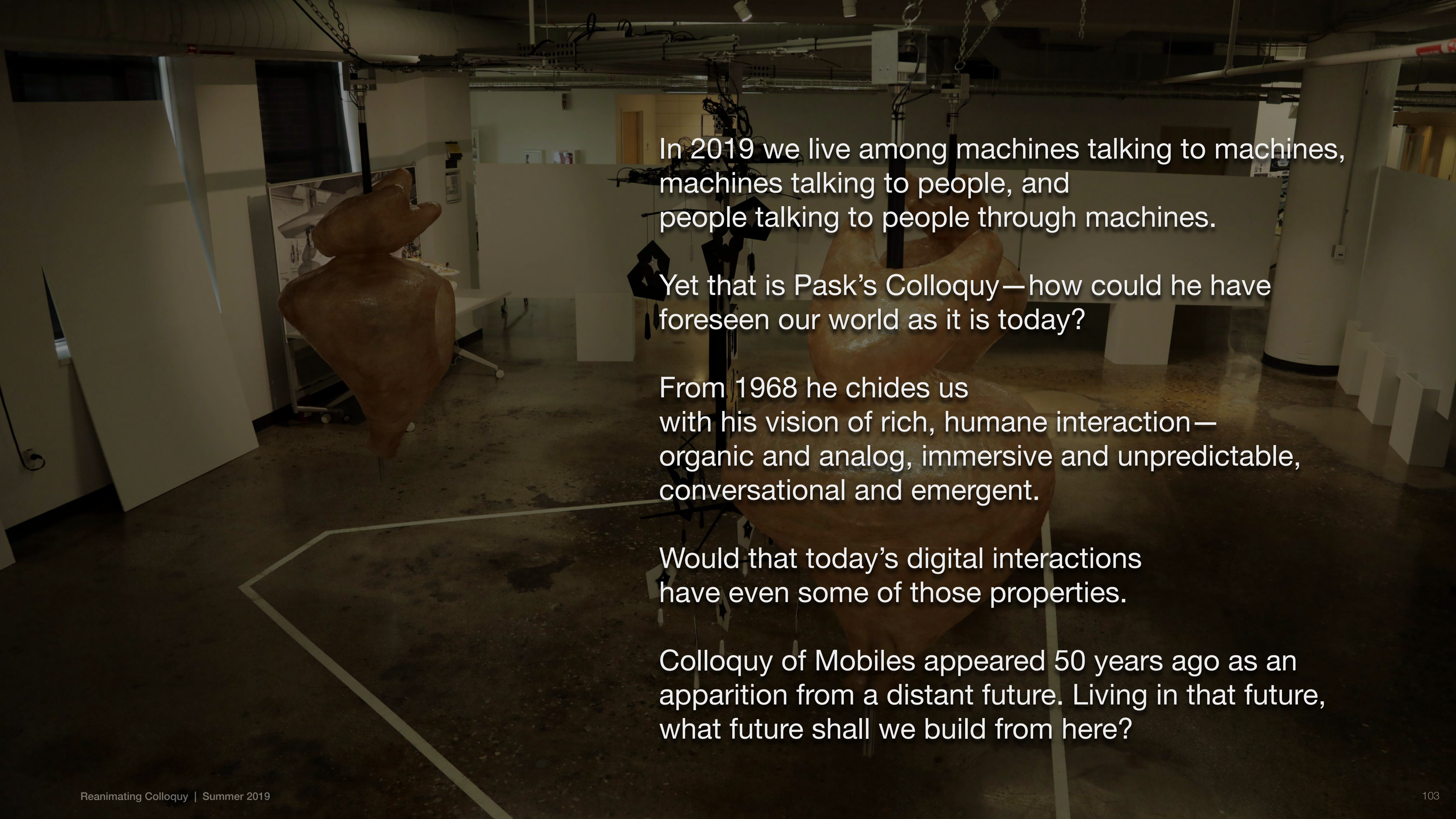
Hugh Dubberly

Pooja Upadhyay

Paul Pangaro

ppangaro@cmu.edu

pangaro.com/ixda2019/



In 2019 we live among machines talking to machines, machines talking to people, and people talking to people through machines.

Yet that is Pask's Colloquy—how could he have foreseen our world as it is today?

From 1968 he chides us with his vision of rich, humane interaction—organic and analog, immersive and unpredictable, conversational and emergent.

Would that today's digital interactions have even some of those properties.

Colloquy of Mobiles appeared 50 years ago as an apparition from a distant future. Living in that future, what future shall we build from here?

Place Conversation at the Heart of IxD

Second-order Design = Design for Conversation

The goal of second-order design is to facilitate the emergence of conditions in which others can design — to create conditions in which conversations can emerge — and thus to increase the number of choices open to all.

— Dubberly & Pangaro, *Cybernetics and Design: Conversations for Action*, 2019

The Design of Ethical Interfaces

Organizing Principle

“I shall act always so as to increase the total number of choices.”

— Ethical Imperative, Heinz von Foerster

Click for PDF of “Ethics and Second-Order Cybernetics”, 1991

The Design of Ethical Interfaces

Ethical Interfaces — Axiom #1

“As a designer, I shall act always so as to increase the total number of choices for a user.”

— Ethical Imperative, Interaction Designers

The Design of Ethical Interfaces

Ethical Interfaces — Axiom #2

Interaction designers have the responsibility to create conditions such that a user may converse with the interface.

Design for Conversation

Design for Conversation

Ethical Interfaces — Axiom #2

Interaction designers have the responsibility to create conditions such that a user may converse with the interface.

Design **as** Conversation

Ethical Interfaces — Axiom #3 — “Second-order Design”

The goal of second-order design is to facilitate the emergence of conditions in which others can design — to create conditions in which conversations can emerge — and thus to increase the number of choices open to all.

— Dubberly & Pangaro, “Cybernetics and Design: Conversations for Action”, 2019

On “Metadesign” – Humberto Maturana

***We are responsible for the language we bring forth,
for the emotions we embody in our language and our actions,
and for the technology they both bring to the world.***

***That is, we are responsible for what we conserve in our
living day-to-day.***

That is an ethical choice at every minute of our lives.

— Hugh Dubberly after H. Maturana

[Click for PDF of "Metadesign" by Humberto Maturana](#)

What are the design principles?

- *incorporate a formal model of conversation*
- *build on the individual experience of the participant*
- *use **context & shared goals** to guide the exchange*
- *compute **novelty & uncertainty** to keep engagement.*

How does all this work — computationally?

- *scrape and segment text from target page*
- *categorize each segment according to content**
- *calculate uncertainty score for each segment*
- *choose a segment that injects novelty... but not too much.*

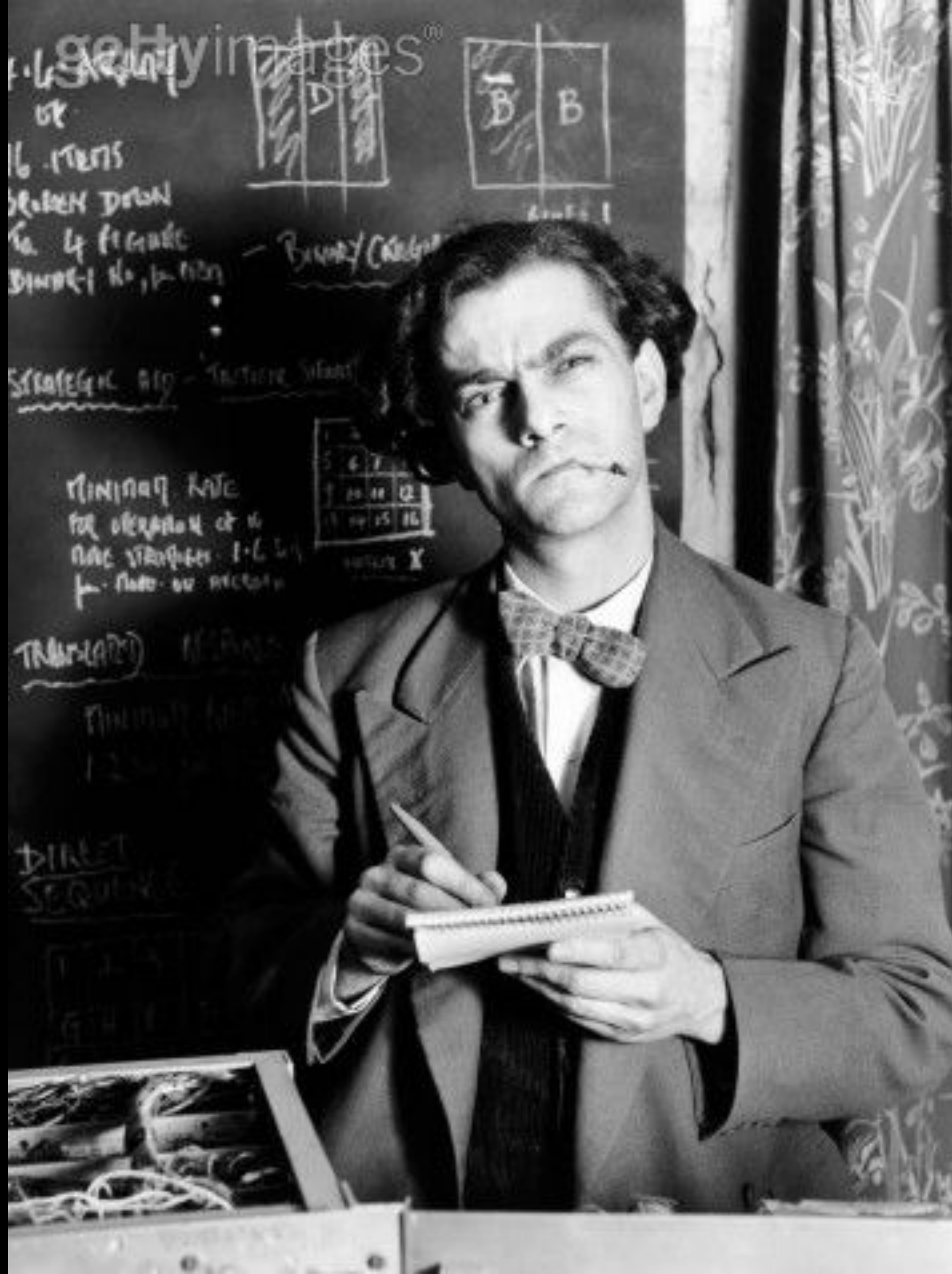
* using NLP or LSA or EM's or...

This directly applies Pask's Novelty Regulation and Uncertainty Regulation.

CONVERSE

Gordon Pask
Early 1950s

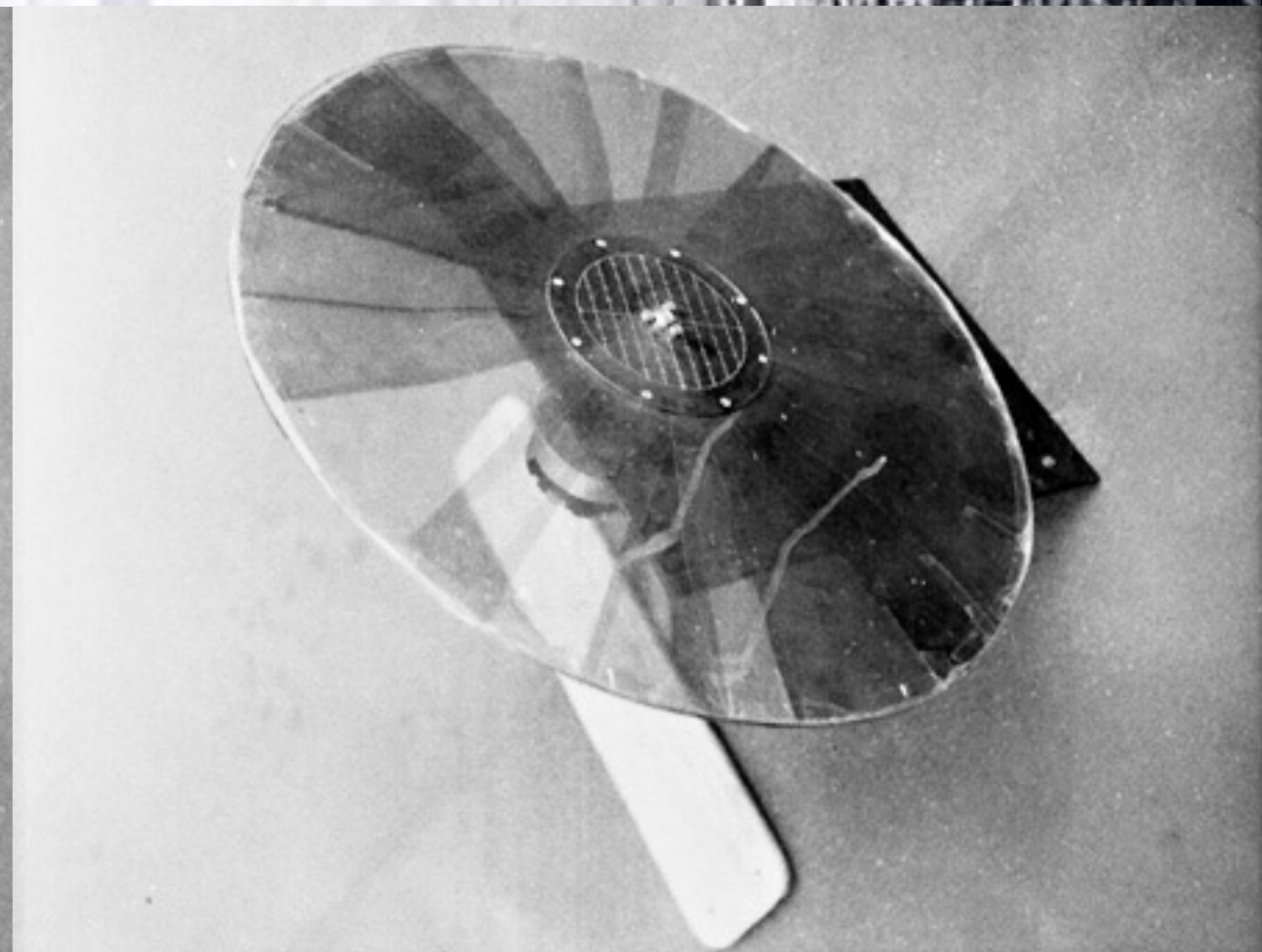
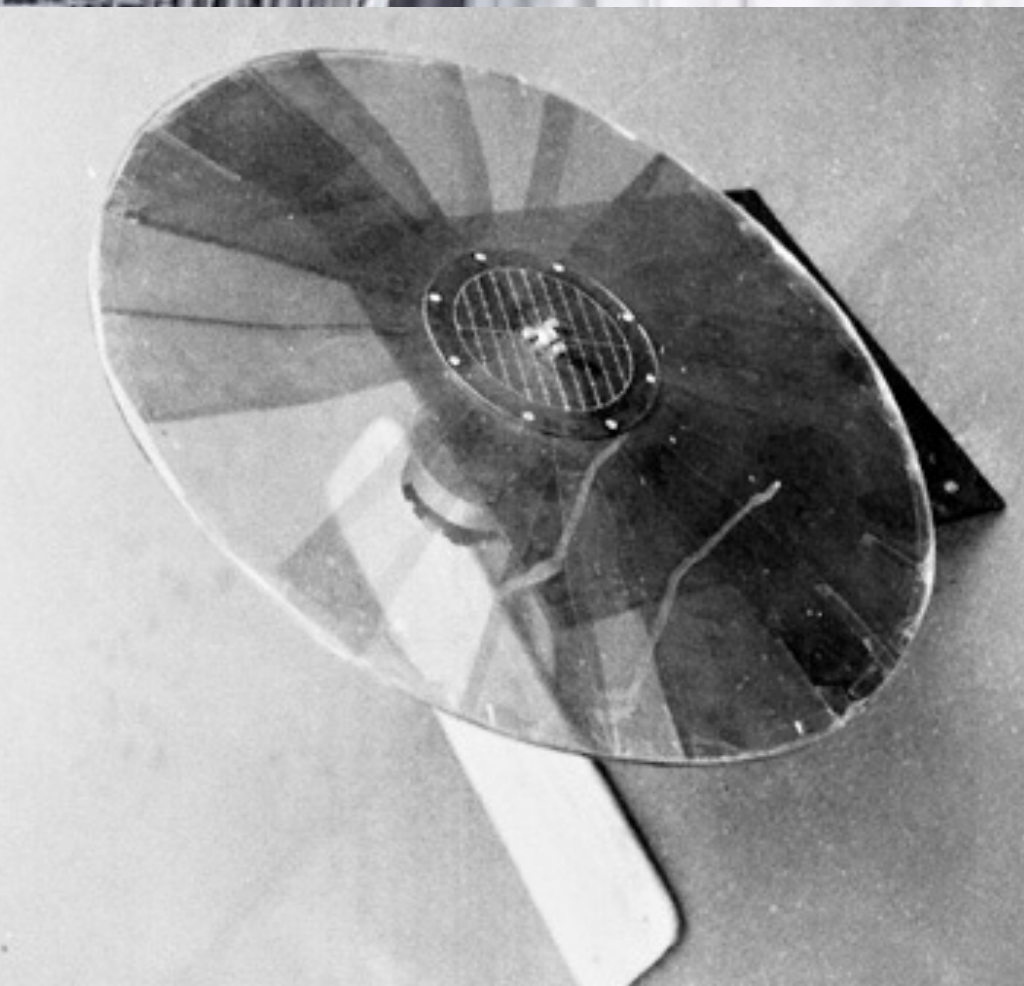
Photo: getty images (R)





