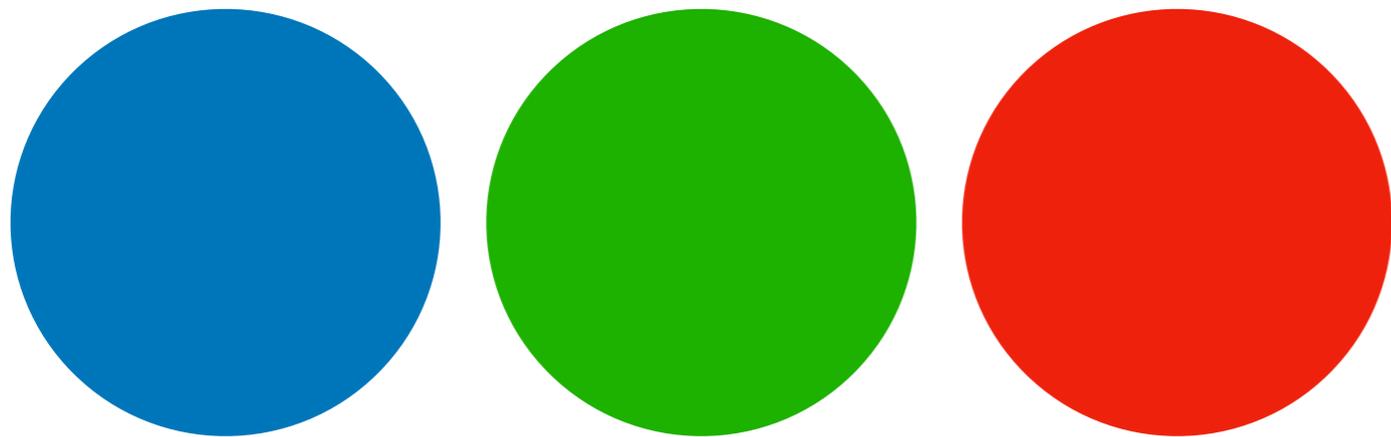


Intention Recognition as the Mechanism of Human Communication



**Daniel Harris
Hunter College**



Intention Recognition: What and Why?

Intention Recognition

Intention Recognition

(1) Intention to produce **R** in 

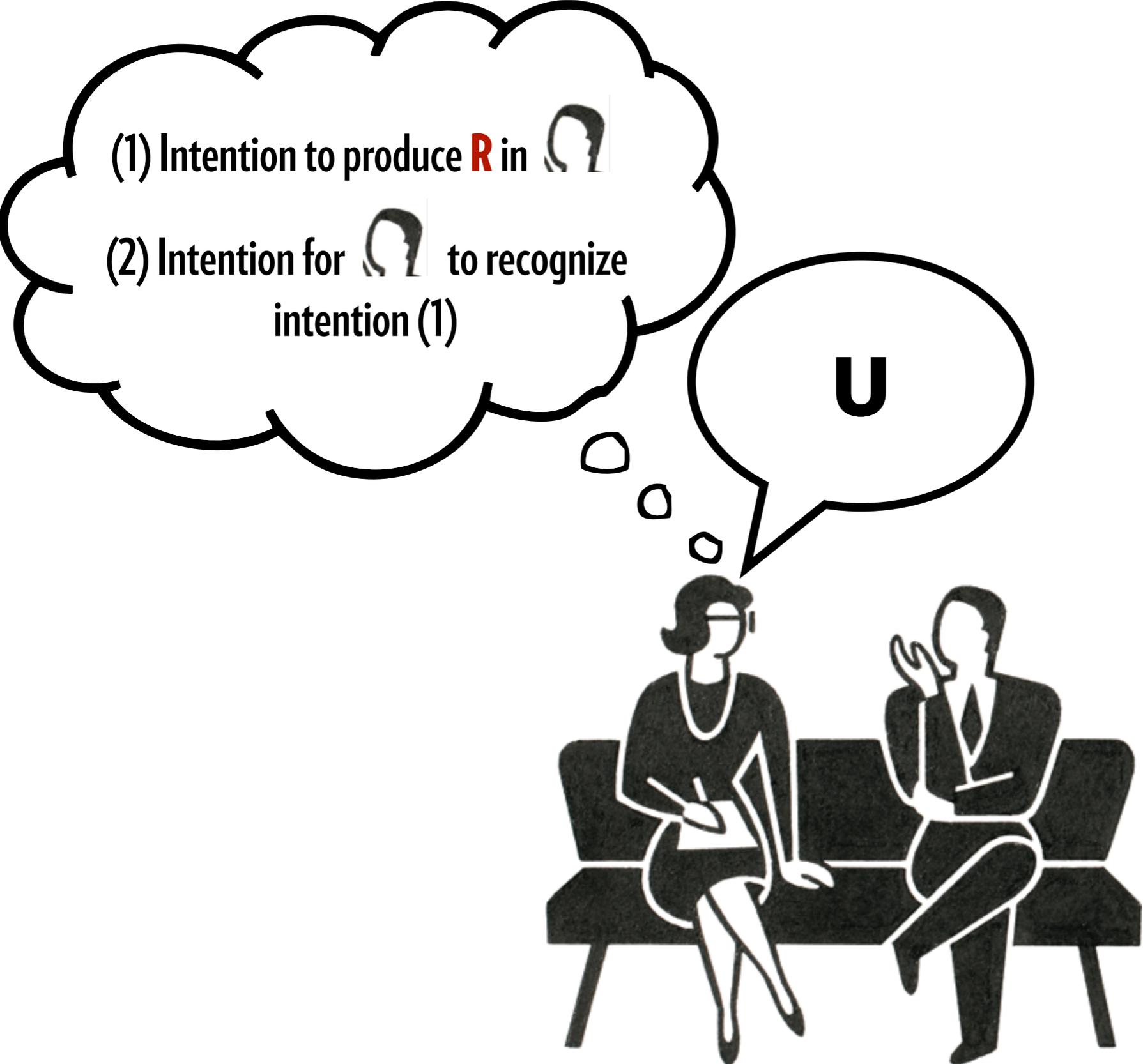


Intention Recognition

(1) Intention to produce **R** in 
(2) Intention for  to recognize
intention (1)



Intention Recognition



Intention Recognition

(1) Intention to produce **R** in 
(2) Intention for  to recognize
intention (1)

U

U



Intention Recognition

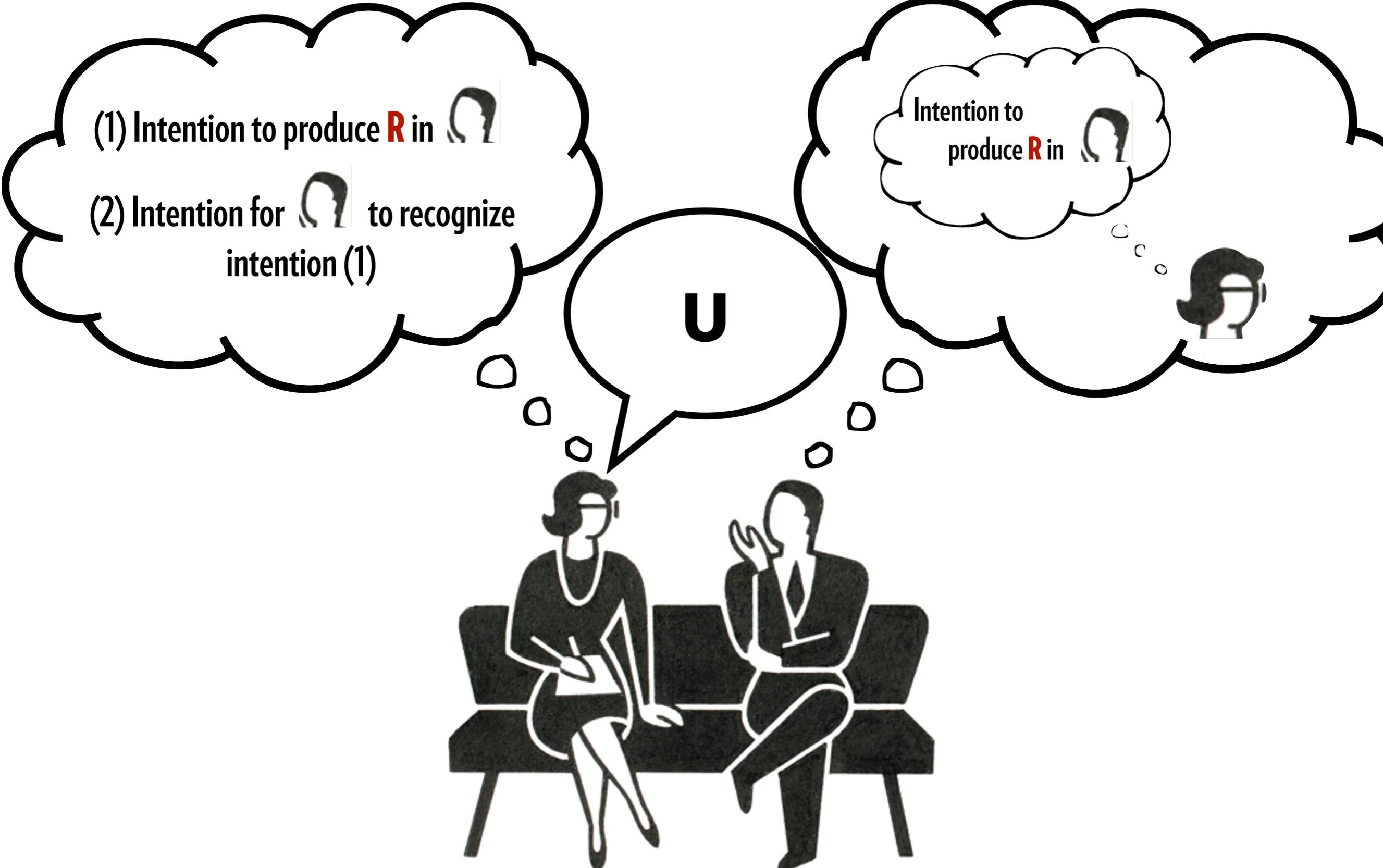
(1) Intention to produce **R** in 
(2) Intention for  to recognize intention (1)