Pask installed Musicolour
in venues around England.

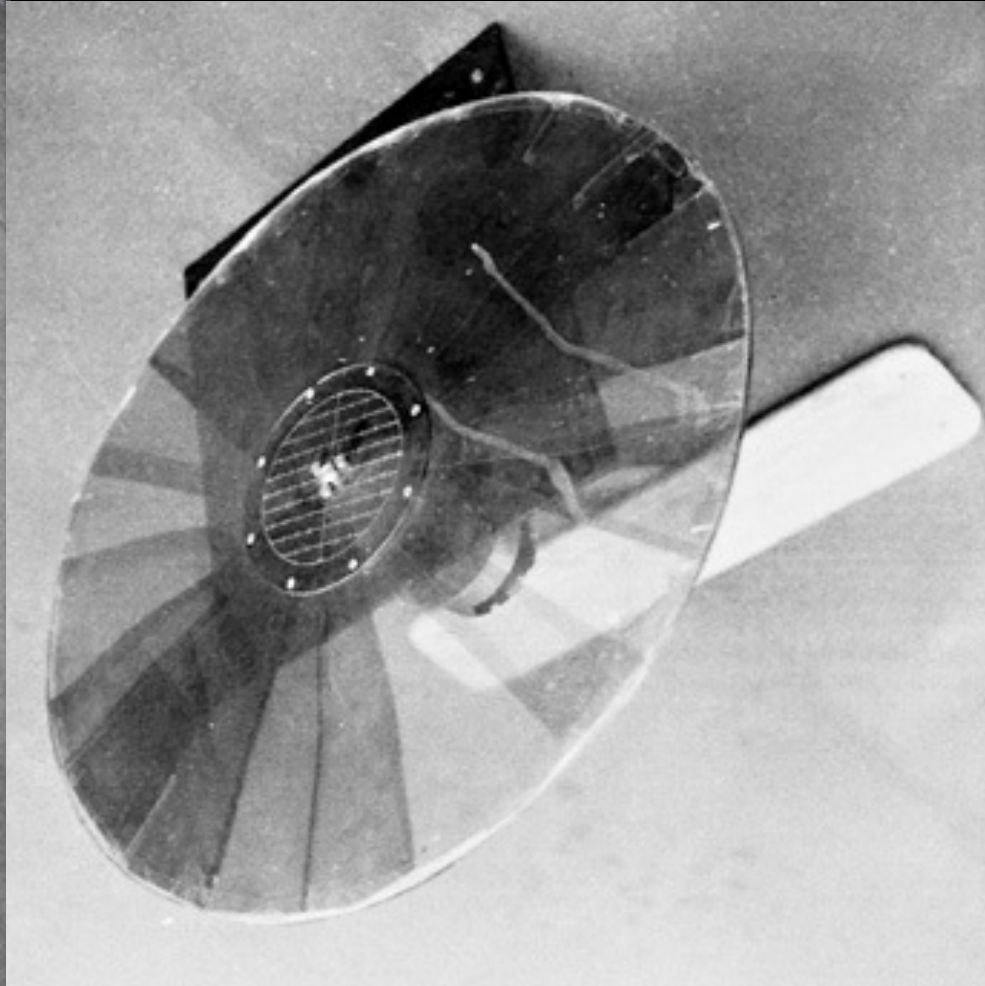
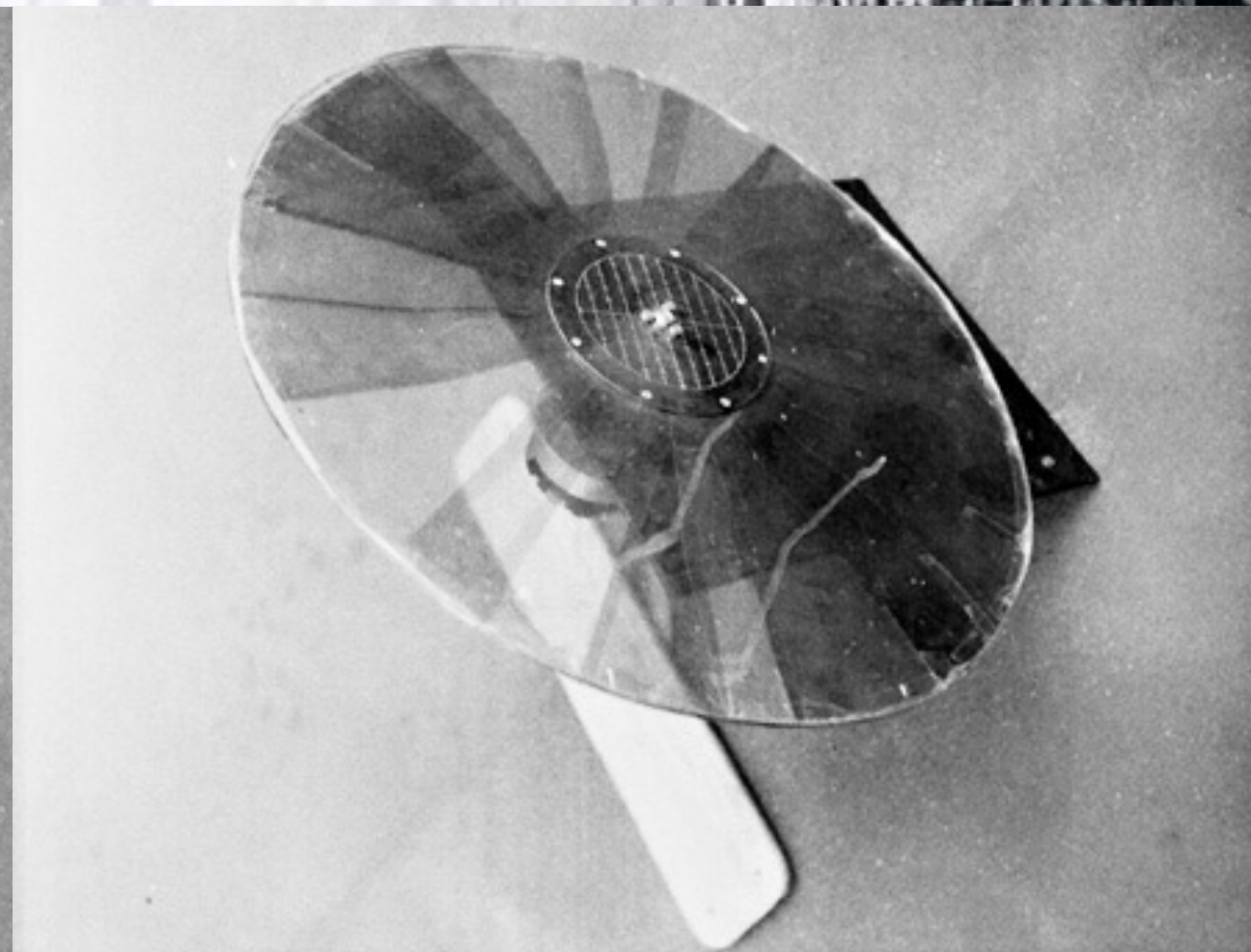
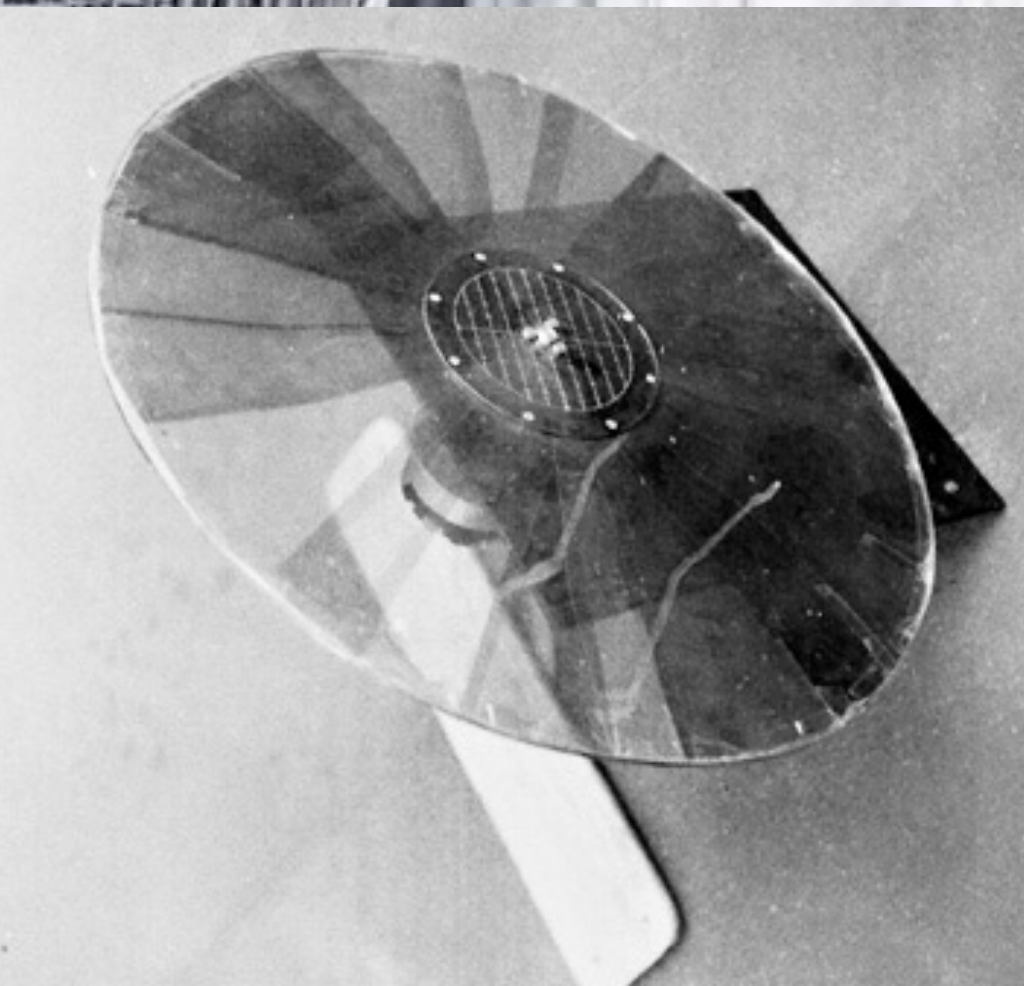






Lights were configured to shine on curtains.

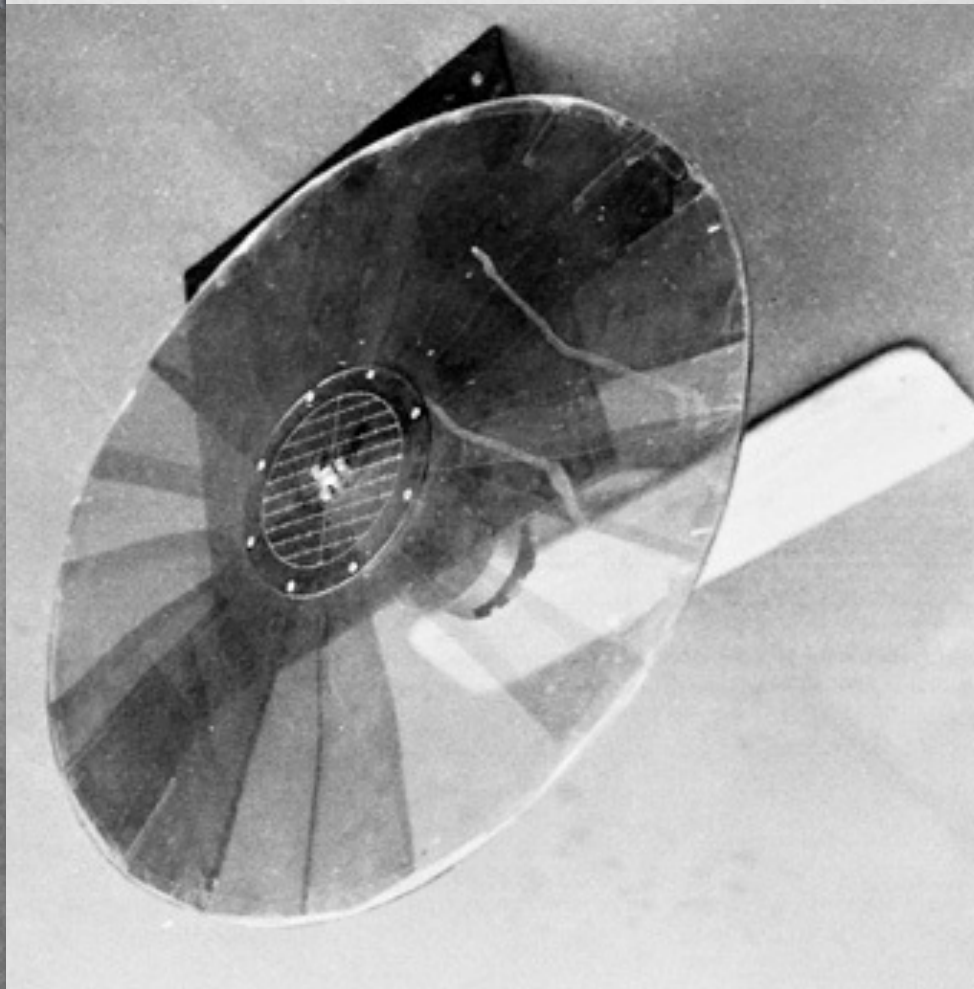
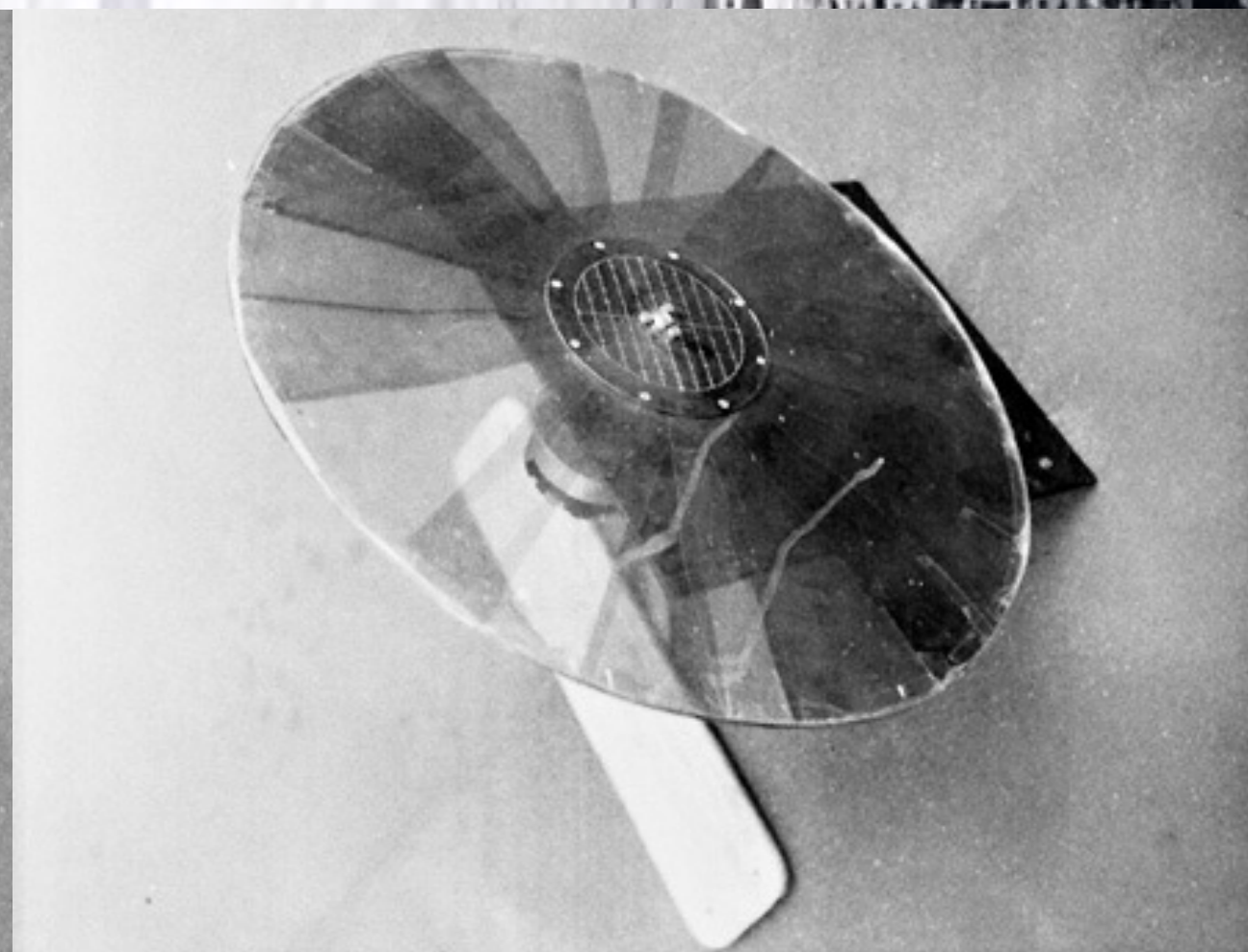
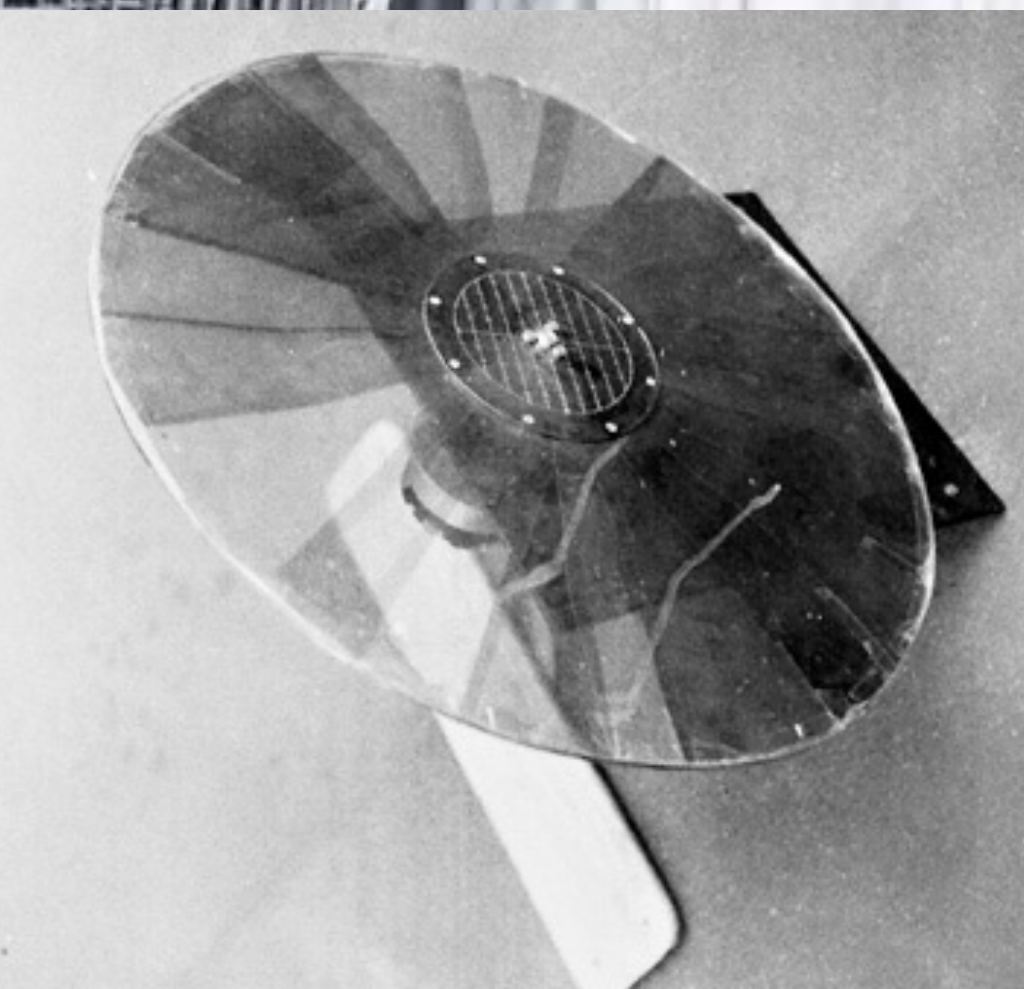
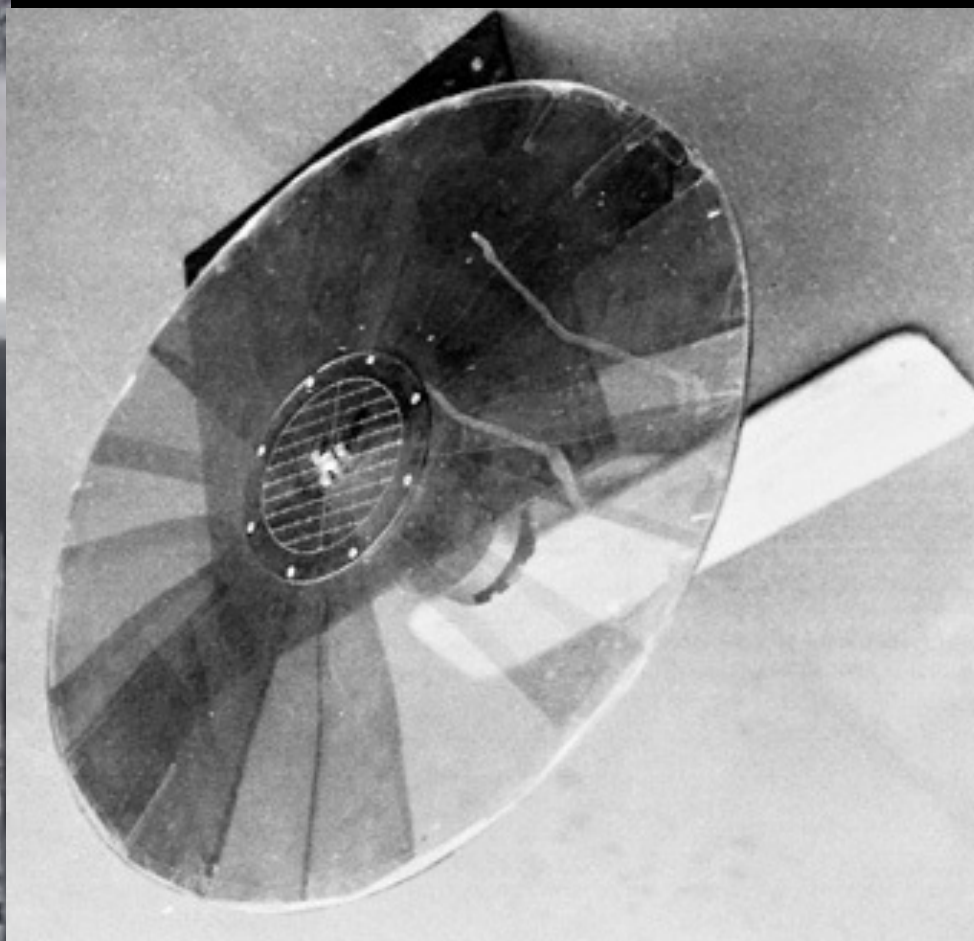
The electronics were bulky and complex and could malfunction or catch fire.

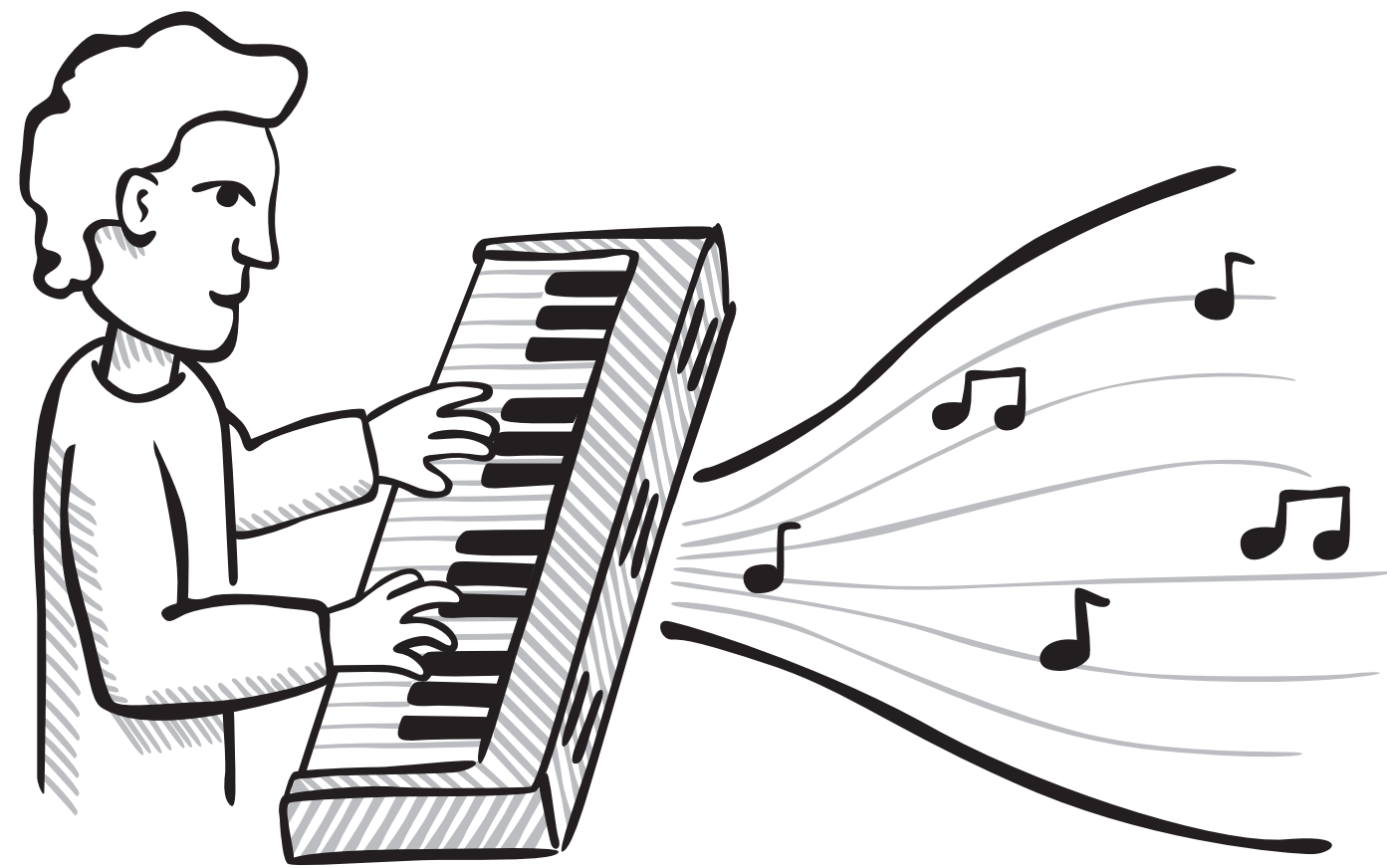




Lights were configured to shine on curtains.