U

$[[\mathbf{U}]] = \{\mathbf{P}, \mathbf{Q}, \mathbf{R}\}$



Intention Recognition



The Code Model of Communication

SENDER

M

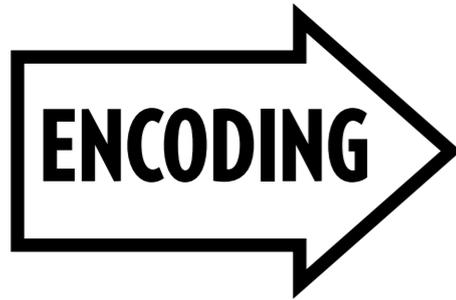
MESSAGE

RECEIVER

The Code Model of Communication

SENDER

M
MESSAGE



RECEIVER

The Code Model of Communication

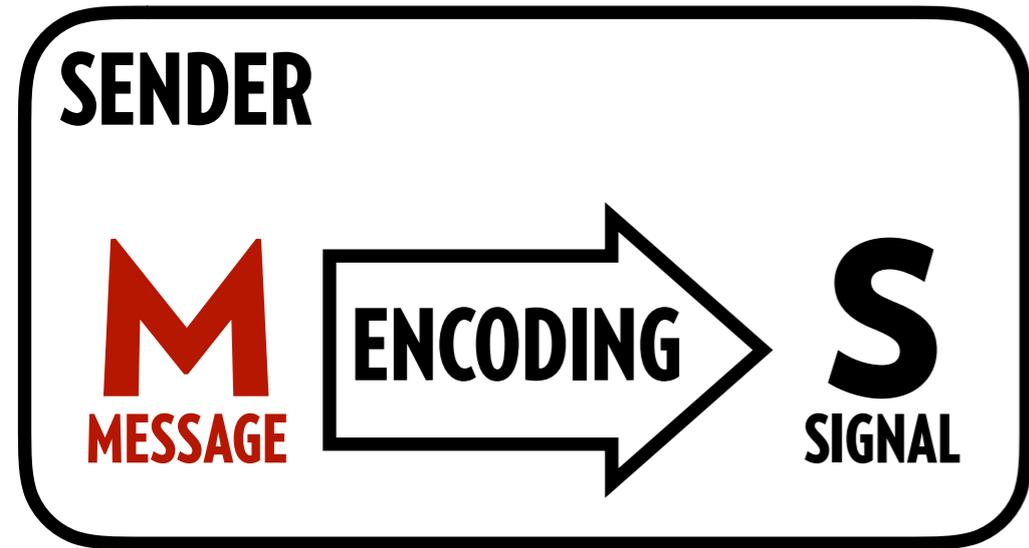
SENDER

M
MESSAGE

ENCODING

S
SIGNAL

RECEIVER

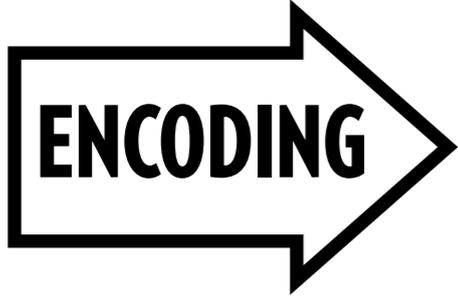


The Code Model of Communication

SENDER

M
MESSAGE

ENCODING



S
SIGNAL

CHANNEL

RECEIVER

The Code Model of Communication

SENDER

M
MESSAGE

ENCODING

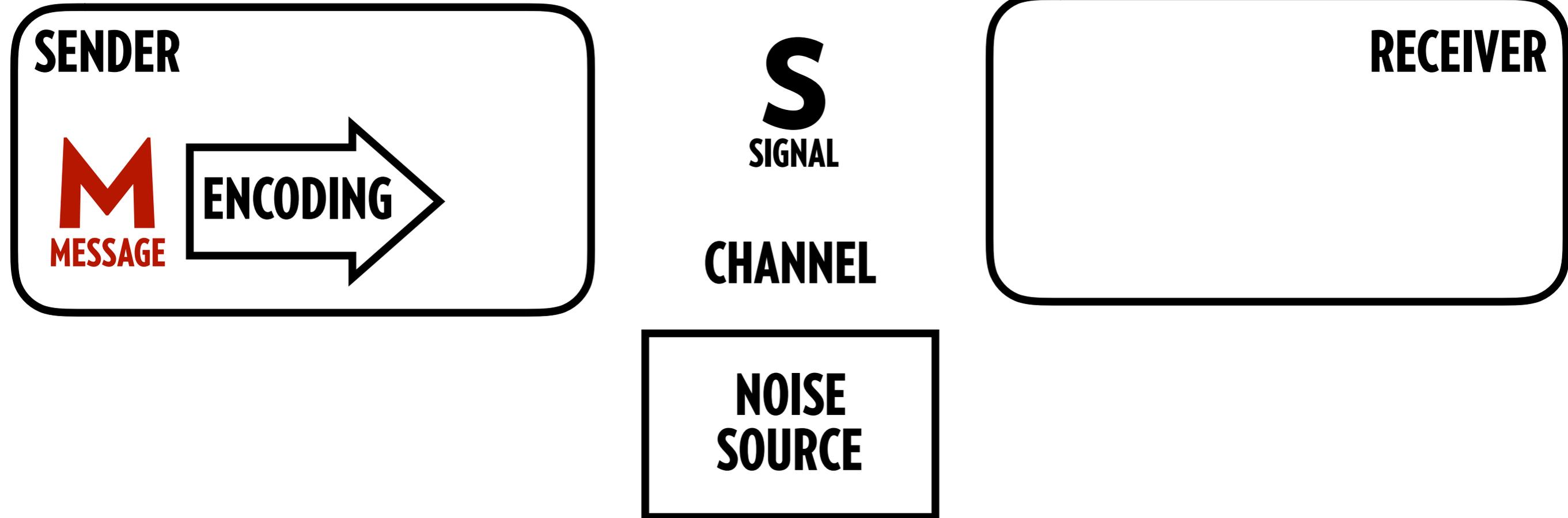
S

SIGNAL

CHANNEL

RECEIVER

**NOISE
SOURCE**



The Code Model of Communication

SENDER

M
MESSAGE

ENCODING

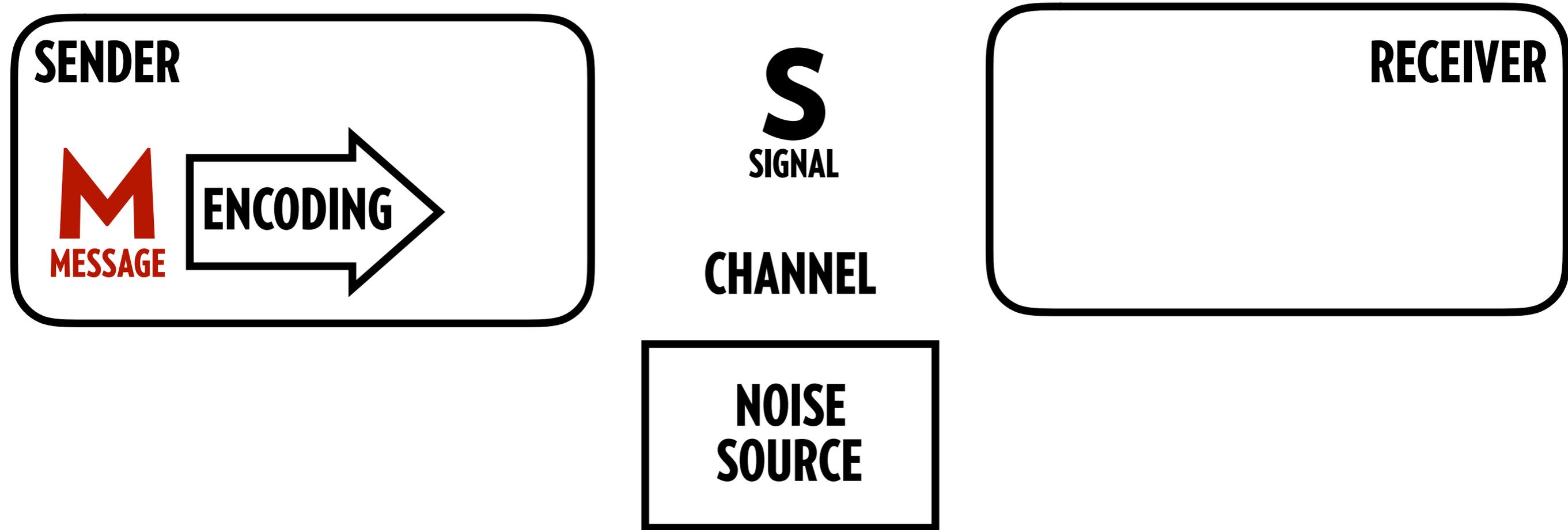
S

SIGNAL

CHANNEL

RECEIVER

**NOISE
SOURCE**



The Code Model of Communication

SENDER

M
MESSAGE

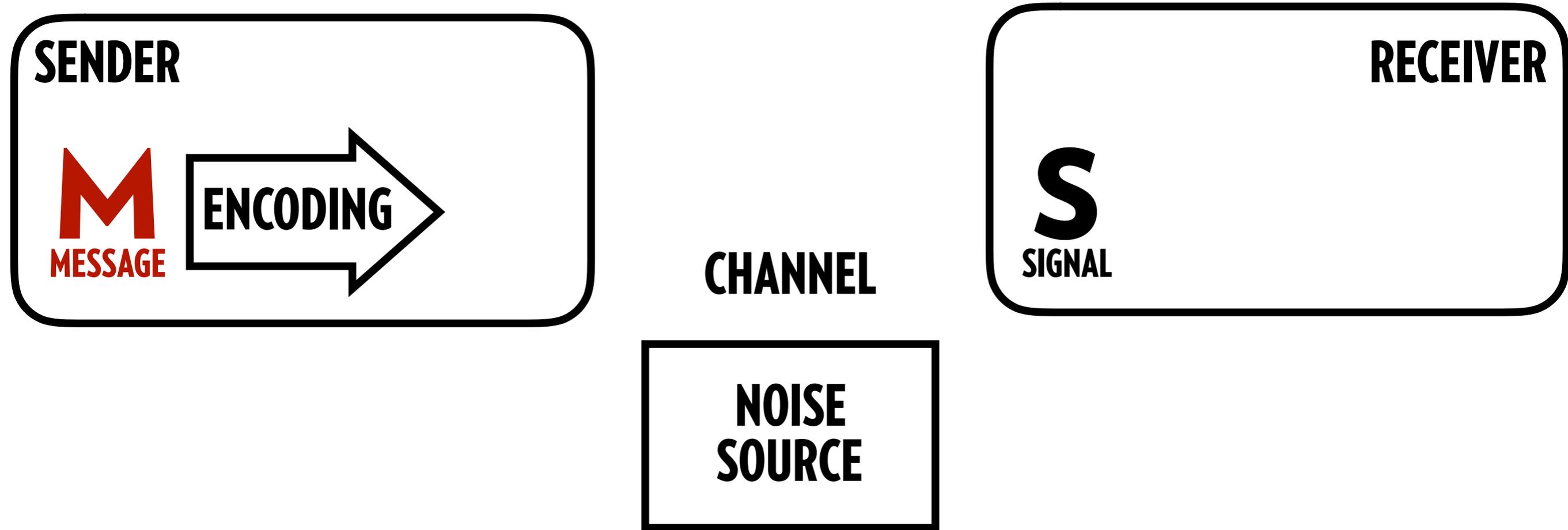
ENCODING

RECEIVER

S
SIGNAL

CHANNEL

**NOISE
SOURCE**



The Code Model of Communication

SENDER

M
MESSAGE

ENCODING

CHANNEL

RECEIVER

S
SIGNAL

DECODING

**NOISE
SOURCE**

The Code Model of Communication

SENDER

M
MESSAGE

ENCODING

CHANNEL

RECEIVER

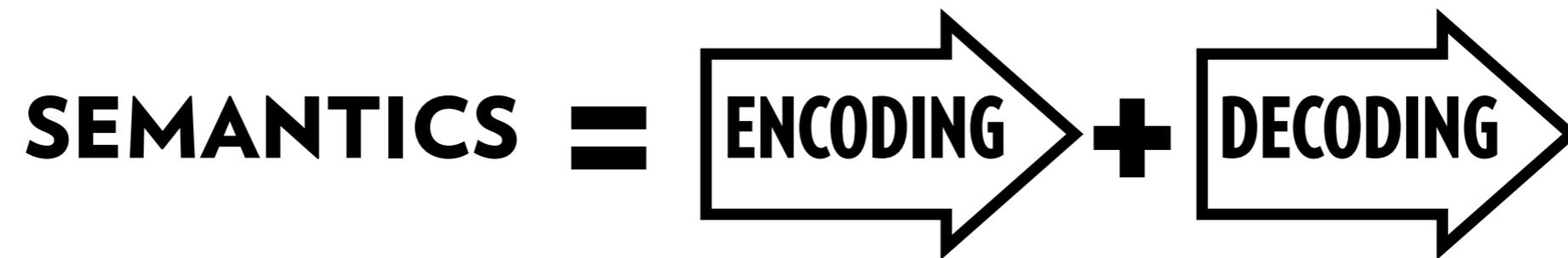
S
SIGNAL

DECODING

M
MESSAGE

**NOISE
SOURCE**

The Code Model of Communication



Intention Recognition

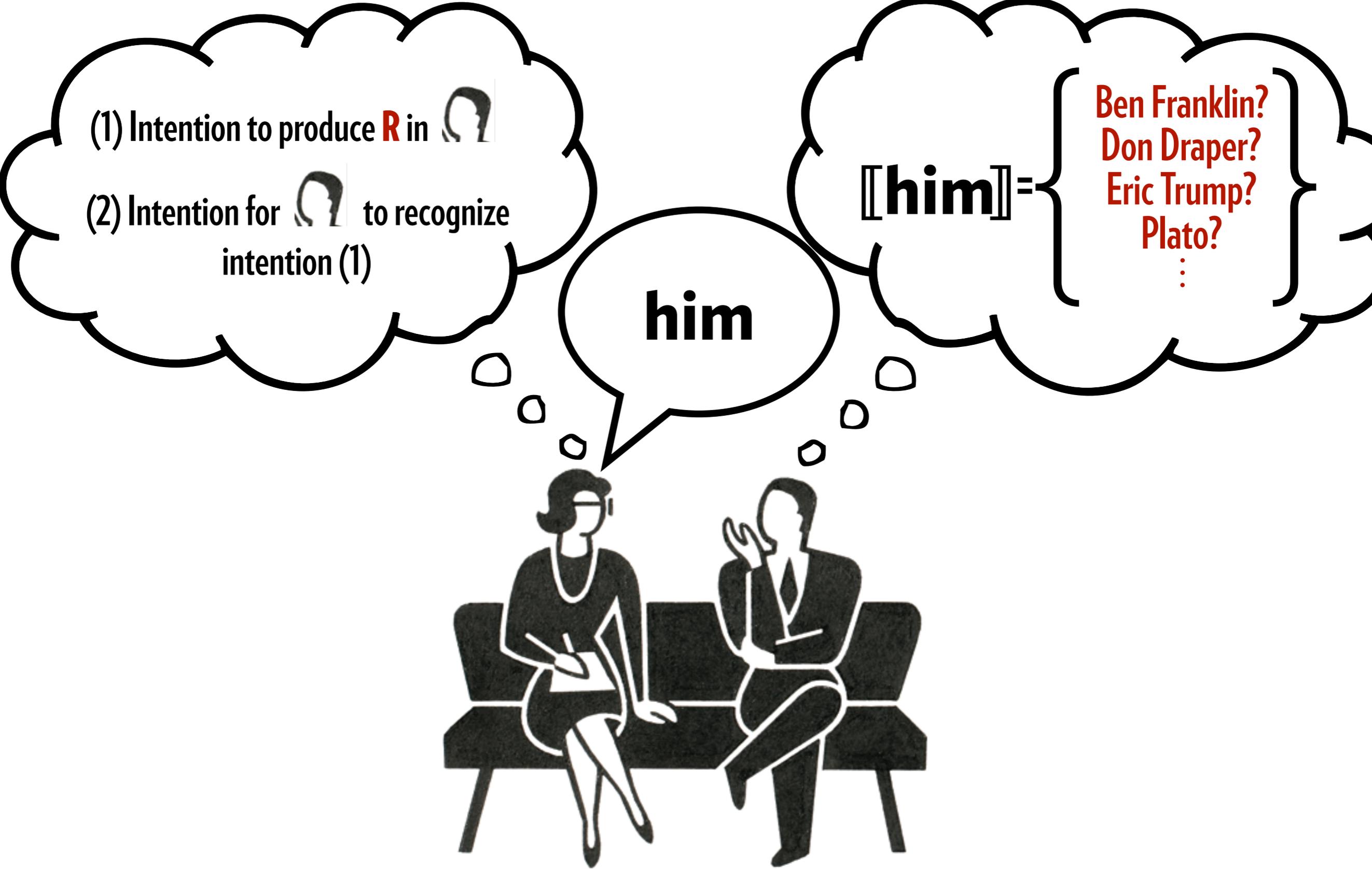
(1) Intention to produce **R** in 
(2) Intention for  to recognize intention (1)

U

$[[U]] = \{P?, Q?, R?\}$



Intention Recognition



Intention-Based Semantics

Utterance-Type Meaning



Utterer's Meaning



**Intentions, Beliefs,
other Psychological States**

Utterer's Meaning

S means something by an utterance if and only if S produces the utterance intending:

- (1) to produce thereby a certain response R in a certain addressee A;
- (2) that A recognize S's intention to produce R;
- (3) that A's response be at least partly based on of her recognition of S's intention to produce it.

H. P. Grice (1969): 'Utterer's Meaning and Intention'

Utterance-Type Meaning

“[An utterance-type] X means that so-and-so” might as a first shot be equated with some statement or disjunction of statements about what “people” (vague) intend (with qualifications about “recognition”) to effect by X .

H. P. Grice (1957): ‘Meaning’

Intention-Based Semantics

The result of these definitions will be that all questions about the meaning of marks and sounds will have been reduced to questions about the content of propositional attitudes...

Stephen Schiffer (1987): 'Remnants of Meaning'

Why Intention Recognition?

Why Intention Recognition?

1. Semantic Underdetermination

He should be there
by tomorrow.



Why Intention Recognition?

2. Non-Literal and Indirect Speech

Shouldn't you be
sitting on some other
sofa?



Why Intention Recognition?

2. Non-Literal and Indirect Speech

Quit being such a
Socrates about
everything.



Why Intention Recognition?

3. Unconventional Communication



Why Intention Recognition?

3. Unconventional Communication



Why Intention Recognition?

4. Convention Acquisition

Grrrrrrr.



Why Intention Recognition?

4. Convention Acquisition

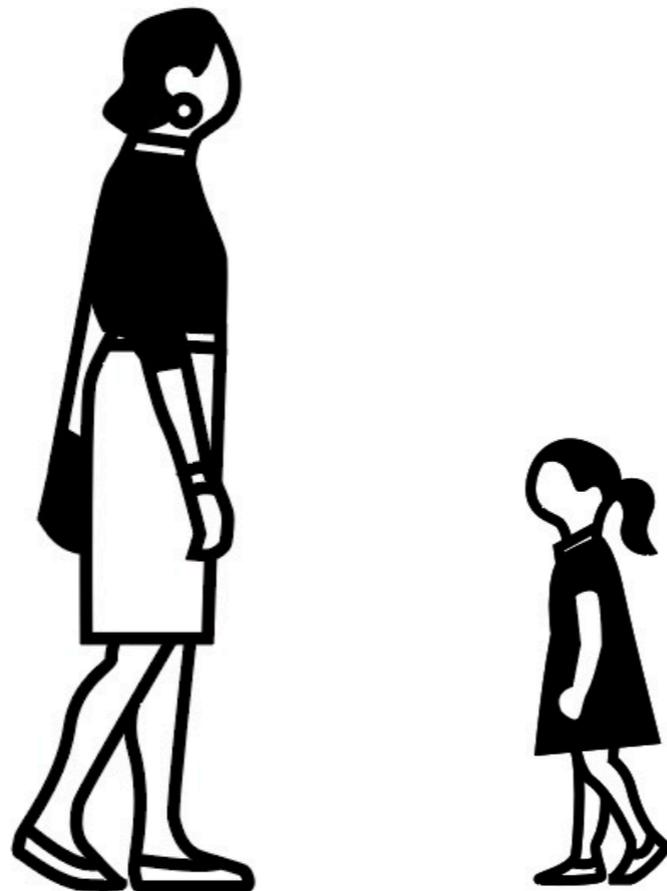
I see what you mean.



Why Intention Recognition?

4. Convention Acquisition

Do you know that
some birds can't fly?



Hacquard & Lidz (2018):
“Children’s attitude problems:
Bootstrapping verb meaning from syntax
and pragmatics”, *Mind & Language*

The Problem of Non-Communicative Language Use



I'm good enough. I'm smart enough.



I'm good enough. I'm smart enough.

A close-up shot of a man sitting in the driver's seat of a car at night. He has a somber expression and a small amount of blood is smeared on his lower lip. The background is dark with some out-of-focus lights visible through the car windows.

The rain on my car is a baptism.

A close-up shot of a man sitting in the driver's seat of a car at night. He has a somber expression and a small amount of blood is smeared on his lower lip. The background is dark with some out-of-focus lights visible through the car windows.

The rain on my car is a baptism.







Come on! Please! Please!



Come on! Please! Please!

A man with a dark complexion, wearing a dark loincloth, is crouching on a pile of sticks and debris. He is looking down at something on the ground. The background is a dark, cluttered area with many sticks and branches.

You dont have a match by any chance...do you?

A man with a muscular build, wearing a dark loincloth, is crouching on a pile of sticks and debris. He is looking down at a small object in his hands. The background is a dark, cluttered area with many sticks and branches.

You dont have a match by any chance...do you?