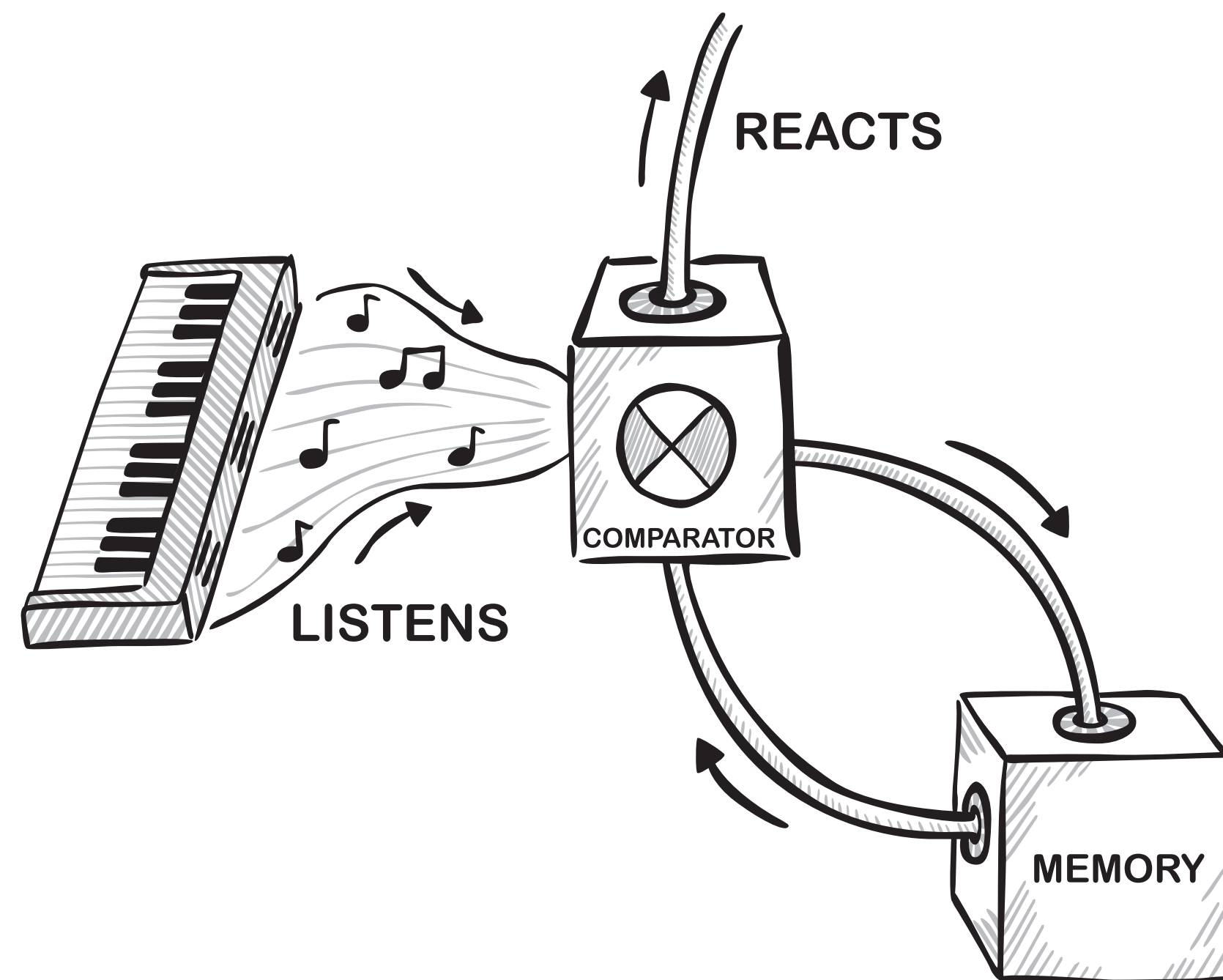
The electronics were bulky and complex and could malfunction or catch fire.

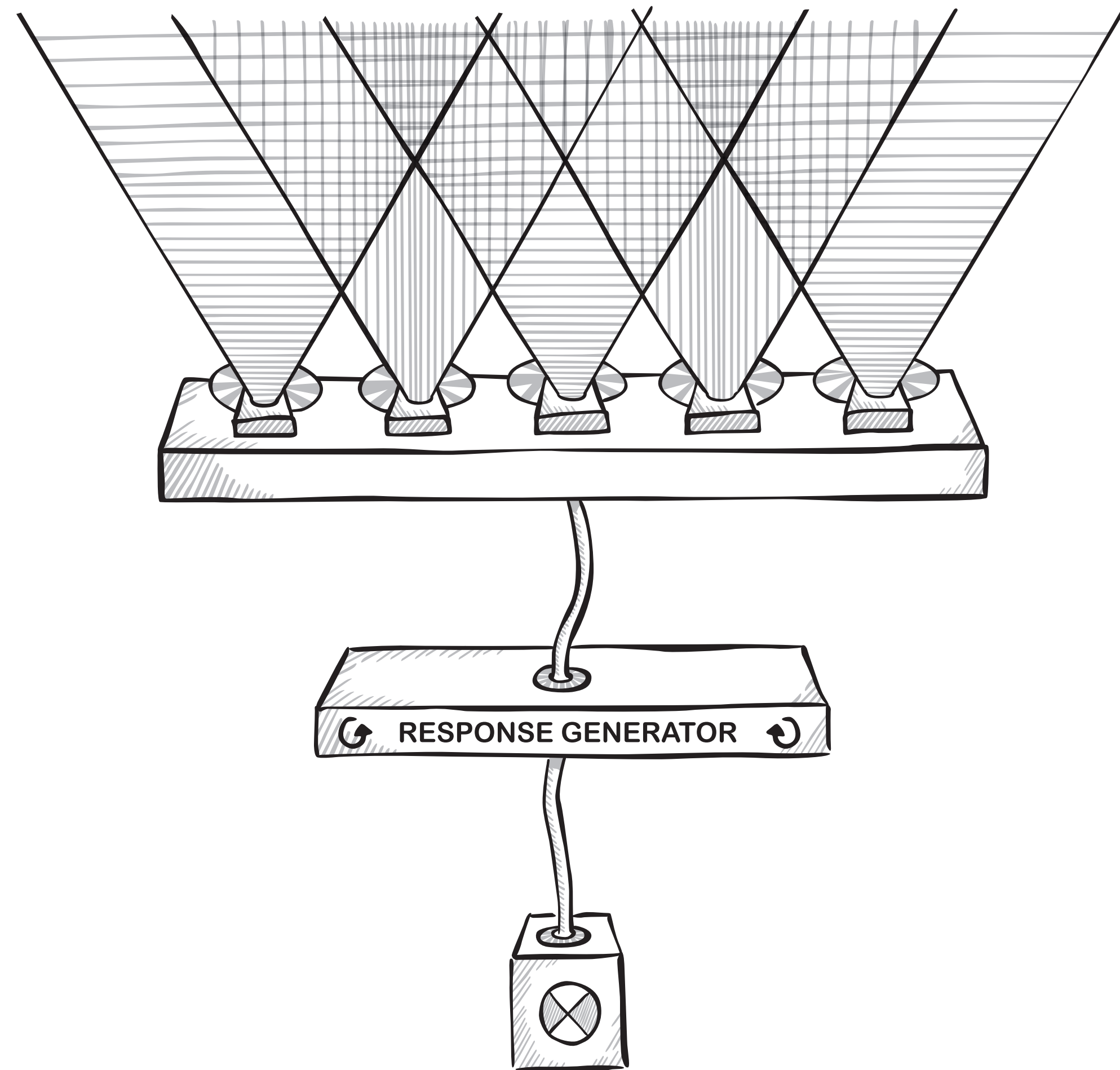




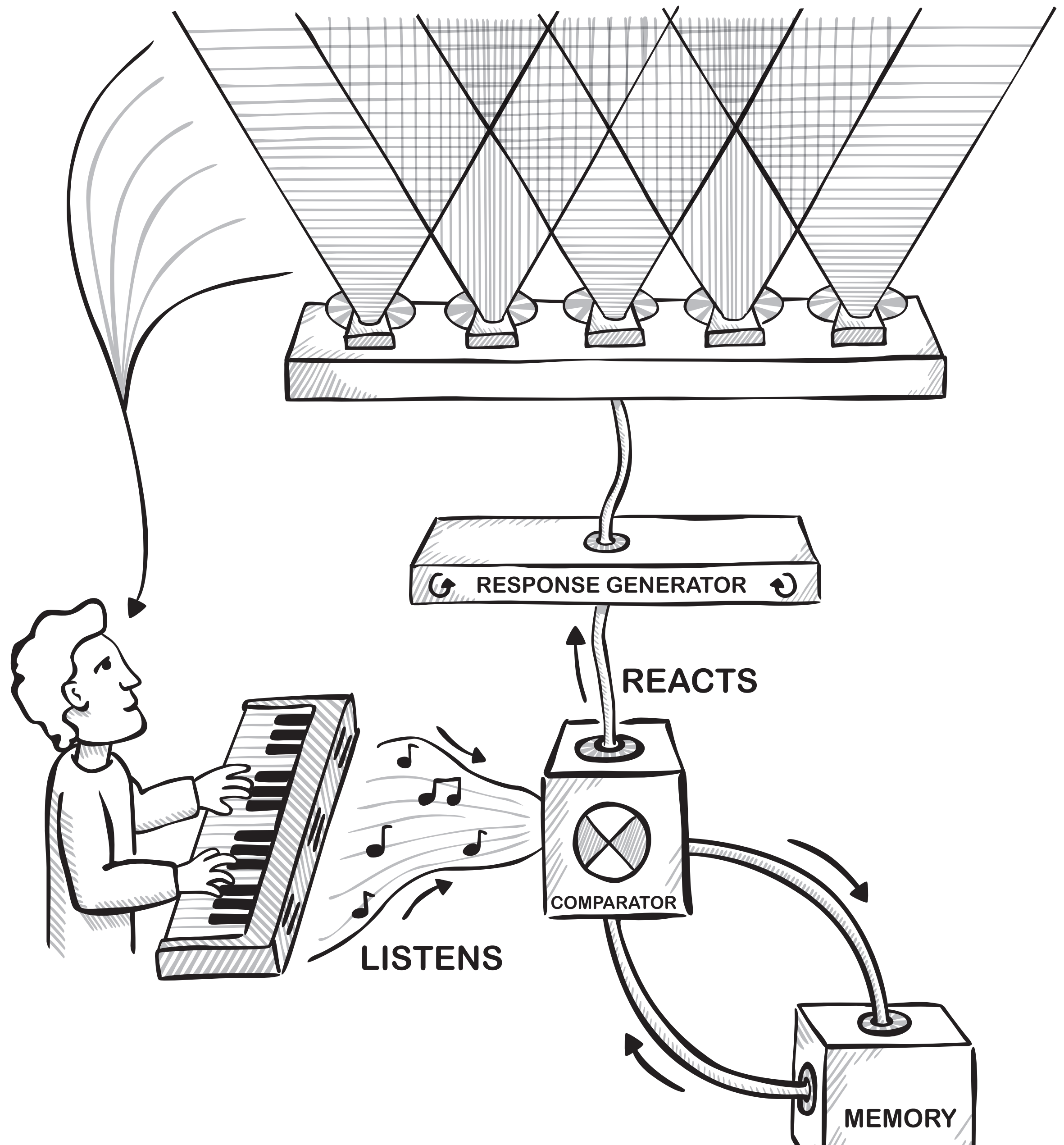
Musicolour
mid-1950s

Musicolour
mid-1950s

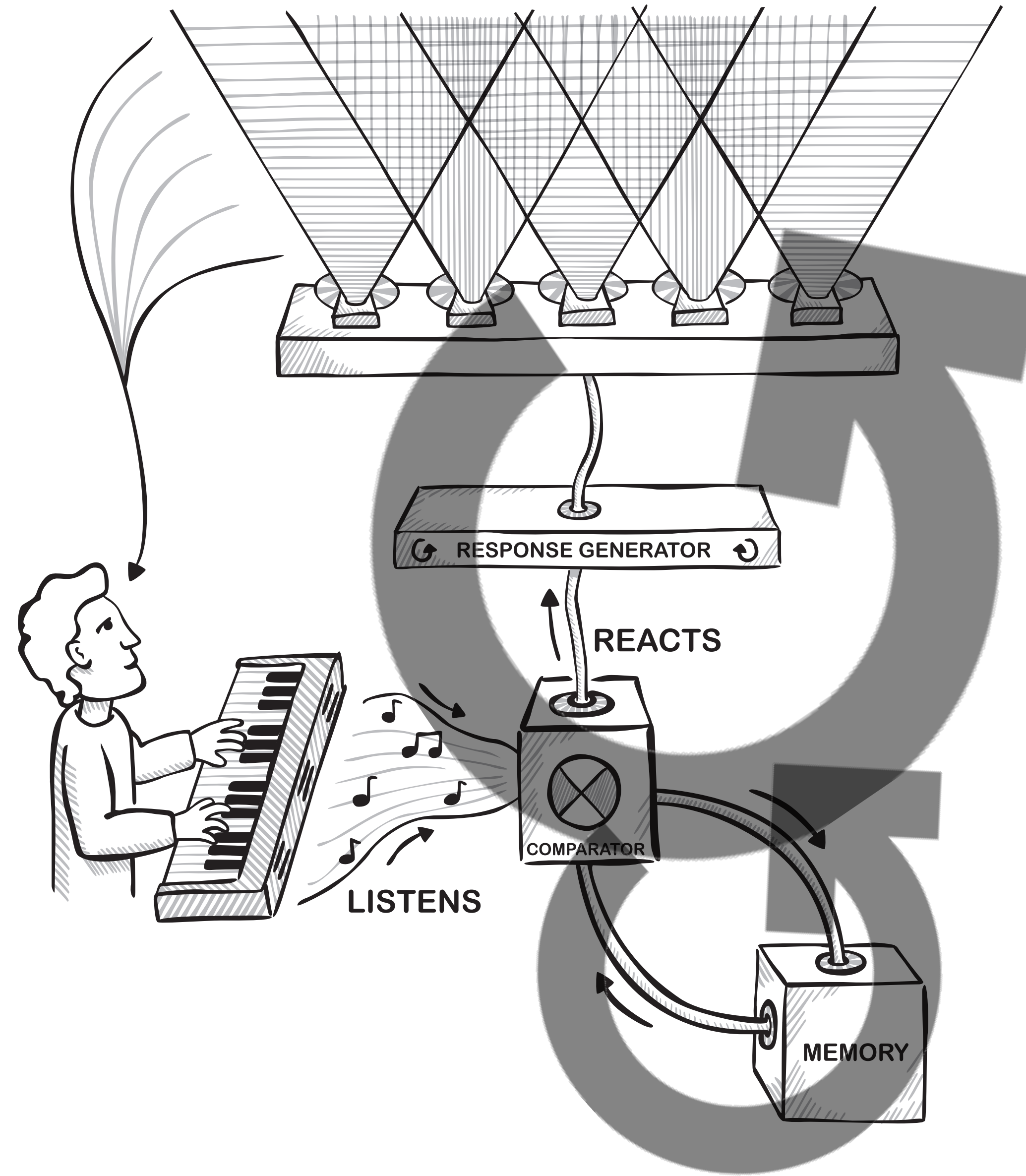




Musicolour
mid-1950s



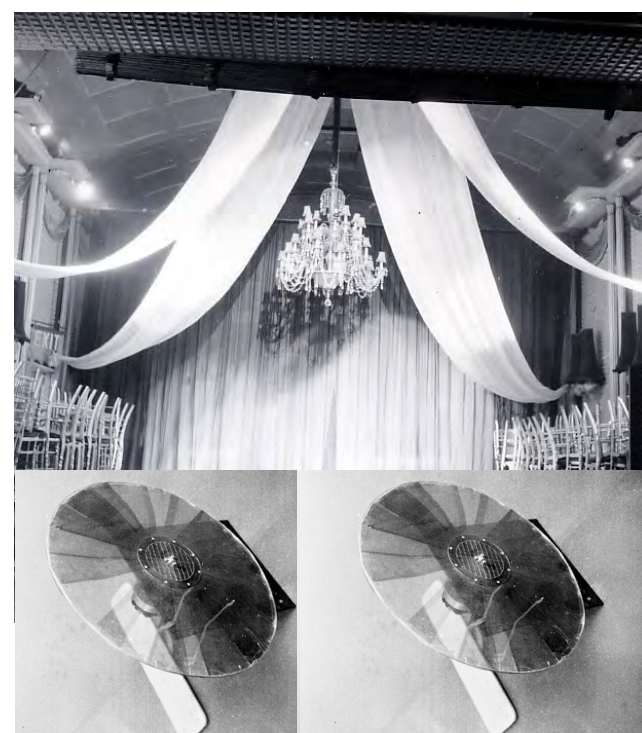
Musicolour
mid-1950s



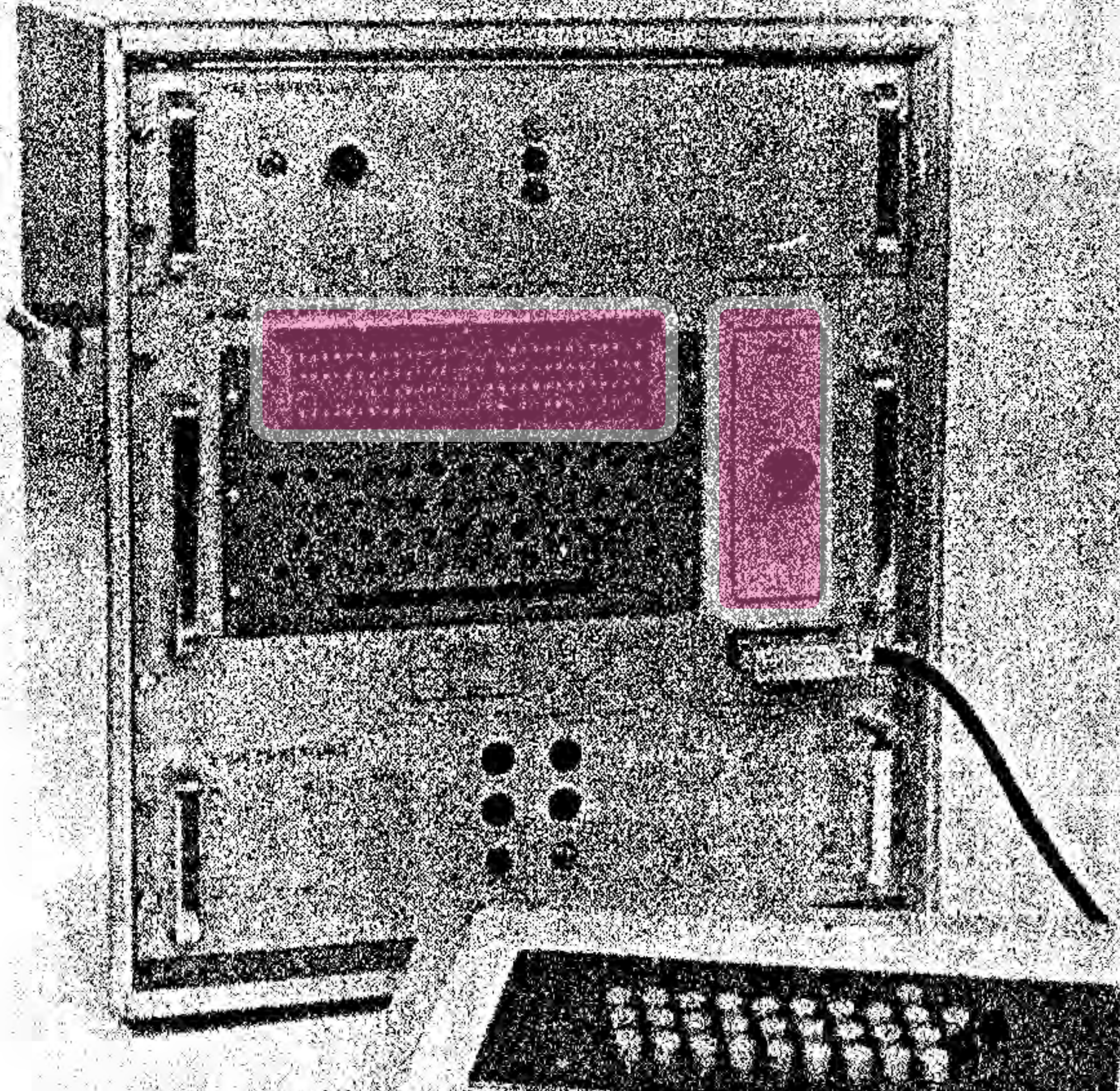
Musicolour
mid-1950s

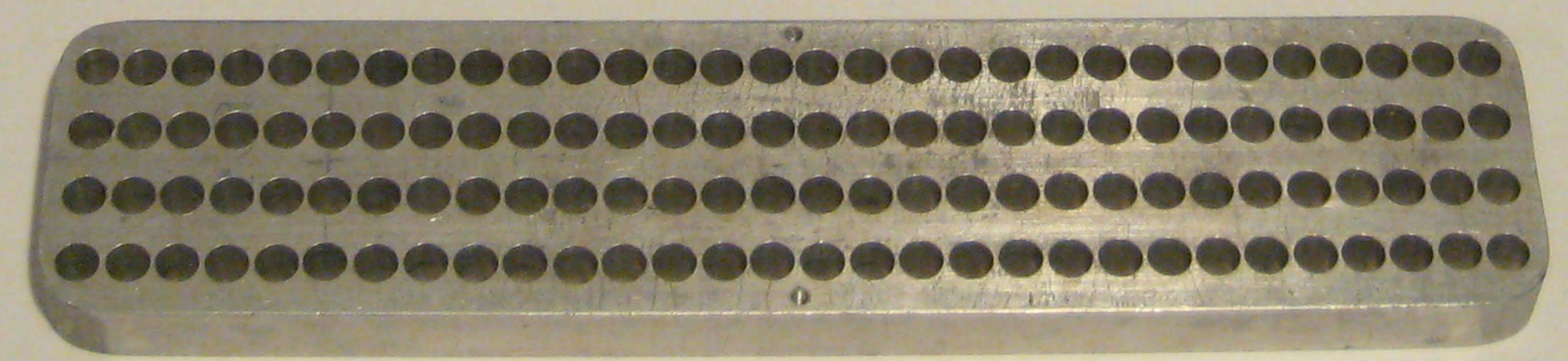
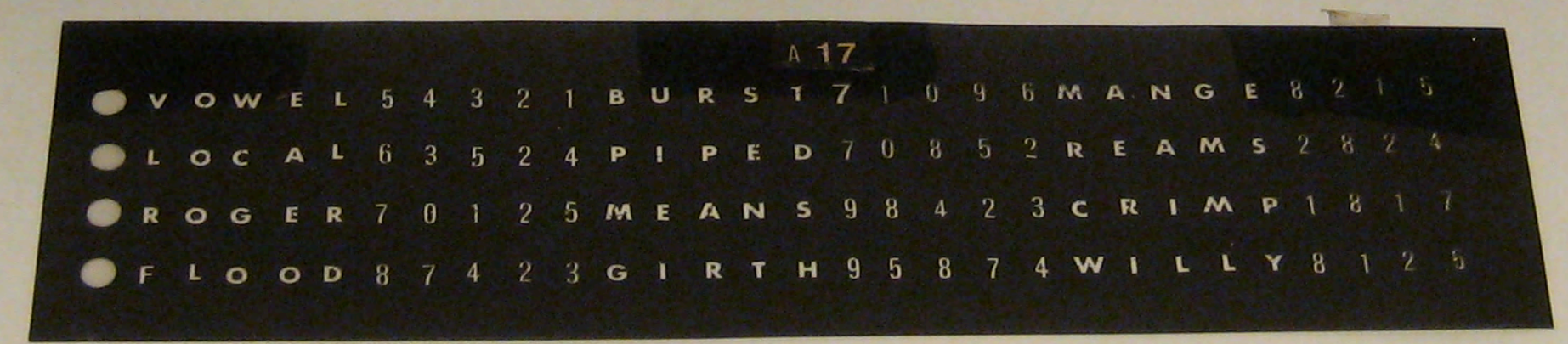
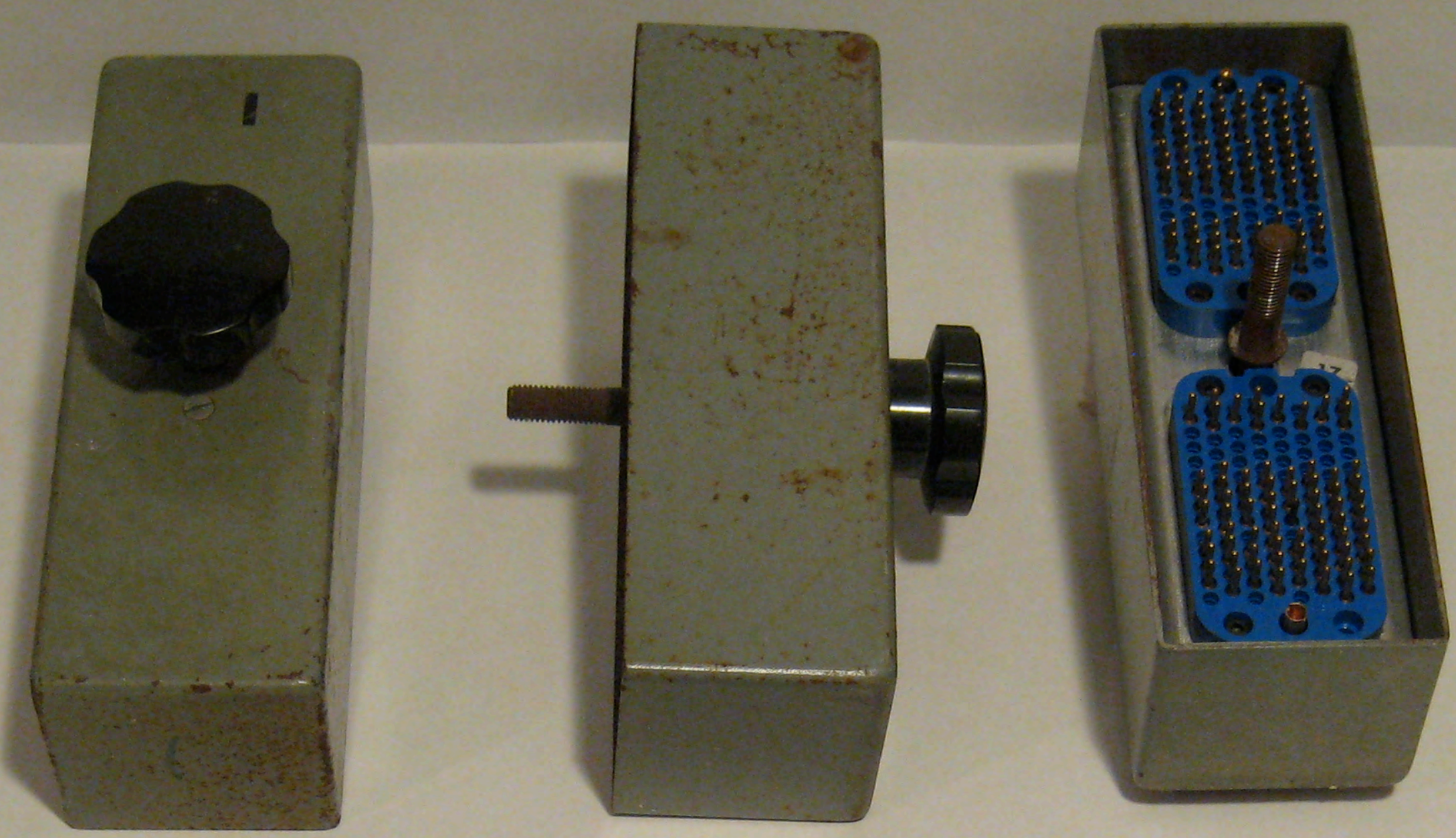
Paskian Interaction Principle #1 — Novelty Regulation

Musicolour implements Novelty Regulation because it detects repetition, gets “bored”, and changes its responsiveness in order to maintain engagement of participants in a conversation.