A man with dark hair, wearing a grey military flight suit with a yellow pilot's wings emblem on the chest, is shown from the chest up. He has a confused or questioning expression on his face, with his eyebrows slightly furrowed and his mouth slightly open. He is standing in what appears to be a kitchen or a break room. In the background, there is a metal rack filled with various food items, including bags of snacks and a box of instant noodle cups. Several metal pans are hanging on the wall behind him. The lighting is somewhat dim and the overall tone is slightly muted.

You talkin' to me?

A man with dark hair, wearing a grey military flight suit with a yellow pilot's wings emblem on the chest, is shown from the chest up. He has a confused or questioning expression on his face, with his eyebrows slightly furrowed and his mouth slightly open. He is standing in a kitchen. In the background, there is a metal rack on the wall filled with various food items, including bags of snacks and a box of instant noodle cups. Several metal pans are hanging on the wall behind him. The lighting is somewhat dim, typical of an indoor kitchen setting.

You talkin' to me?

A scene featuring two Kermit the Frog puppets in a dark, space-like environment. They are positioned on the left and right sides of the frame, both looking upwards and to the right. In the upper right corner, a large, bright, spherical object resembling a moon or planet is visible against a black background filled with faint stars. The puppets are green with large white eyes and a small white tuft on their heads. The overall lighting is dim, highlighting the puppets and the celestial body.

I guess I was wrong when I said I never promised anyone.

Two Kermit the Frog puppets are shown from the chest up, positioned on the left and right sides of the frame. They are both looking upwards and to the right. The background is a dark, starry space with a large, bright, textured sphere resembling a moon or planet in the upper right quadrant. The puppets are green with large white eyes and a small white tuft on their heads. The overall lighting is dim, highlighting the puppets against the dark background.

I guess I was wrong when I said I never promised anyone.









[The intention-based theory of meaning] offers no way to deal with the many cases in which language is not used for communication..., normal cases, in which the speaker's intention with regard to an audience offers no particular insight into the literal meaning of what he says.

—Noam Chomsky (1975): *Reflections on Language*

The Gricean focus is entirely on the use of language to communicate. But surely we also use natural language in thinking and reasoning? ... When I think aloud, or on paper, there may surely be no intention to induce a belief in another person, since I may know that there is no audience, or be indifferent to the presence of an audience.

—Peter Carruthers (1996): *Language, Thought, and Consciousness*

Yet such public performances are surely not intended to induce beliefs in oneself, either, since they involve the expression of beliefs which one already has.

—Peter Carruthers (1996): *Language, Thought, and Consciousness*

There are such phenomena as working out ideas on a word processor, thinking out loud in sentences, engaging in inner speech: can we not conceive of settings in which they stand on their own, independently of communication? And, more basically, there is the possibility that we normally think, at least in part, in a natural language, that our beliefs and intentions depend on having internalized some natural language, perhaps even in a way that is not typically phenomenologically available. ... It does not seem to be an obvious conceptual truth that such private meaningful uses of language would presuppose, even indirectly, communicative intentions or linguistic manifestations thereof. The strong Gricean thesis is not something I am inclined to defend.

—Brian Loar (2001): "The Supervenience of Social Meaning on Speaker's Meaning"

What Kind of Explanation?

Intention-Based Semantics

Utterance-Type Meaning



Utterer's Meaning



**Intentions, Beliefs,
other Psychological States**

Utterer's Meaning

S means something by an utterance **if and only if**

S produces the utterance intending:

- (1) to produce thereby a certain response R in a certain addressee A;
- (2) that A recognize S's intention to produce R;
- (3) that A's response be at least partly based on of her recognition of S's intention to produce it.

Conceptual Analysis

S means something by an utterance

if and only if

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Conceptual Analysis

S means something by an utterance

if and only if

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Conceptual Analysis

Conceptual Analysis

S means something by an utterance

What we ordinarily
mean by this...

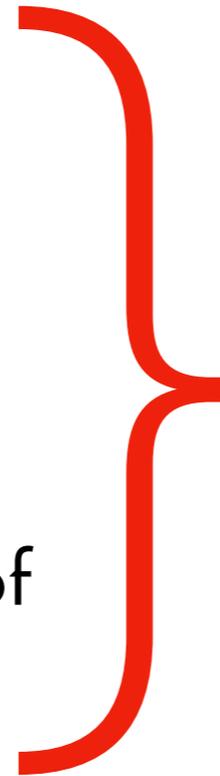


if and only if

S produces the utterance intending:

- (1) to produce thereby a certain response R in a certain addressee A;
- (2) that A recognize S's intention to produce R;
- (3) that A's response be at least partly based on of her recognition of S's intention to produce it.

...is given by this.



Grice (1957)

Grice (1957)
Strawson (1964)
Searle (1965)
Grice (1968)
Grice (1969)
Ziff (1969)
Searle (1969)
Schiffer (1972)
Harman (1974)
Loar (1976)
Bach & Harnish (1979)
McDowell (1980)
Grice (1982)
Loar (1982)
Schiffer (1982)
Blackburn (1984)

Sperber & Wilson (1986)
Recanati (1986)
Schiffer (1987)
Bach (1988)
Avramides (1989)
Thomason (1990)
Neale (1992)
Davis (1992)
Schiffer (1994)
Davis (2003)
Schiffer (2006)
Roberts (2012)
Scott-Phillips (2014)
Harris (2014)
•
•
•

Intention-Based Semantics

Utterance-Type Meaning



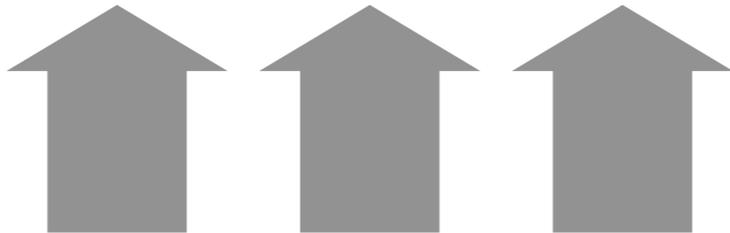
Utterer's Meaning



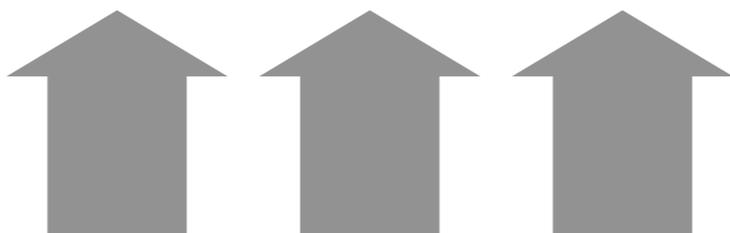
**Intentions, Beliefs,
other Psychological States**

Intention-Based Semantics

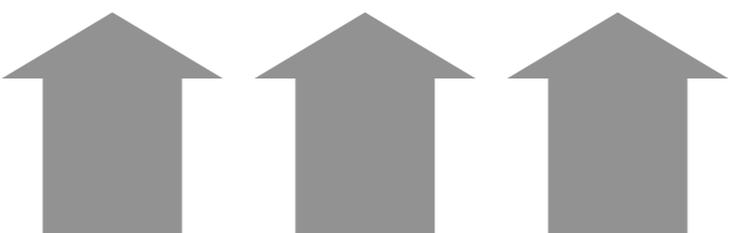
Utterance-Type Meaning



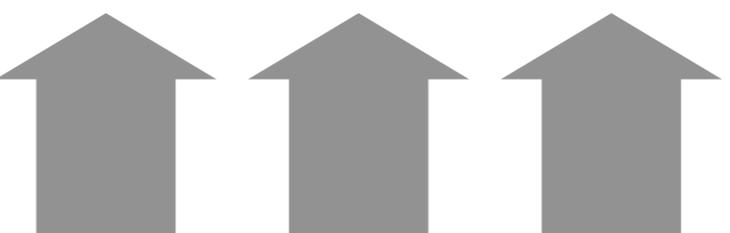
Utterer's Meaning



Intentions, Beliefs,
other Psychological States



Brain States



Physics

Inter-Theoretic Reduction

Inter-Theoretic Reduction

Law of high-level theory


$$S1 \rightarrow S2$$

Inter-Theoretic Reduction

Law of high-level theory


$$S1 \rightarrow S2$$

$$P1 \rightarrow P2$$



Law of lower-level theory

Inter-Theoretic Reduction

Law of high-level theory

$$S1 \rightarrow S2$$

↕

↕

$$P1 \rightarrow P2$$

Bridge principles
translating predicates
of higher theory into
predicates of lower
theory.

Law of lower-level theory

Inter-Theoretic Reduction

Law of high-level theory

$$S1 \rightarrow S2$$

↕

↕

$$P1 \rightarrow P2$$

Law of lower-level theory

Bridge principles translating predicates of higher theory into predicates of lower theory.

Result:
lower-level laws entail higher-level laws.

Explication as Inter-Theoretic Reduction

S means something by an utterance

if and only if

S produces the utterance intending:

- (1) to produce thereby a certain response R in a certain addressee A;
- (2) that A recognize S's intention to produce R;
- (3) that A's response be at least partly based on of her recognition of S's intention to produce it.

A bridge principle
linking the vocabulary
of pragmatics to the
vocabulary of folk
psychology.

Loar (1982): *Mind and Meaning*
Schiffer (1982): 'Intention-Based Semantics',

Explication as Inter-Theoretic Reduction

S means something by an utterance

if and only if

S produces the utterance intending:

- (1) to produce thereby a certain response R in a certain addressee A;
- (2) that A recognize S's intention to produce R;
- (3) that A's response be at least partly based on of her recognition of S's intention to produce it.

This is an empirical hypothesis...



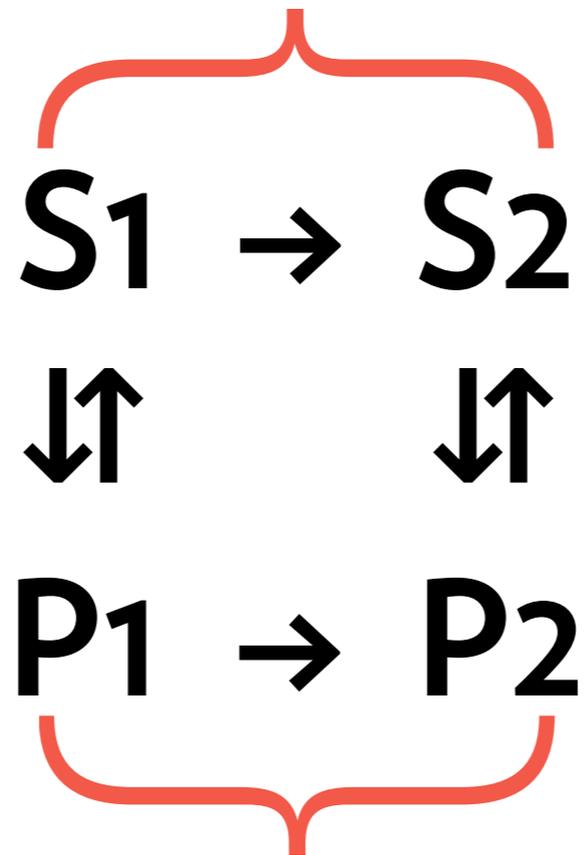
...whose content is ultimately cashed by this.



Loar (1982): *Mind and Meaning*
Schiffer (1982): 'Intention-Based Semantics',

Inter-Theoretic Reduction

What are the laws of pragmatics?



What are the laws of folk psychology, or, for that matter, of neuroscience?

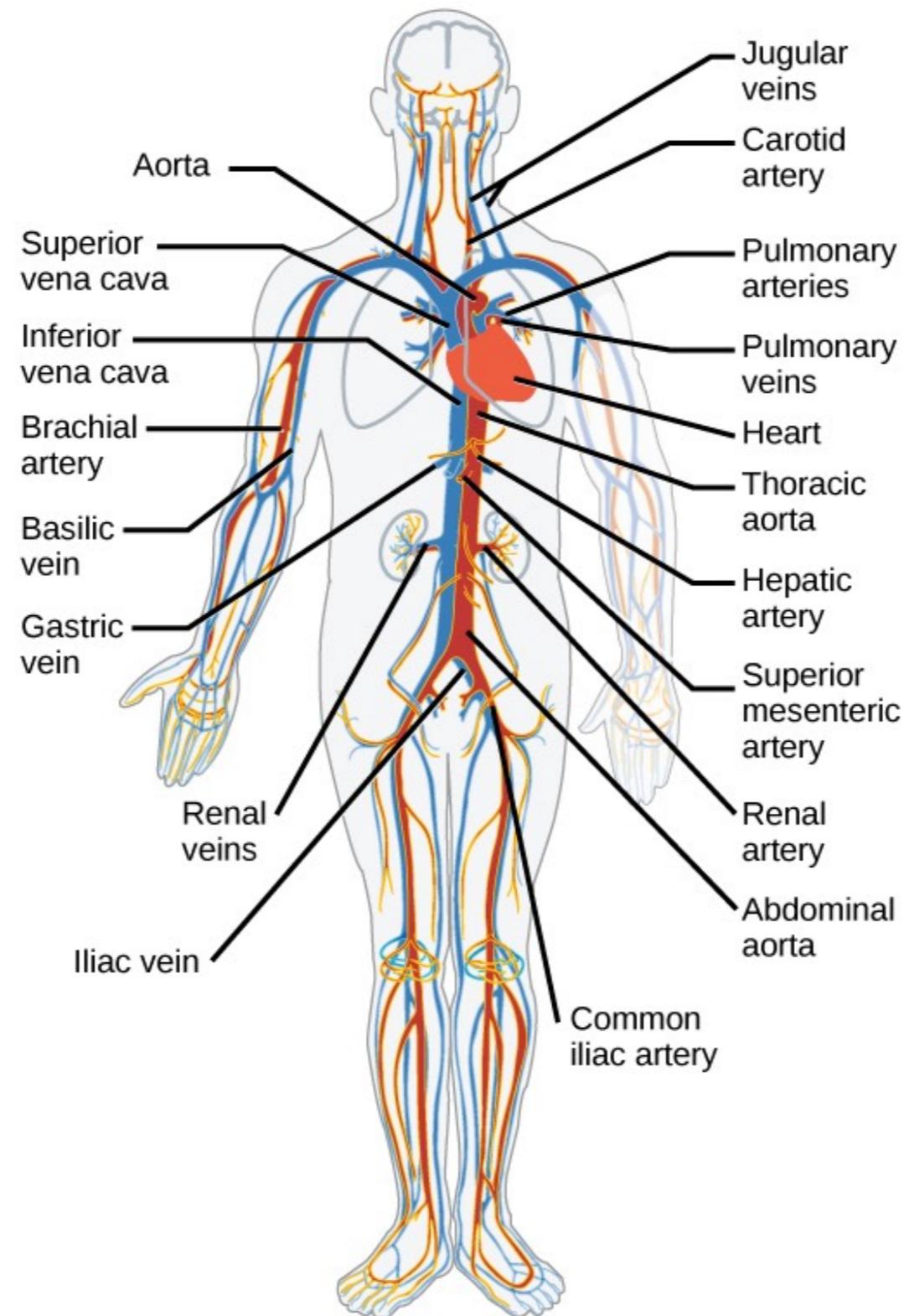
Explication vs. Explanation

There may be a Chomsky sense of knowledge — having an internal representation — in which a speaker knows the rules of his language, but that is a psychological hypothesis and, however reasonable it is, we do not want to build it into an *explication* of what it is for [a language] to be the language of [a population]. Better that it should be offered, at a later stage, as an *explanation* of how it is possible for a complex entity like English to be the language of the population of English speakers.