Gordon Pask's S.A.K.I.
Self-Adaptive Keyboard Instructor
1956



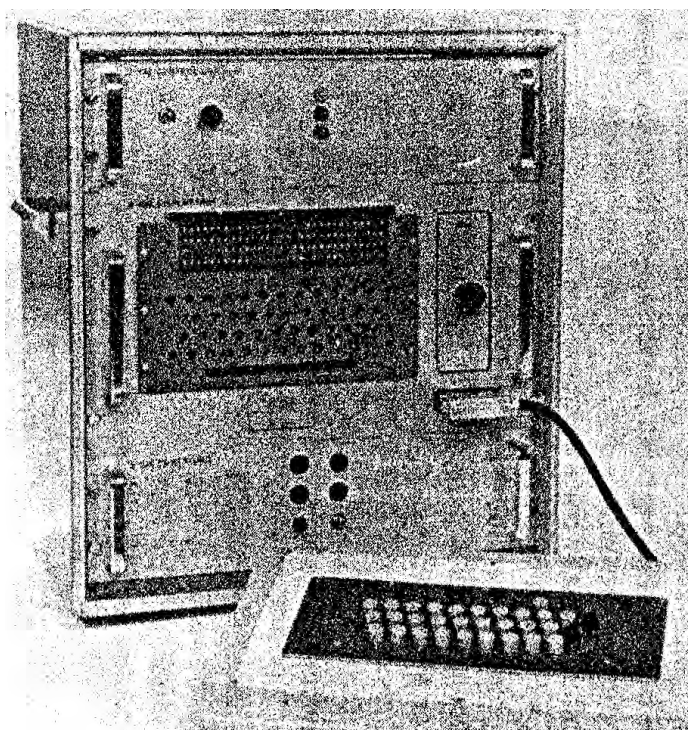


S.A.K.I.
Programming Modules
1956

#1 — Novelty Regulation

Paskian Interaction Principle #2 — Uncertainty Regulation

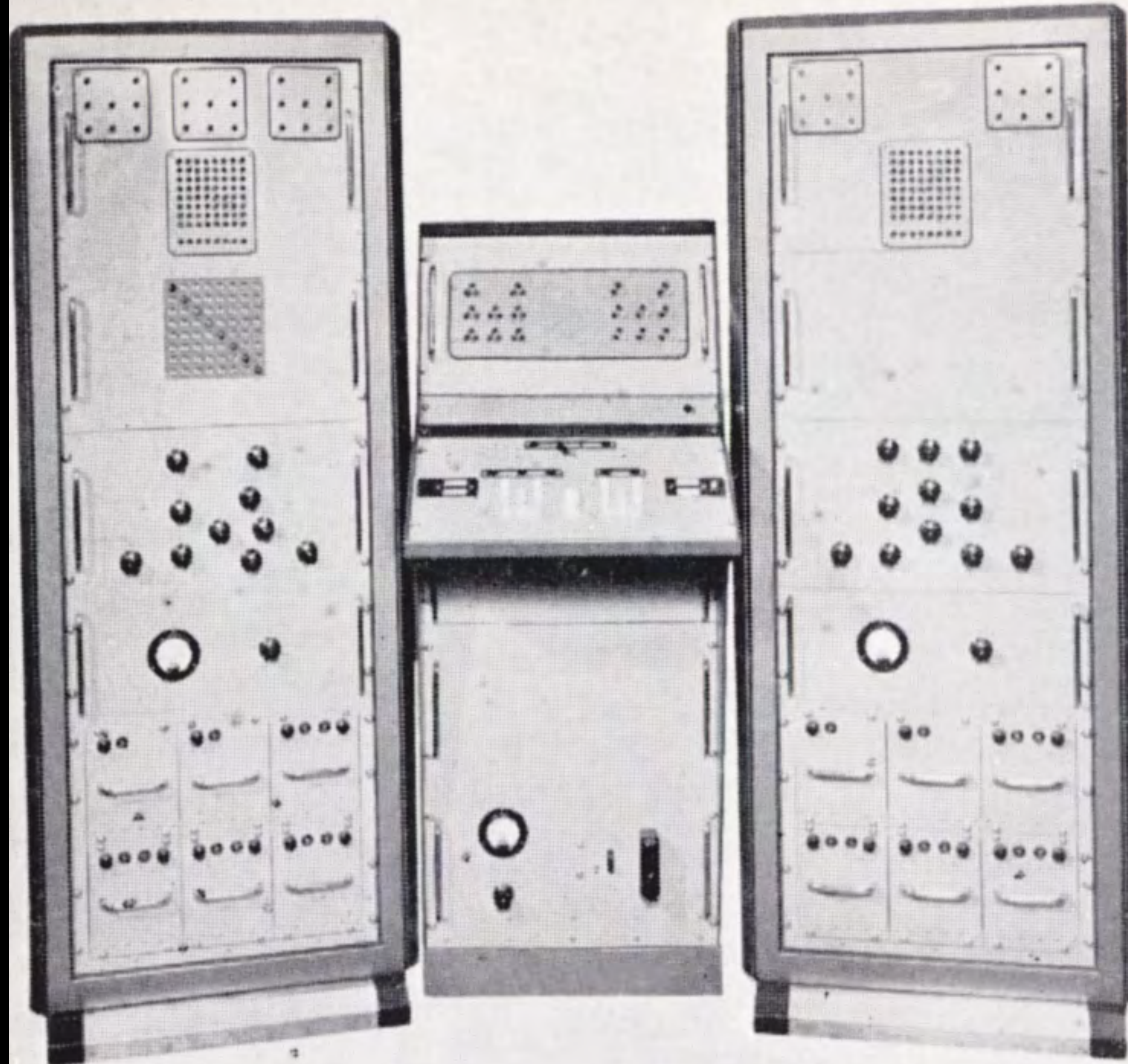
S.A.K.I. implements **Uncertainty Regulation** because it senses facility and failure, and then calculates how to modulate its responses in order to maintain consistent learning by a participant in a conversation.



TEACHER
SIMULATOR

CONTROL
CONSOLE

PUPIL
SIMULATOR



Gordon Pask's
Euclates

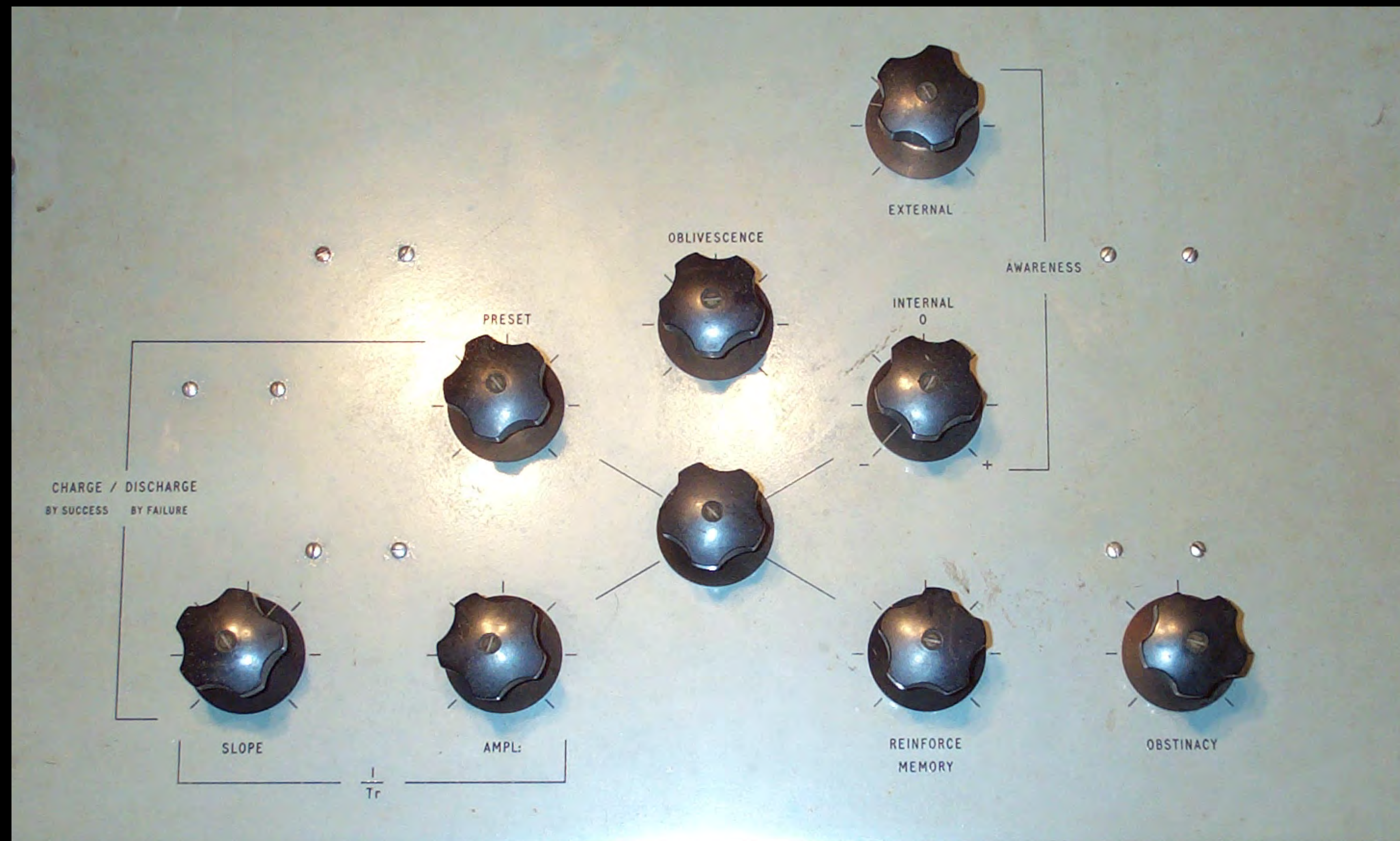
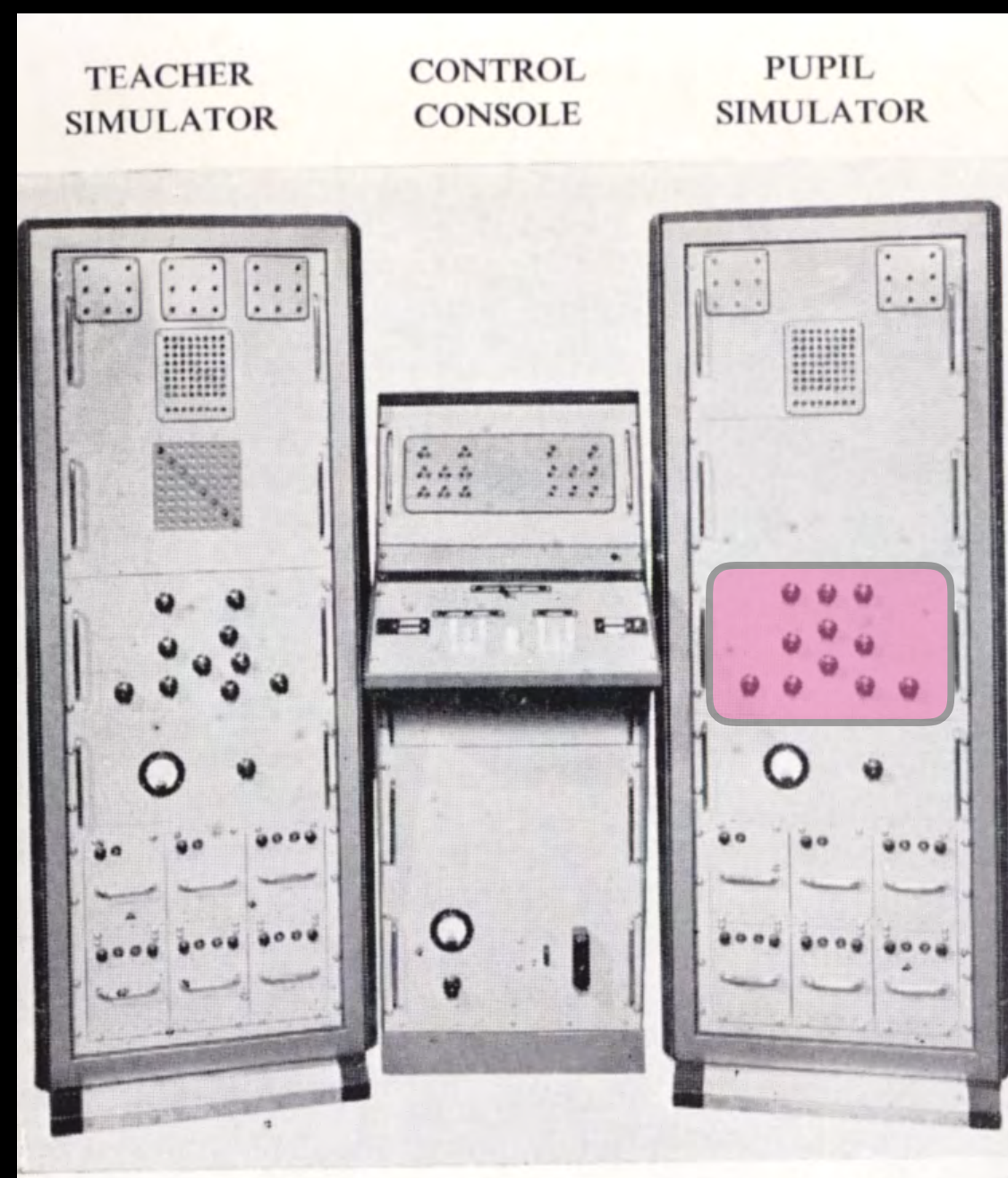
1958

Pask created many
conversational machines.

Here a teacher-machine
converses with a pupil-machine.