—Brian Loar (1976): “Two Theories of Meaning”

**Explanation without
Explication?**

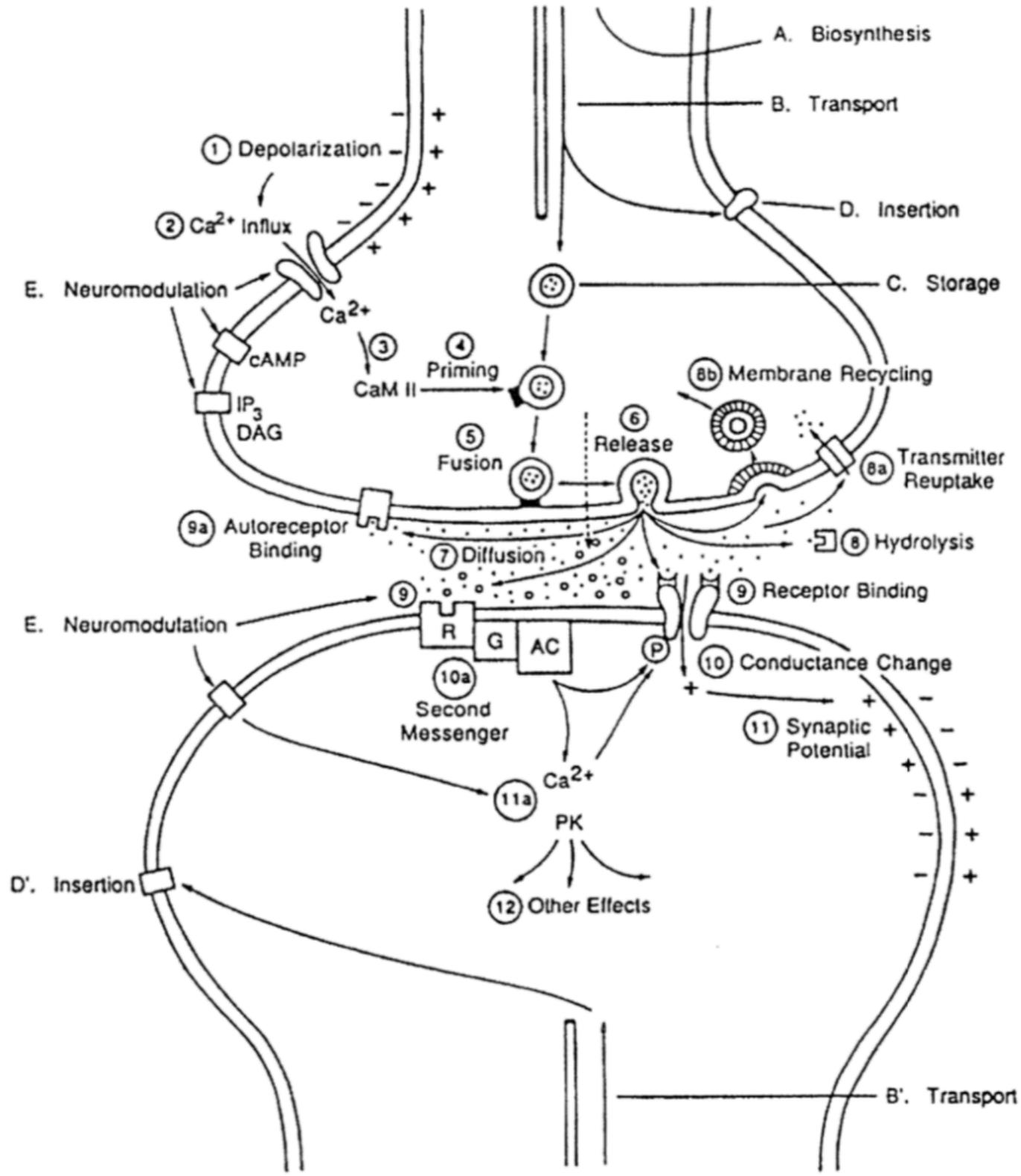
Functional Analysis



Cummins (1975): 'Functional Analysis'

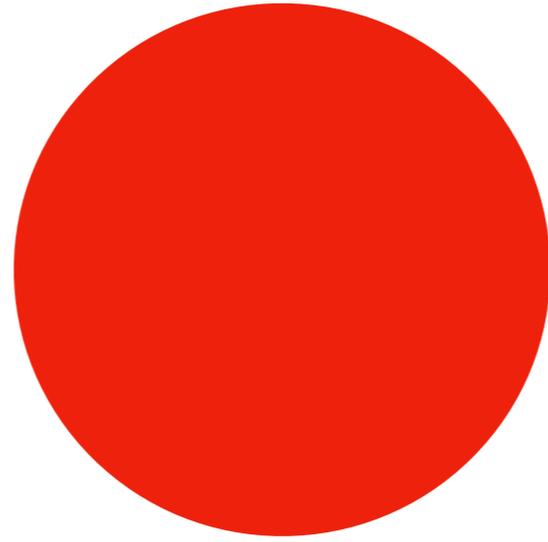
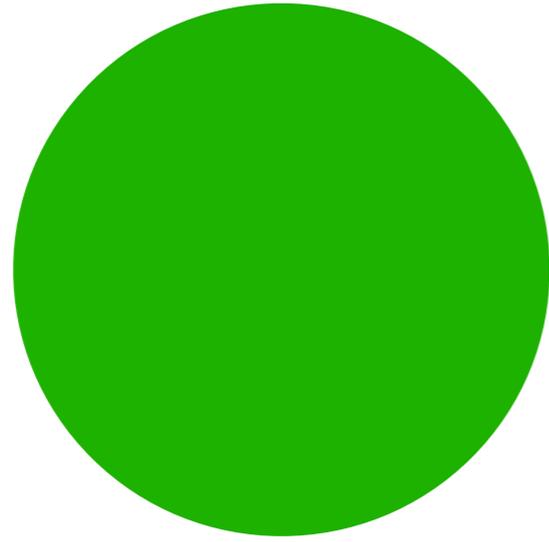
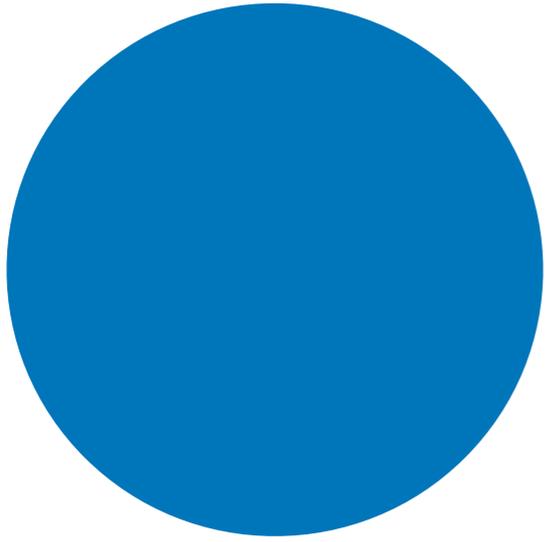
Cummins (1983): The Nature of Psychological Explanation

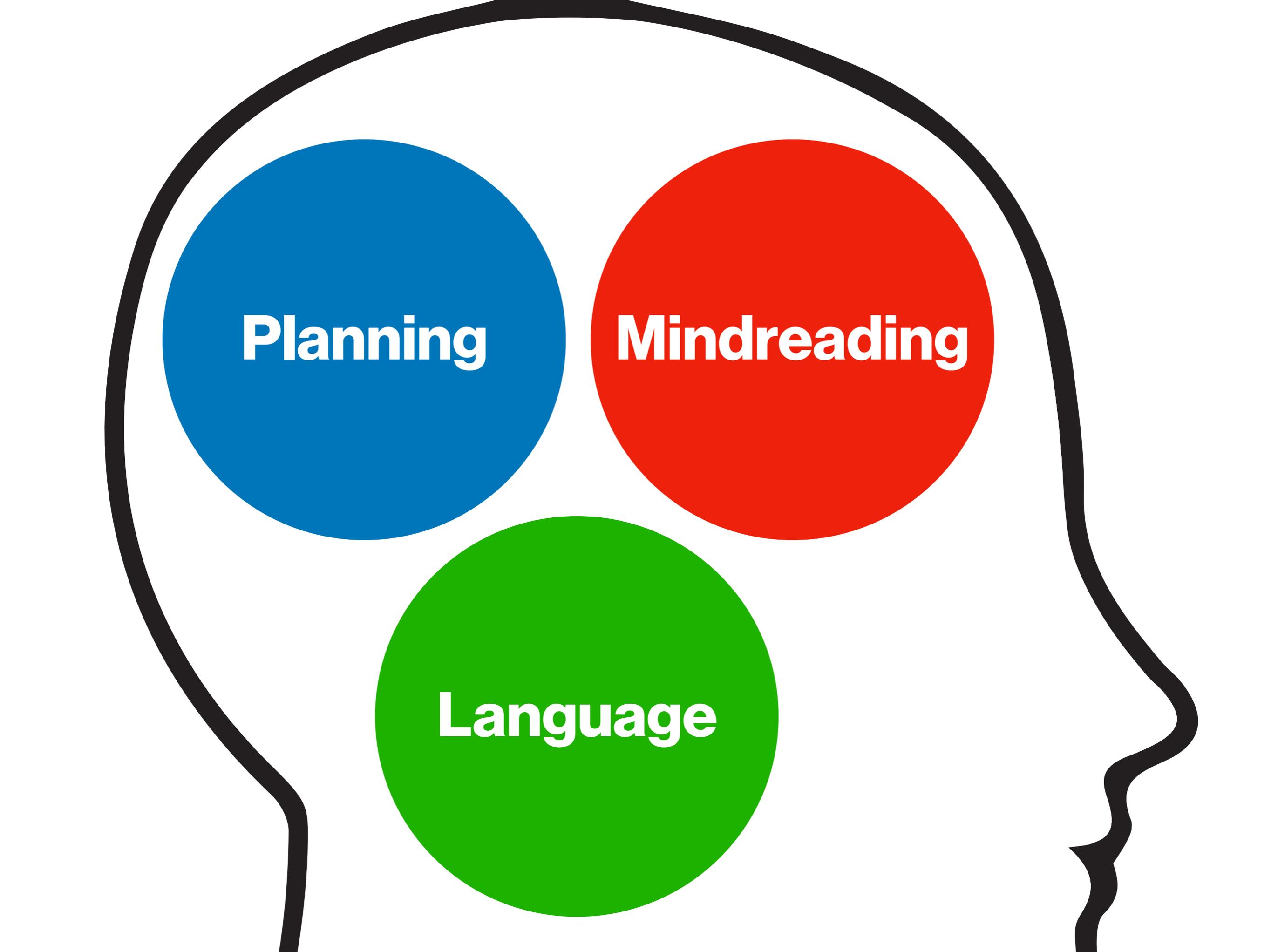
Mechanistic Reduction



Machamer, Darden, and Craver (2001): 'Thinking about Mechanisms'
 see also, Bechtel (2009): *Mental Mechanisms*

Communication: Three Systems





Planning

Mindreading

Language



Planning

**...is the subject
of a massive
literature in the
philosophy of
action and AI.**



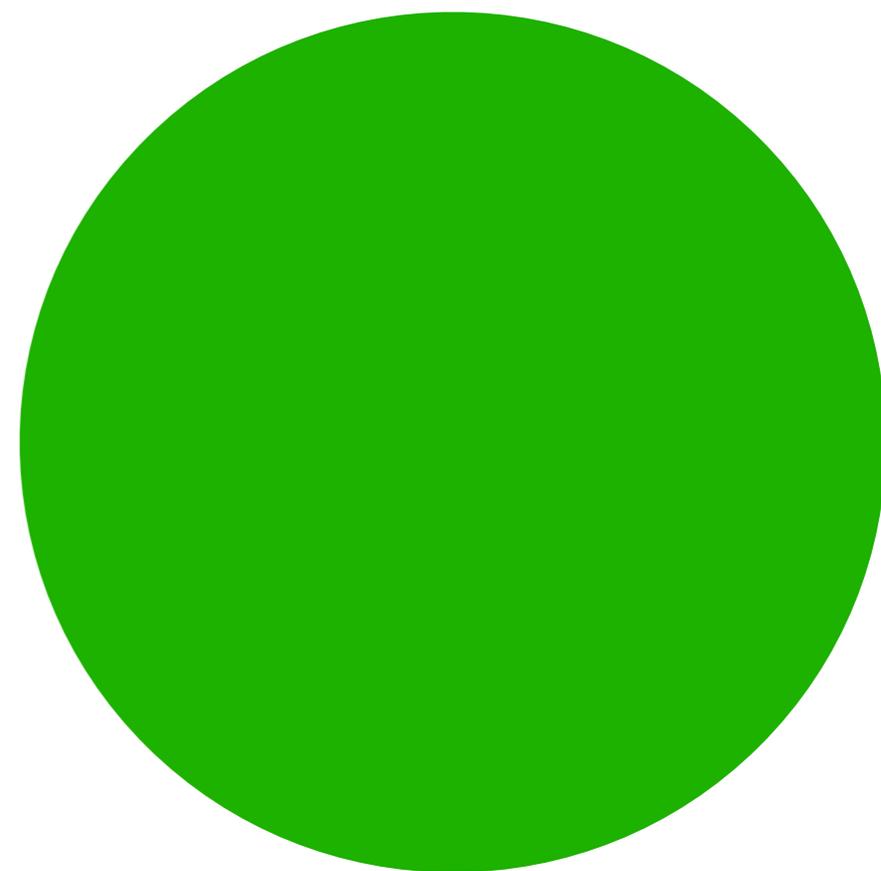
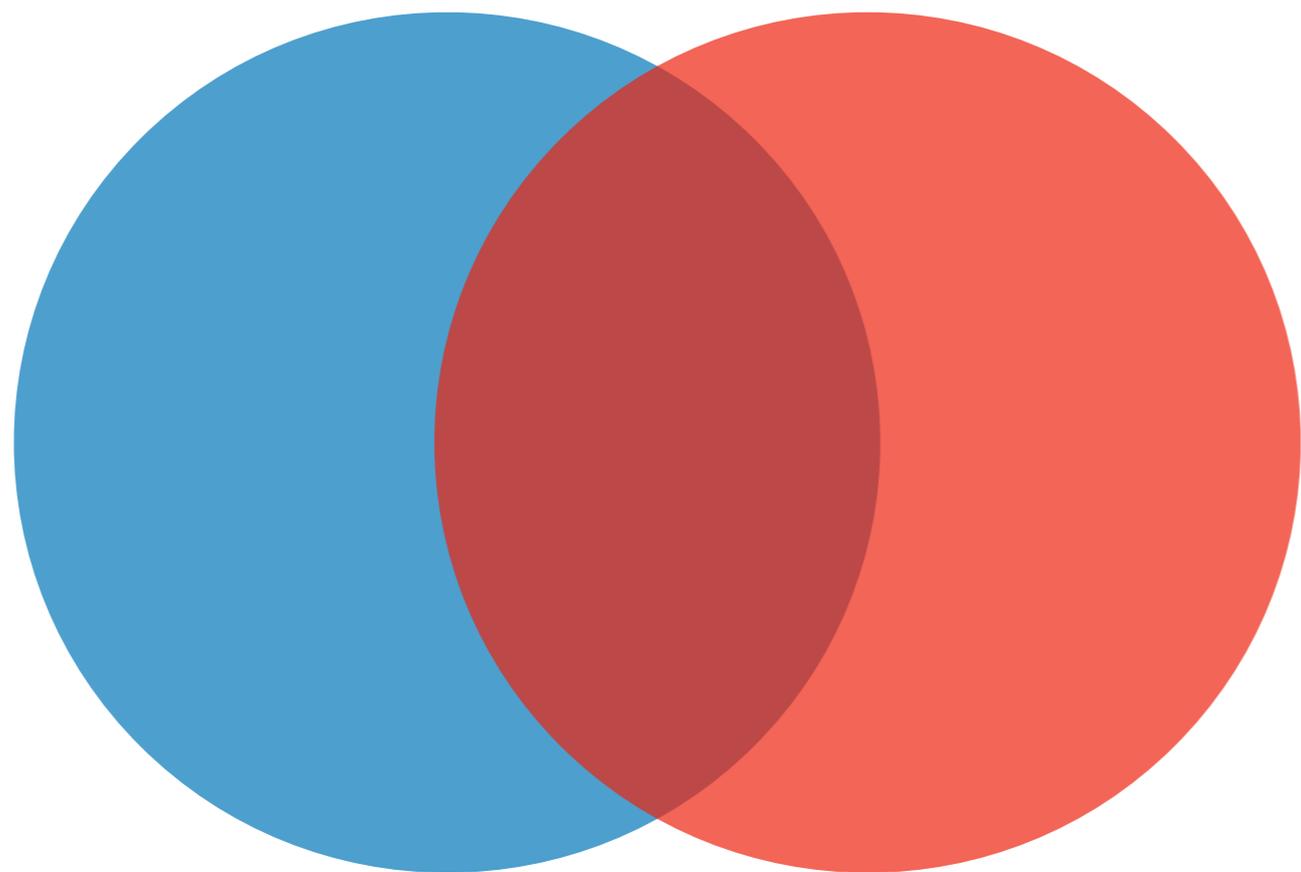
Mindreading

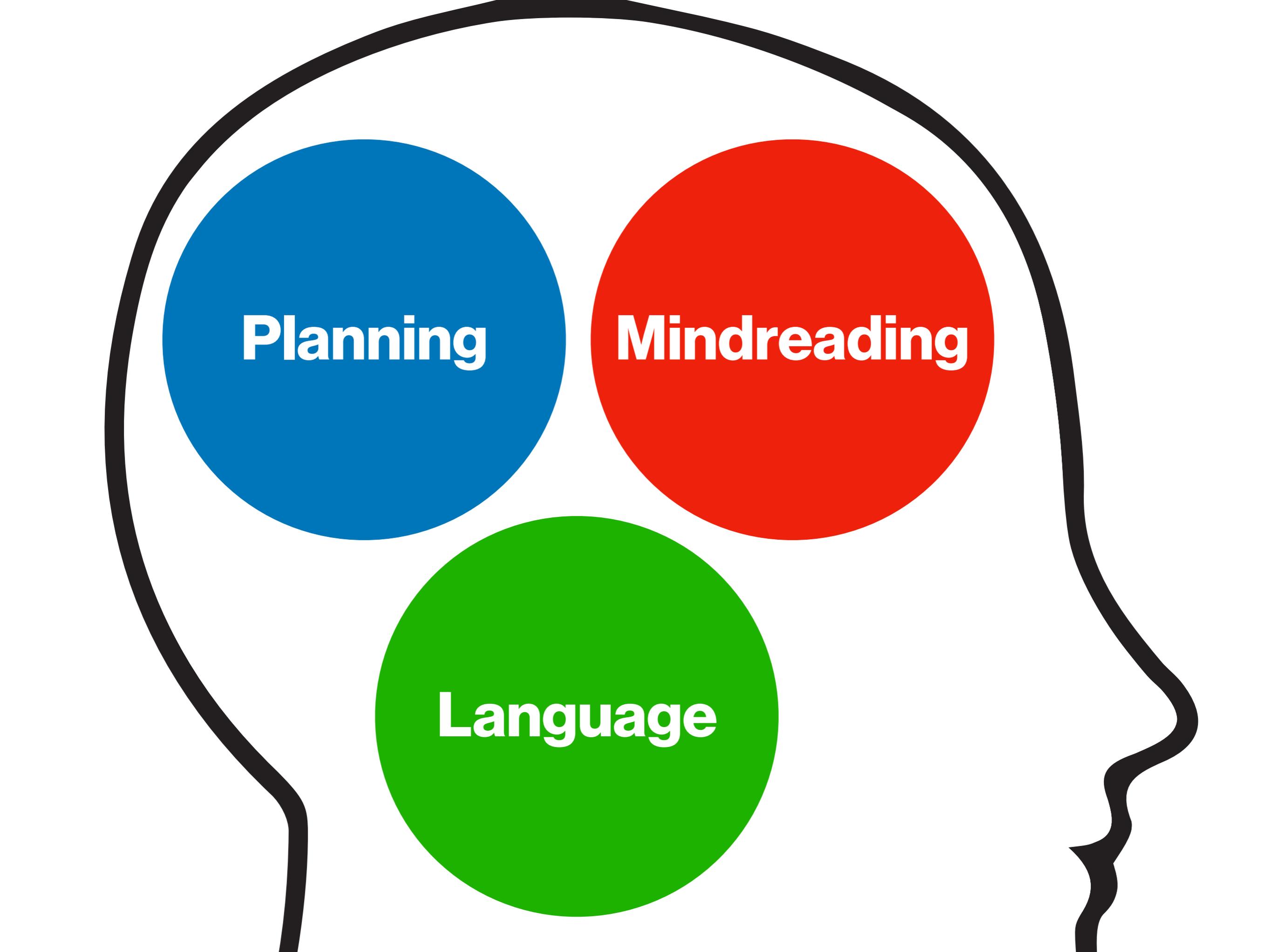
**...is the subject
of a massive
literature in
the cognitive
sciences.**



Language

**...is the subject
of a massive
literature in
linguistics.**





Planning

Mindreading

Language



Mindreading

Mindreading

a.k.a.

“folk psychology”

“theory of mind”

**whatever part(s) of our
minds we use to infer
others' mental states**

Mindreading

**...has many of the
properties of Fodorian
central systems**

ITS INFERENCES ARE:

**abductive/explanatory/
non-demonstrative**

**(potentially) informed by
any background beliefs**

Mindreading

...has many of the
properties of Fodorian
central systems

ITS INFERENCES ARE:

sometimes (not always)
conscious

sometimes (not always)
effortful

Mindreading

WE USE IT:

a lot! compulsively!

starting at least at 3yrs.,

**but probably much
younger.**

Mindreading

SOME CURRENT DEBATES:

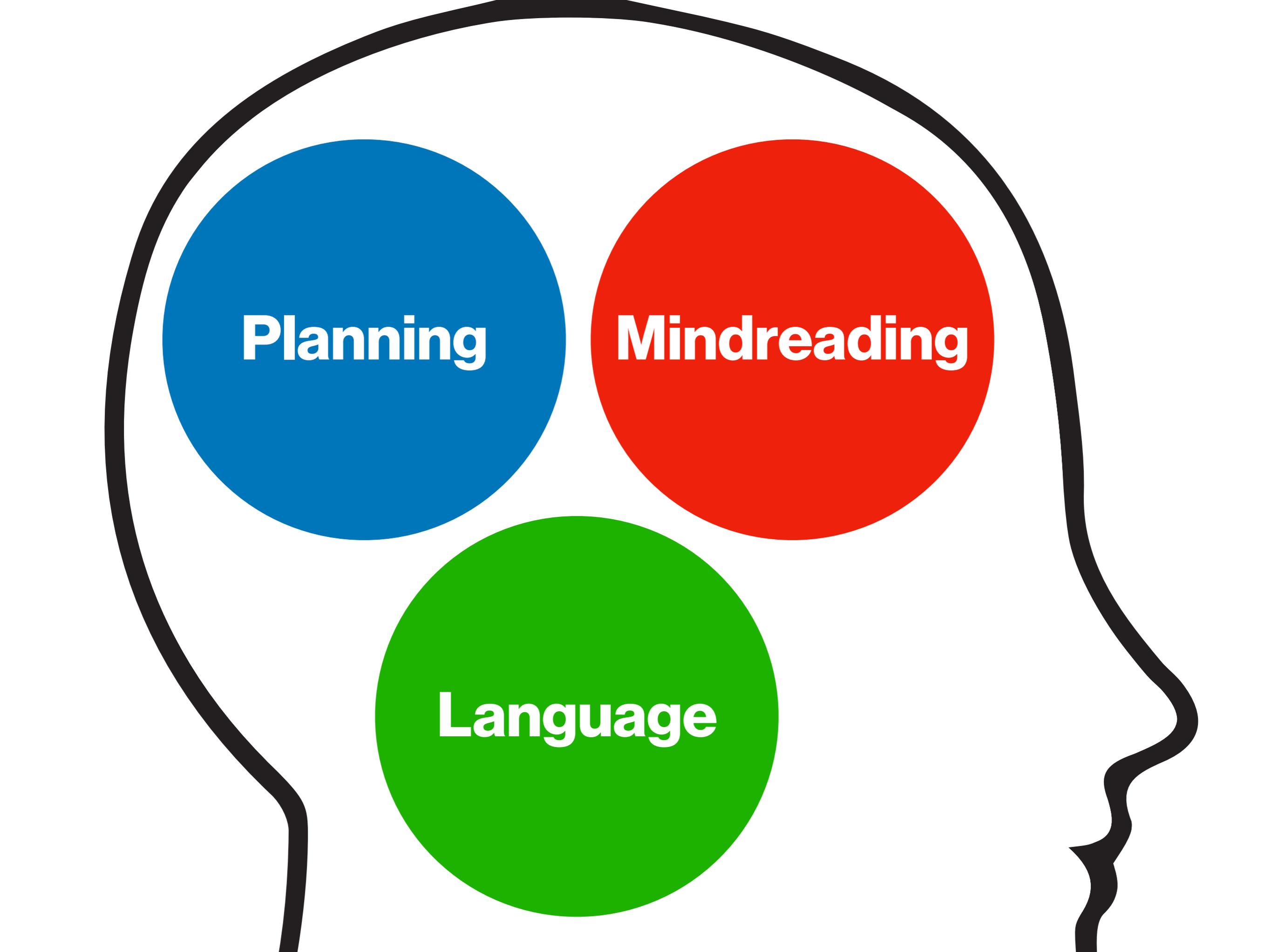
How Old: 3mos or 3yrs?