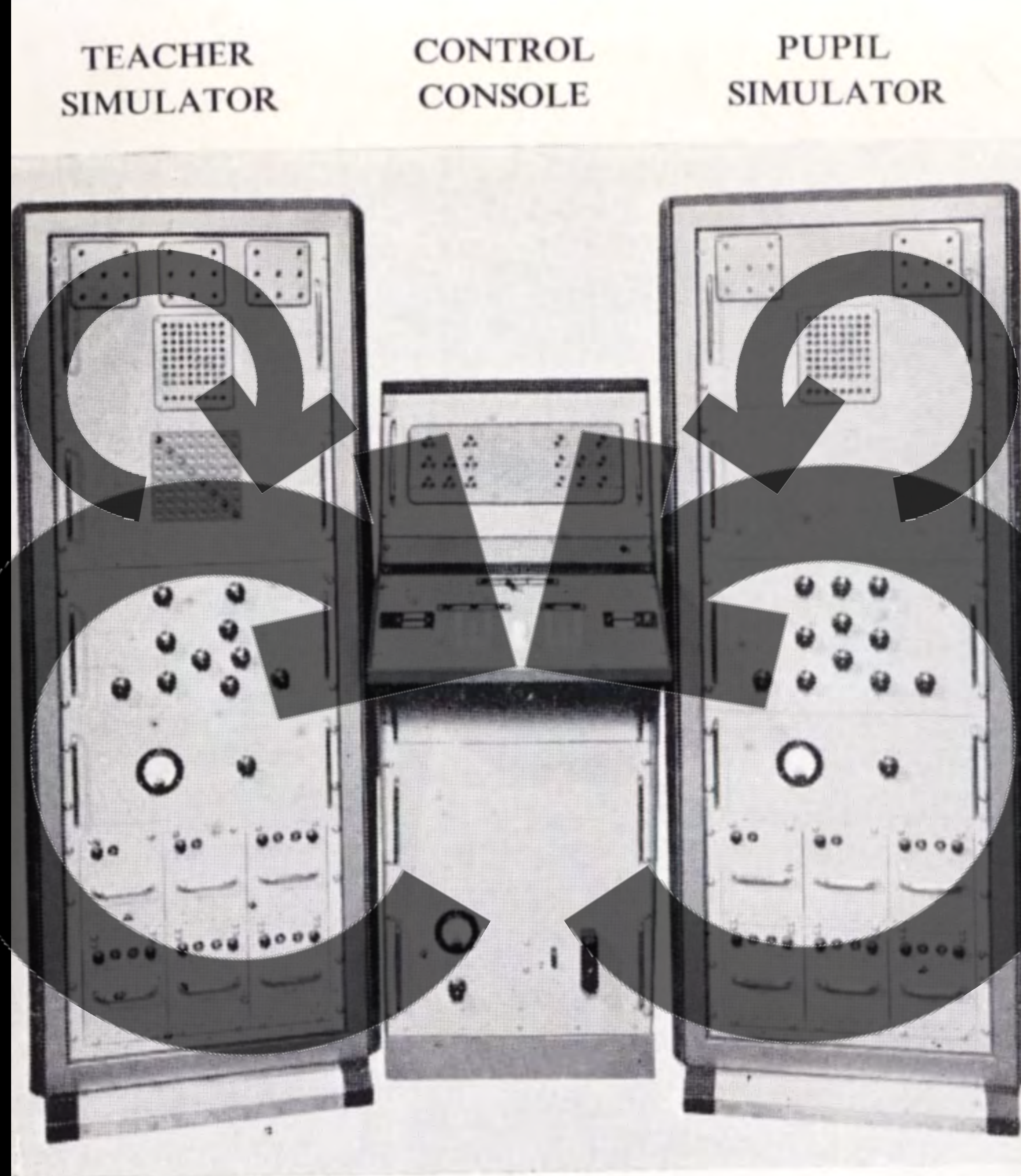
Gordon Pask's Eucrates

1958



Gordon Pask's
Euclates

1958



The conversation architecture
was the same as Musicolour.

One loop applied feedback
from actions and another
applied feedback about goals.

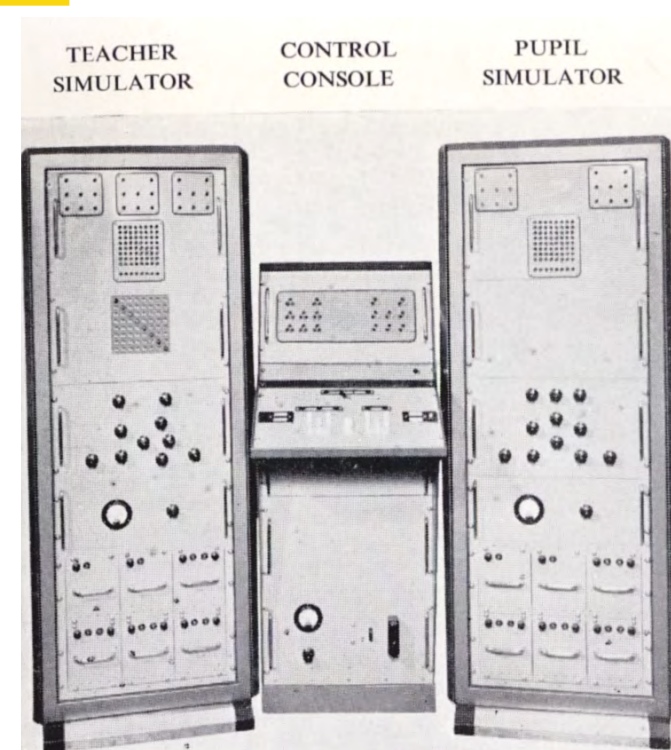
Both machines appear to have
had multiple loops.

#1 — Novelty Regulation

#2 — Uncertainty Regulation

Paskian Interaction Principle #3 — Autonomy

Eucrates demonstrates **machine autonomy** as participants process multiple levels of feedback, engage in conversation, and maintain individualized goals (here, of teaching and learning).



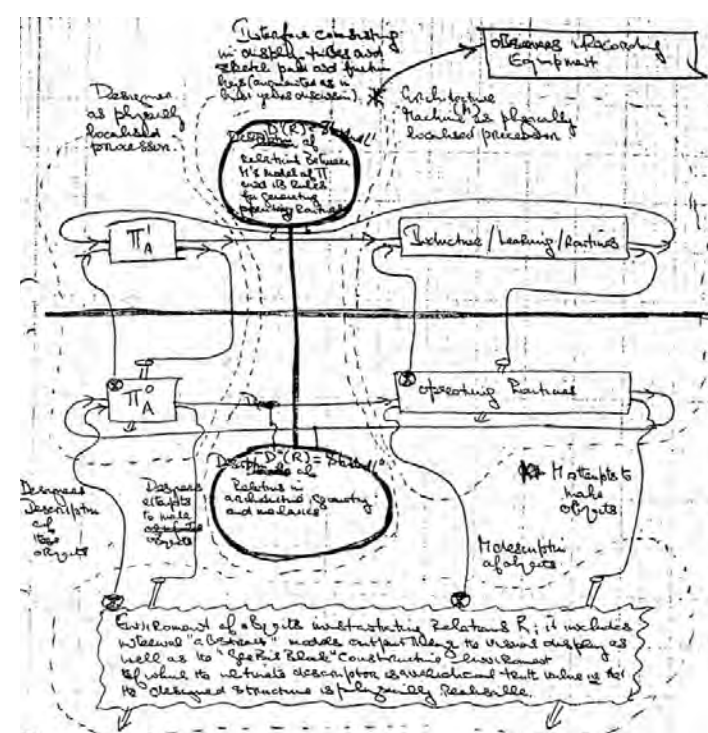
#1 — Novelty Regulation

#2 — Uncertainty Regulation

#3 — Autonomy

Paskian Interaction Principle #4 — Conversation for Design

The Architecture Machine proposes a human-computer conversation for design where the machine co-participates in evolving goals as well as methods.



Paskian Interaction Principles

- #1 – Novelty Regulation**
- #2 – Uncertainty Regulation**
- #3 – Autonomy**
- #4 – Conversation for Design**

Paskian Interaction Principles – v1.0 – March 2019

Applying C-L-E-A-T

Questions for Designing for Conversation

- What channel is being opened to begin the conversation?
Is the interruption reasonable in how and when it intrudes?
What is the bio-cost of the intrusion relative to its benefit?
Are there better ways to interrupt?
- Is the first message clear?
Does it offer something to the recipient?
- Does the exchange convey the potential benefits in continuing?
Is there learning or delight? Is curiosity or interest stimulated?
- Is meaning easily understood—
do the messages speak in the language of the participants?
Are messages sensitive to others' context, needs, interests, values?
How can messages be made more efficient or clear?

C – Context

L – Language

E – Engagement

A – Agreement

T – Transaction

See “What is Conversation?”
Dubberly & Pangaro 2009

[http://www.dubberly.com/articles/
what-is-conversation.html](http://www.dubberly.com/articles/what-is-conversation.html)

Why can't AI + Conversation Interfaces do all this?

Applying C-L-E-A-T

Questions for Designing “Conversation Interfaces”

- What does the Conversation Interface (CUI) know about the user’s context— what more can it know, automatically or by input from the user?
- How can a user convey intention *to* the software— can the CUI be open to the user’s goals, values, preferences?
- Does the CUI evolve during the engagement— in addition to understanding the user, can it build new knowledge?
- When should the CUI be confident it understands the user— and when should it double-check?
- Can the CUI’s capabilities build a relationship of trust— what does that take?

C – Context

L – Language

E – Engagement

A – Agreement

T – Transaction

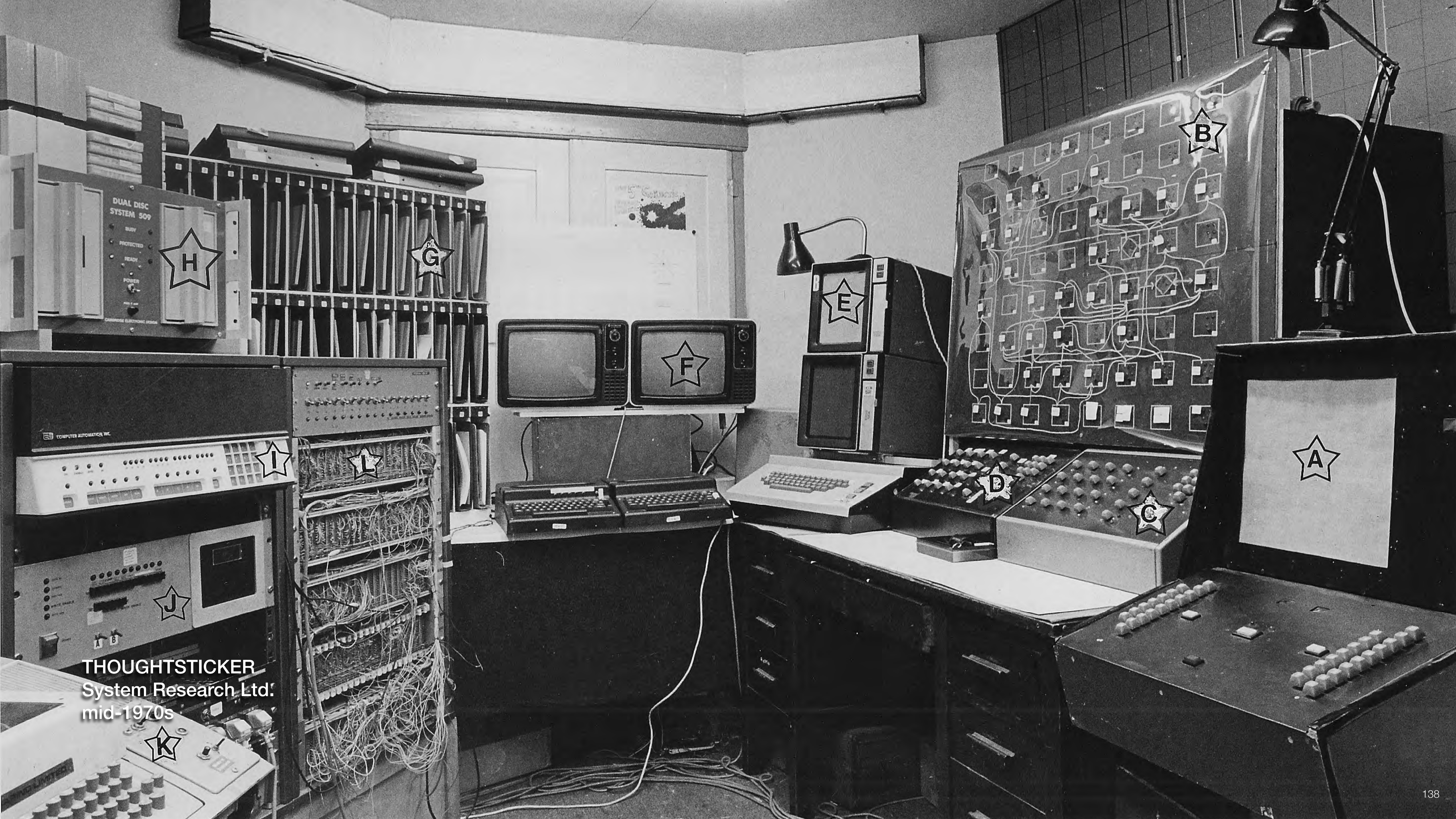
See “What is Conversation?”
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[http://www.dubberly.com/articles/
what-is-conversation.html](http://www.dubberly.com/articles/what-is-conversation.html)

When will Conversation Interfaces do all this?

Designing for Conversation

“Who said conversation had to be spoken?”



H

G

F

E

B

I

L

D

C

A

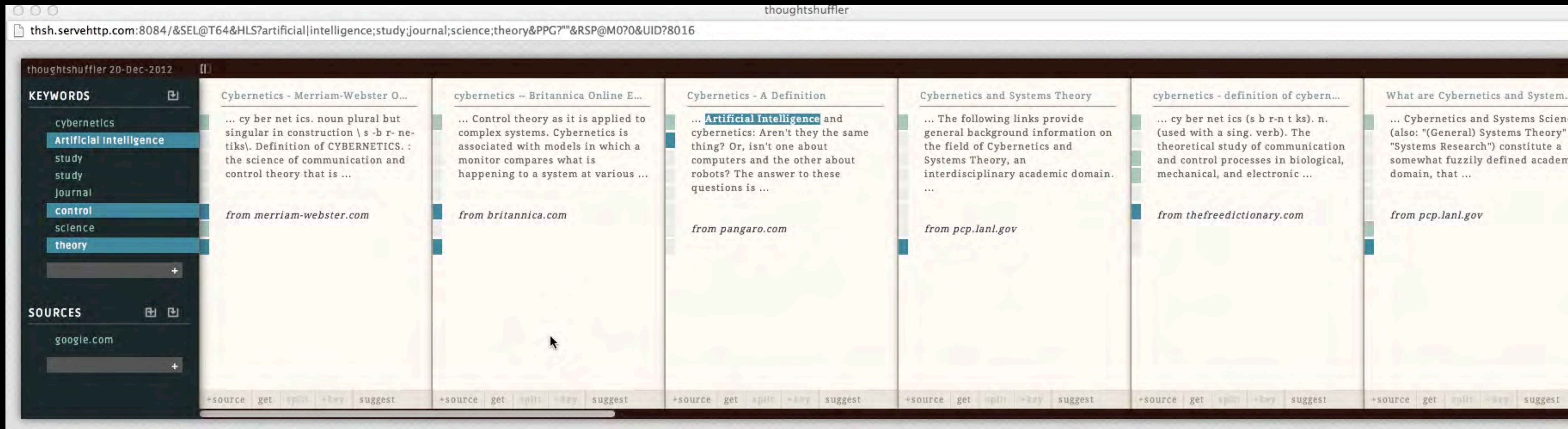
J

THOUGHTSTICKER
System Research Ltd.
mid-1970s

K

<p style="text-align: center;">Tutorial</p> <p>This is a tutorial to help you become familiar with Zmacs. The tutorial software is called THOUGHTSTICKER and has been developed by PANGARO Incorporated.</p>	<p>Associated Topics:</p> <p>HELP PANGARO THOUGHTSTICKER Tutorial Zmacs</p>
<p style="text-align: center;">User Serialist in Explore Mode</p> <p style="text-align: right;">Next More (1/2) Which?</p> <p style="text-align: right;">Back Jump List Other</p>	

Thoughtsticker
Ph.D. Dissertation
Paul Pangaro
1987



ThoughtShuffler
UI design and coding by Jeremy Scott Diamond
UX & heuristics by Paul Pangaro
2012



+chrysler building +mural +Edward Trumbull

Terms	Count
chrysler building	25
mural	16
Edward Trumbull	
ADD TERM...	