One system or two?

**Perception or cognition
(or both)?**

**Theory or simulation
(or both)?**

Mindreading



Planning

Mindreading

Language

Planning

Planning

A.K.A.

“practical reasoning”

“instrumental reasoning”

**the part of our minds we
use to form intentions
(a.k.a. plans)**

Planning

**...is the subject of a
substantial literature in
the philosophy of action.**

Planning

PRIOR INTENTION

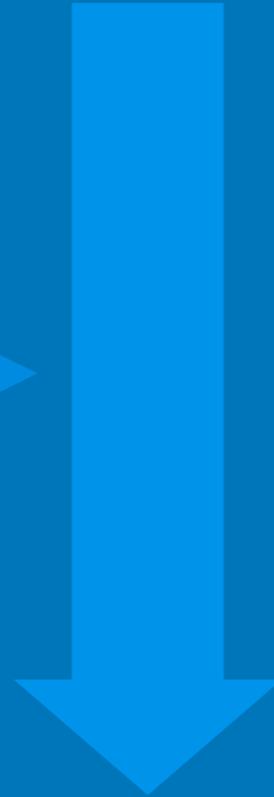
Intention to give a talk

Planning

PRIOR INTENTION

Intention to give a talk

relevant beliefs,
other intentions,
coherence
principles

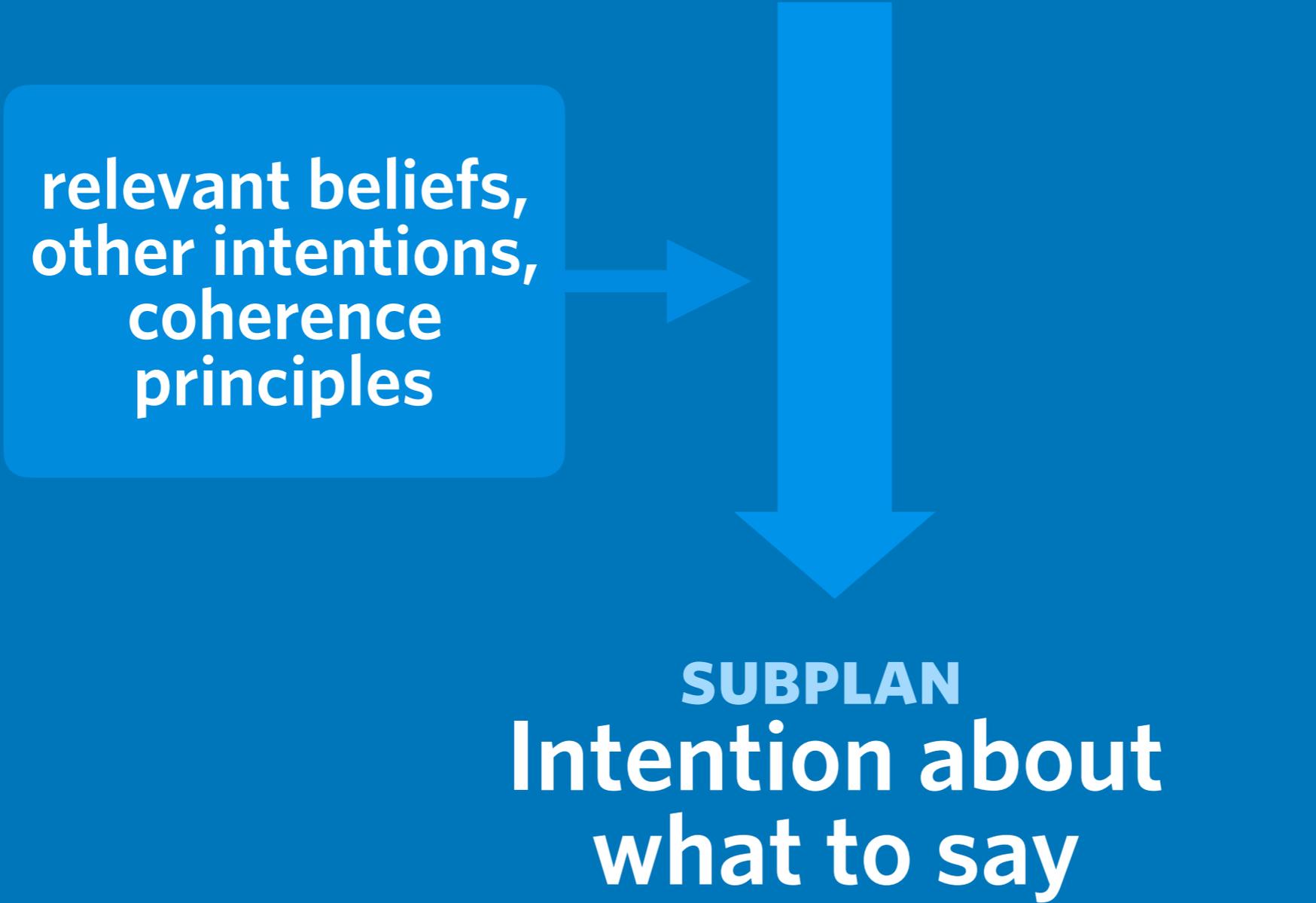


Planning

PRIOR INTENTION

Intention to give a talk

relevant beliefs,
other intentions,
coherence
principles



SUBPLAN

**Intention about
what to say**

Planning

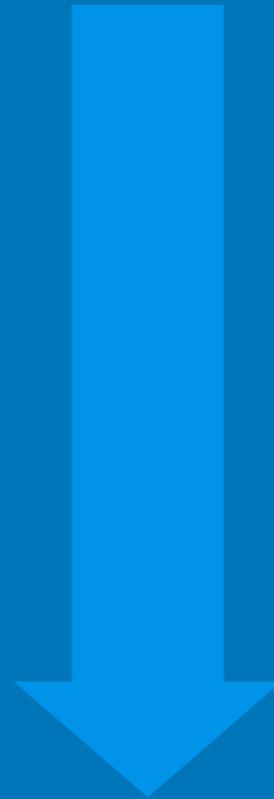
PRIOR INTENTION

Intention for A to believe p

Planning

PRIOR INTENTION

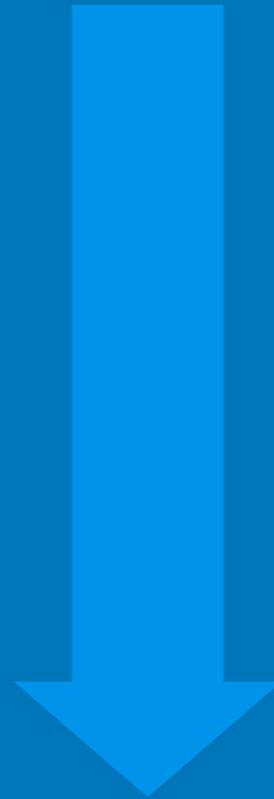
Intention for A to believe p



Planning

PRIOR INTENTION

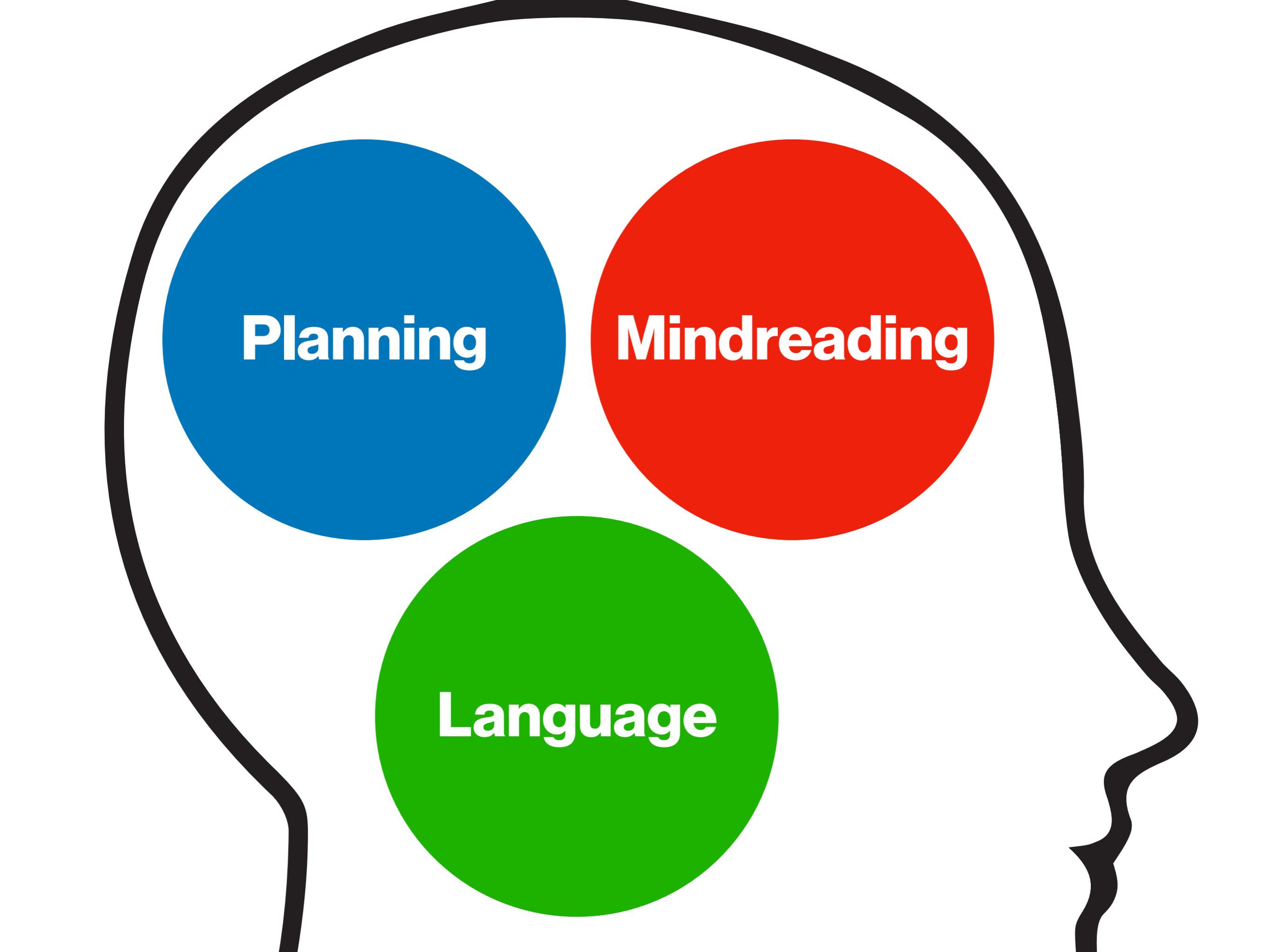
Intention for A to believe p



SUBPLAN

**Intention for A to
recognize this intention**

Planning



Planning

Mindreading

Language

Language

Language

Language

...is the subject of
generative linguistics.