SUGGEST MORE... or OTHERS

Sources	Count
pinterest.com	4
google.com	70
ADD SOURCE...	
TRY gonyc.about.com	6
allposters.com	3
designyourwall.com	1
popartuk.com	3
tripadvisor.com	5
wikipedia.org	3

SUGGEST MORE...

Chrysler Building, 1 Sheet Mini-Mural By Henri Silberman Wall



New York Photography Mini Wall **Mural** (1 Sheet): The **Chrysler building** is one of the most infamous landmarks in New York and now you can turn it into a stunning feature for your wall. This beautiful black and white photograph was taken by popartuk.com

deco and nouveau on Pinterest | Chrysler Building, Murals and



Gorgeous, if tiny, detail from **Edward Trumbull's** spectacular **mural** "Transport and Human Endeavor." This brilliant painting is displayed on the ceiling of the lobby of New York's **Chrysler building**, the second-best skyscraper in the world. More [Chrysler Building, Murals and Oyster Bar](#)

Talk:The Chrysler Building - Wikipedia, the free encyclopedia

Groundbreaking took place on September 19, 1928. When Van Alen began construction of the **Chrysler Building**, he planned to have the building stand 925 feet tall. At the same time that the **Chrysler Building** was being built, former partner H. Craig Severance was working on building the Bank of Manhattan.

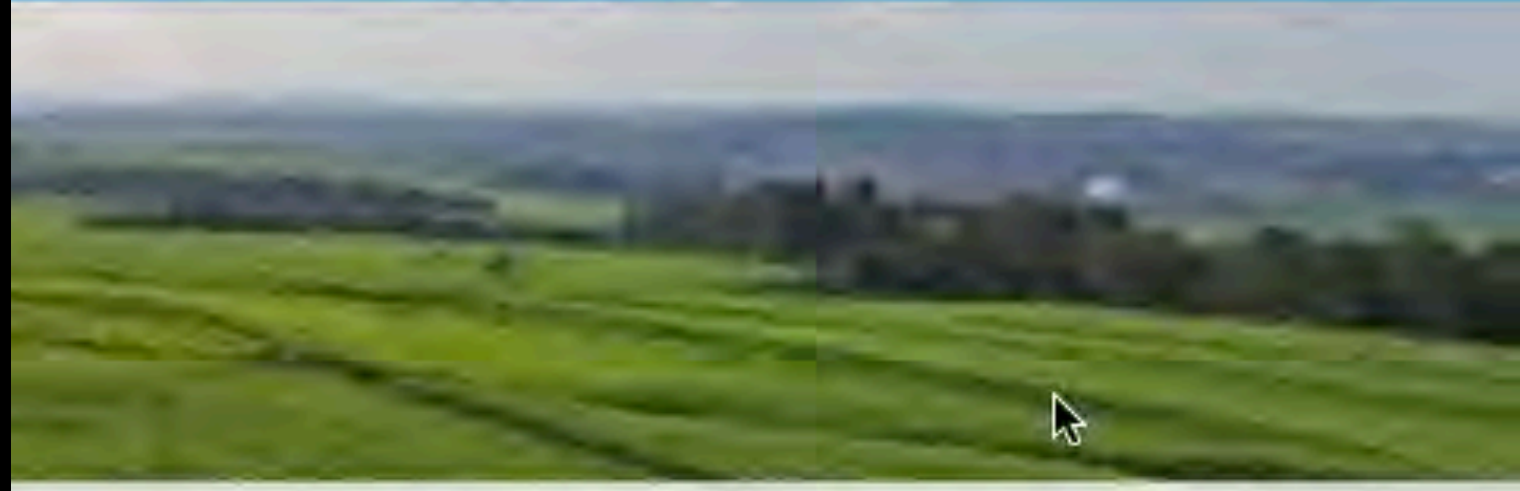
wikipedia.org

Chrysler Building lobby ceiling mural - Picture of Chrysler



Having seen the **Chrysler Building** from various points around Manhattan, including the top of the Empire State Building, I had to take a look inside. It is my favourite building in NYC and I was not disappointed. The lobby has beautiful art deco features which tripadvisor.com

**national geographic, fracking,
Hydraulic fracturing, water, oil, sand**



**March 2013 National Geographic
Cover Story: "America Strikes Oil..."**

nysfrackingunplugged.wordpress.com

In his article entitled "America Strikes **Oil**: The Promise and Risk of **Fracking**," Edwin Dobb, a Berkeley Graduate School of Journalism lecturer and **National Geographic** contributing writer, focuses **fracking** activities in North Dakota.

thoughtshuffler v3 iOS
UX by Miriam Simun
UI by See-ming Lee
concept & heuristics by Paul Pangaro
2013



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THE NEW YORKER



🔗 KING OF CLICKBAIT

- The ability to make things go viral felt like the closest that we could get to having a human superpower.”

He offered practical tips: “Facebook should be eighty per cent of your effort, if you’re focussed on social media”; “Try to change every comma to a period”; “Use lists whenever possible. Lists just hijack the brain’s neural circuitry.” Behind me, two women in their fifties took notes on legal pads.



RELATED

Facebook: The World’s Biggest Direct-Market...
In a conference call after the release of this week’s earnings, she gave a couple of examples of how it is gradually displacing

Can Benefit Corporations Work?
Yet the desire to balance profit and purpose is arguably a return to the model that many American companies once followed. Henry

Streamfully
UI by Barbara de Wilde & John Katagawa
UI coding and AWS coding by John Katagawa
UX & heuristics by Paul Pangaro
2014

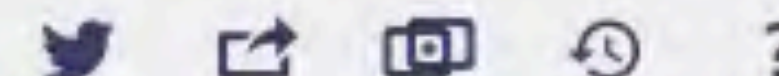
qz.com

Starbucks is finally going to show US coffee drinkers what a “flat white” is. Prepare for controversy – Quartz

1/1/2015, 7:00:26 AM

Starbucks is introducing the “flat white” to its coffee menus across the US on Jan. 6, reports Eater. It’s a little surprising it took this long; the drink has been available for years in the UK and Australia, which both consume far less coffee per capita than the US. (It’s also a popular drink with New Zealanders, whose coffee consumption is on par with that of Americans.)

But good coffee is more about quality than quantity, is it not? Though the US is the birthplace of Starbucks, the most

thoughtstacks.com/m/#t

Designing for Conversation

Discussion —

Who would like to begin this conversation?

**Designers, can we enable conversation for others —
can we *design for conversation*? Enable interactions that...**

- are cooperative, humane, and ethical***
- create conditions for great conversations***
- increase the number of choices open to all***
- help us to be what we want to be... or become.***

Designing for Conversation

“I shall act always so as to increase the total number of choices.”

— Ethical Imperative, Heinz von Foerster

Designing **for** Conversation

A. Declare our Intentions

A. Declare our Intentions

Intention #1 — Build cooperative interfaces

Conversation is a **cooperative interface** when sequences of coherent interactions enable participants to evolve their points-of-view such that understanding and agreement may arise.

Intentions of Interactions for Conversation v2.0 — November 2018

A. Declare our Intentions

Intention #2 — Build ethical interfaces

Conversation is an **ethical interface** when there is reliable transparency of action & intent — what + why — such that trust may arise over time.

Intentions of Interactions for Conversation v2.0 — November 2018

A. Declare our Intentions

Intention #3 — Build humane interfaces

Conversation is an **humane interface** when any participant may influence its direction such that cooperation and collaboration may arise.

Intentions of Interactions for Conversation v2.0 — November 2018

Designing for Conversation

A. Declare our Intentions

B. Riff on Pask

B. Riff on Pask

Proposal 1 — Incorporate Paskian Interaction Principles

- #1 — Novelty Regulation**
- #2 — Uncertainty Regulation**
- #3 — Autonomy**
- #4 — Conversation for Design**

B. Riff on Pask

Proposal 2 — Build a Metric of Conversationality

Calculate the relative quality of a conversation — its novelty, momentum, and milestone agreements — to draw human attention to generative interactions.

Call this the “Turning Test of Conversation”

B. Riff on Pask

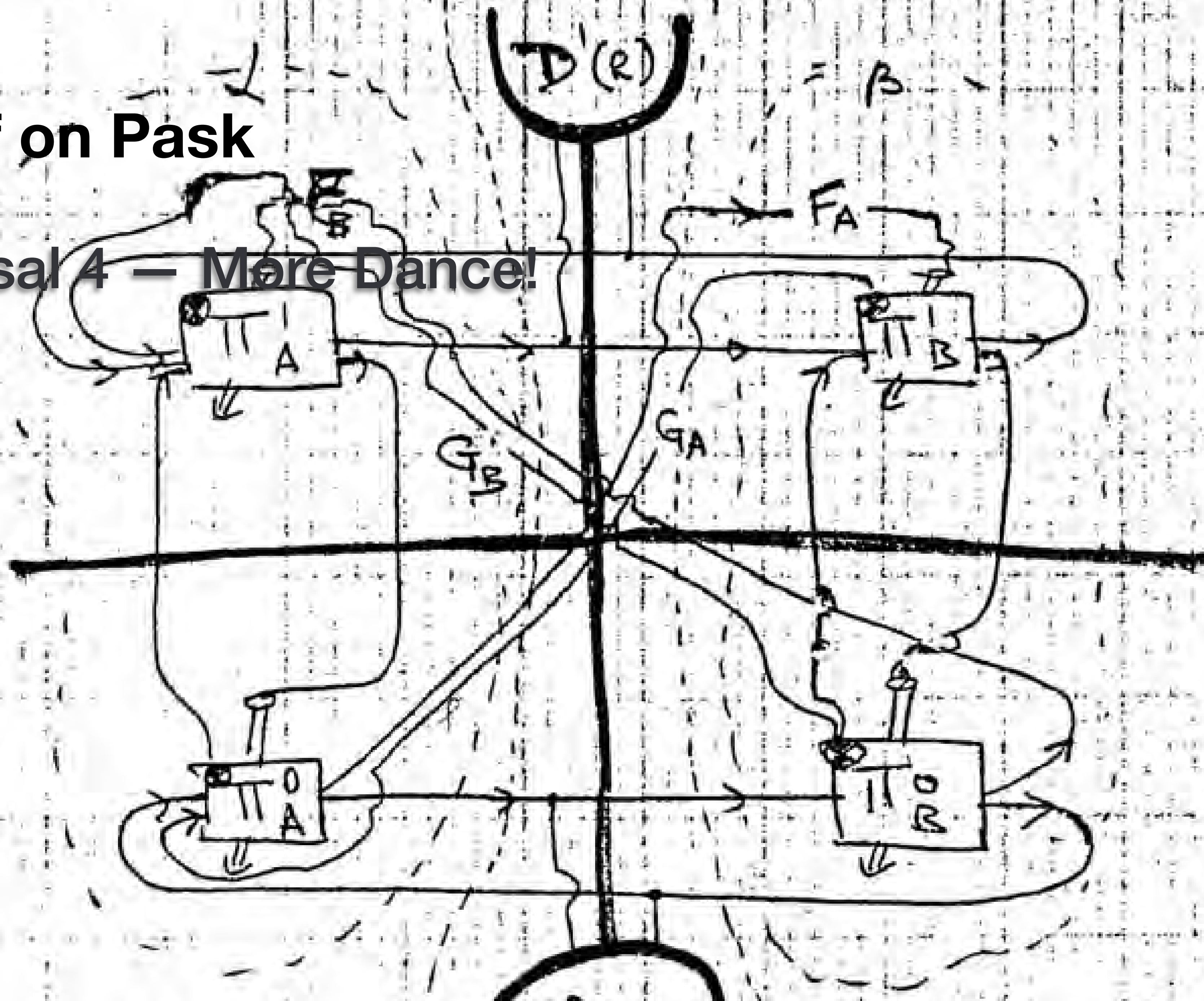
Proposal 3 — Build a Question Engine

Compute relevant and novel questions that invite a generative conversation for design such that new and valid choices are explored.

Substitute this for every “Search Engine”

B. Riff on Pask

Proposal 4 — More Dance!



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Designing for Conversation

“If you desire to see, learn how to act.”

— Aesthetic Imperative, Heinz von Foerster

Designing for Conversation

Second-order Design = Design for Conversation

The goal of second-order design is to facilitate the emergence of conditions in which others can design — to create conditions in which conversations can emerge — and thus to increase the number of choices open to all.

— Dubberly & Pangaro, *Cybernetics and Design: Conversations for Action*, 2019

We believe cybernetics offers a foundation for 21st-century design practice, with this rationale:

If design, then systems:

- The prominence of digital technology in daily life cannot be denied (or reversed).
Digital technology comprises systems of systems (Internet of Things).
- Design has expanded from **giving-form** to **creating systems** that support interactions.
Human interactions span thinking and acting, whether mundane or metaphysical.

We must model and tame this complex mesh of mechanisms.

Therefore: systems literacy is a necessary foundation for design.

If design, then systems.

If systems, then cybernetics:

- Digital interactions comprise reliable connections, communication, and feedback.
Human interactions comprise purpose, feedback, and learning.
- The science of communication and feedback, interaction and purpose, is cybernetics.

We must model communication and intention in a common frame.

Therefore: cybernetics is a necessary foundation for design.

If design, then systems.

If systems, then cybernetics.

If cybernetics, then second-order cybernetics:

- Framing “wicked challenges” requires articulating human values and viewpoints. Values and viewpoints are subjective.
- Designers must offer a persuasive rationale for our subjective viewpoints.
- Modeling subjectivity is the province of second-order cybernetics.

We must embrace values and subjectivity at the heart of designing.

Therefore: second-order cybernetics is a necessary foundation for design.

If design, then systems.

If systems, then cybernetics.

If cybernetics, then second-order cybernetics.

If second-order cybernetics, then conversation:

- Taming “wicked challenges” must be grounded in argumentation.
- Argumentation requires conversation so that participants may understand and agree.
- Agreement is necessary for collaboration and effective action.

We must embrace argumentation and collaboration to the heart of 21st-century design.

Therefore: conversation is a necessary foundation for design.

If design, then systems.

If systems, then cybernetics.

If cybernetics, then second-order cybernetics.

If second-order cybernetics, then conversation.

— Dubberly & Pangaro, *Cybernetics and Design: Conversations for Action*, 2019

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