Language

**...is implicated in both
language perception and
language production**

Language

**...has characteristics of
a Fodorian input-output
system:**

Language

**...has characteristics of
a Fodorian input-output
system:**

**It is fast, automatic,
amenable to computational
modeling.**

Language

**...has characteristics of
a Fodorian input-output
system:**

It is centrally inaccessible.

**Most speakers don't even
have the concepts needed to
centrally entertain the
representations it uses**

Language

**...has characteristics of
a Fodorian input-output
system:**

**It is informationally
encapsulated**

**(in production as well
as perception)**

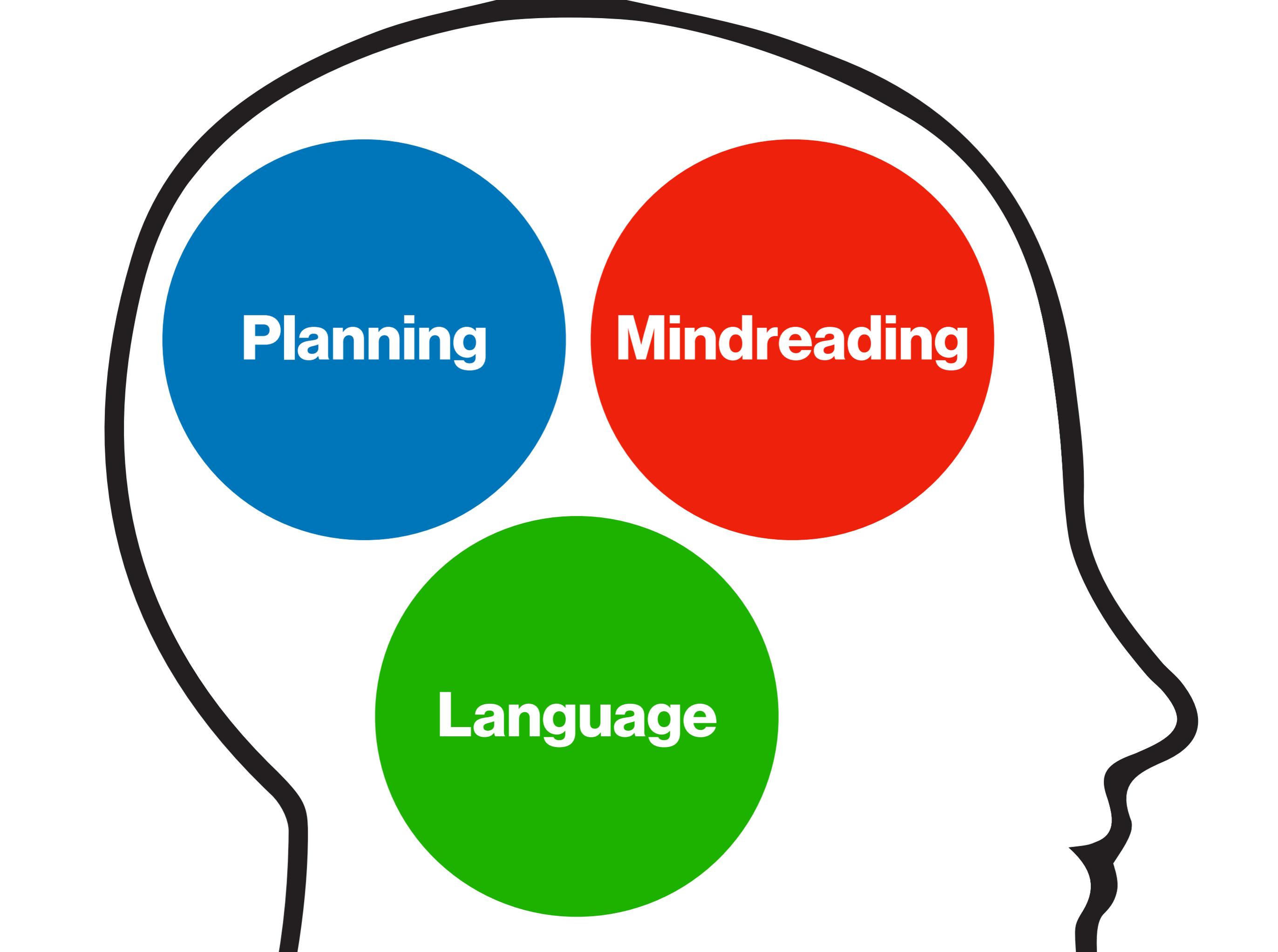
Language

**...has characteristics of
a Fodorian input-output
system:**

Even semantics:

**See Harris (forthcoming):
'Semantics without Semantic Content',
*Mind & Language***

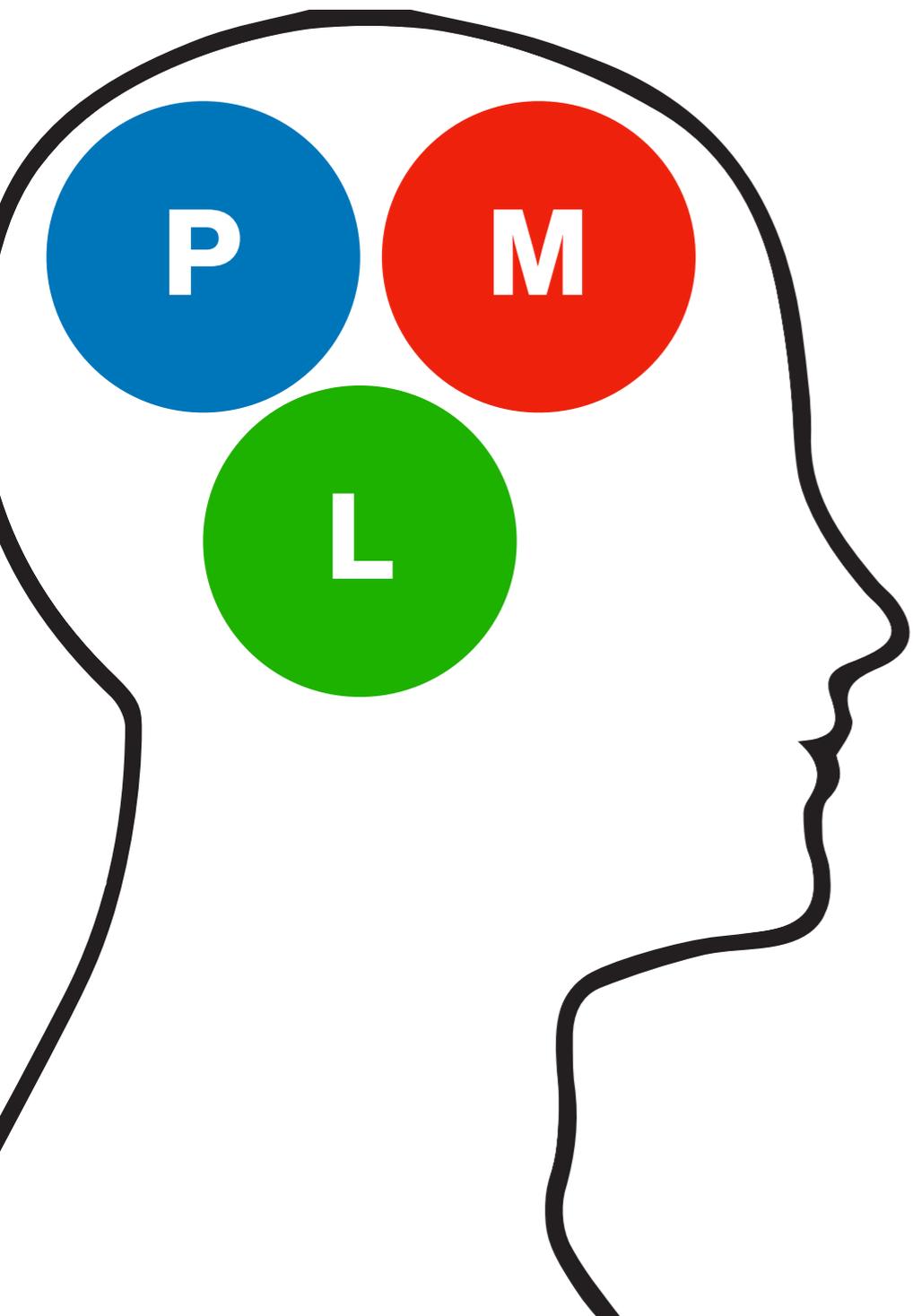
Language



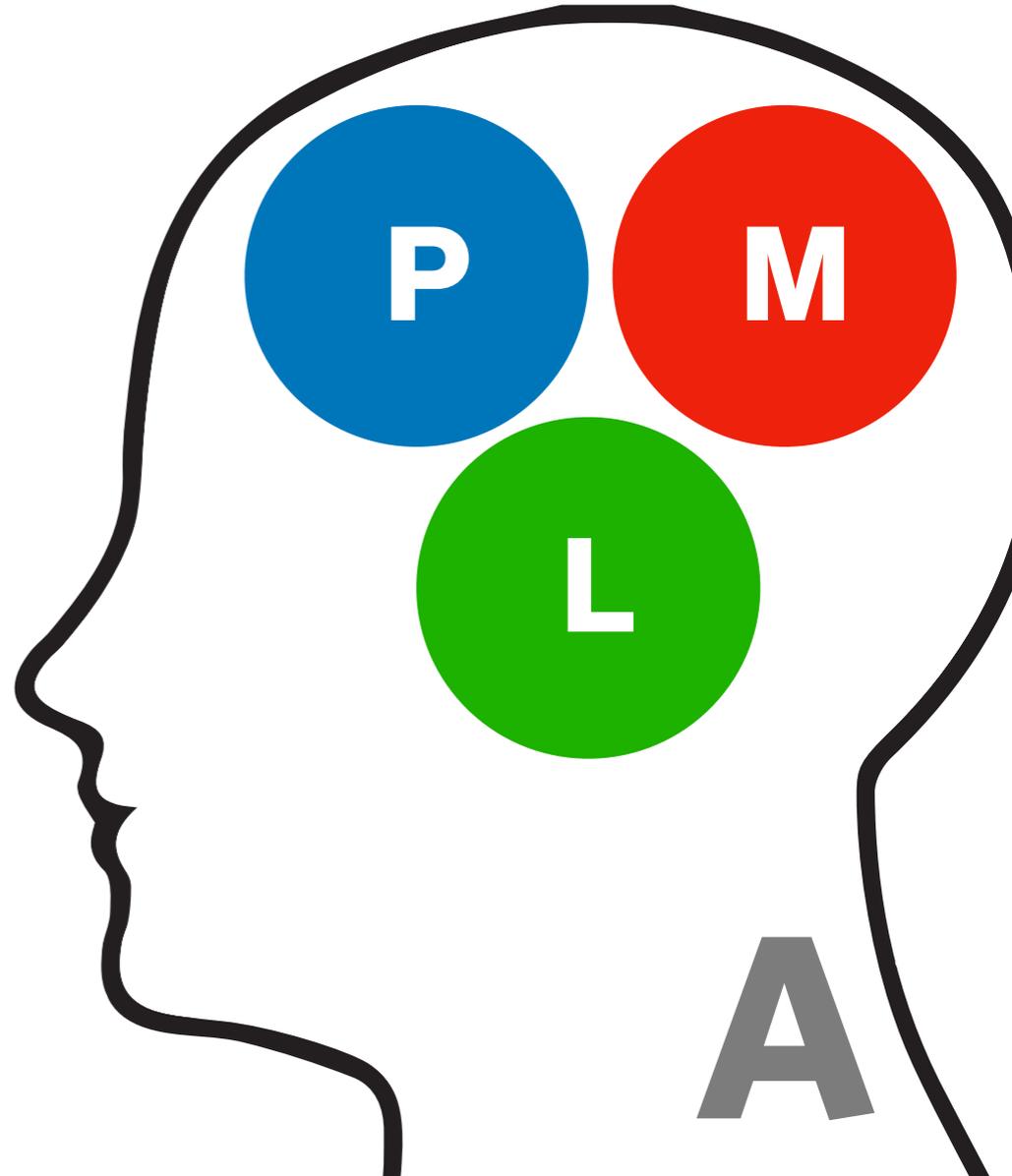
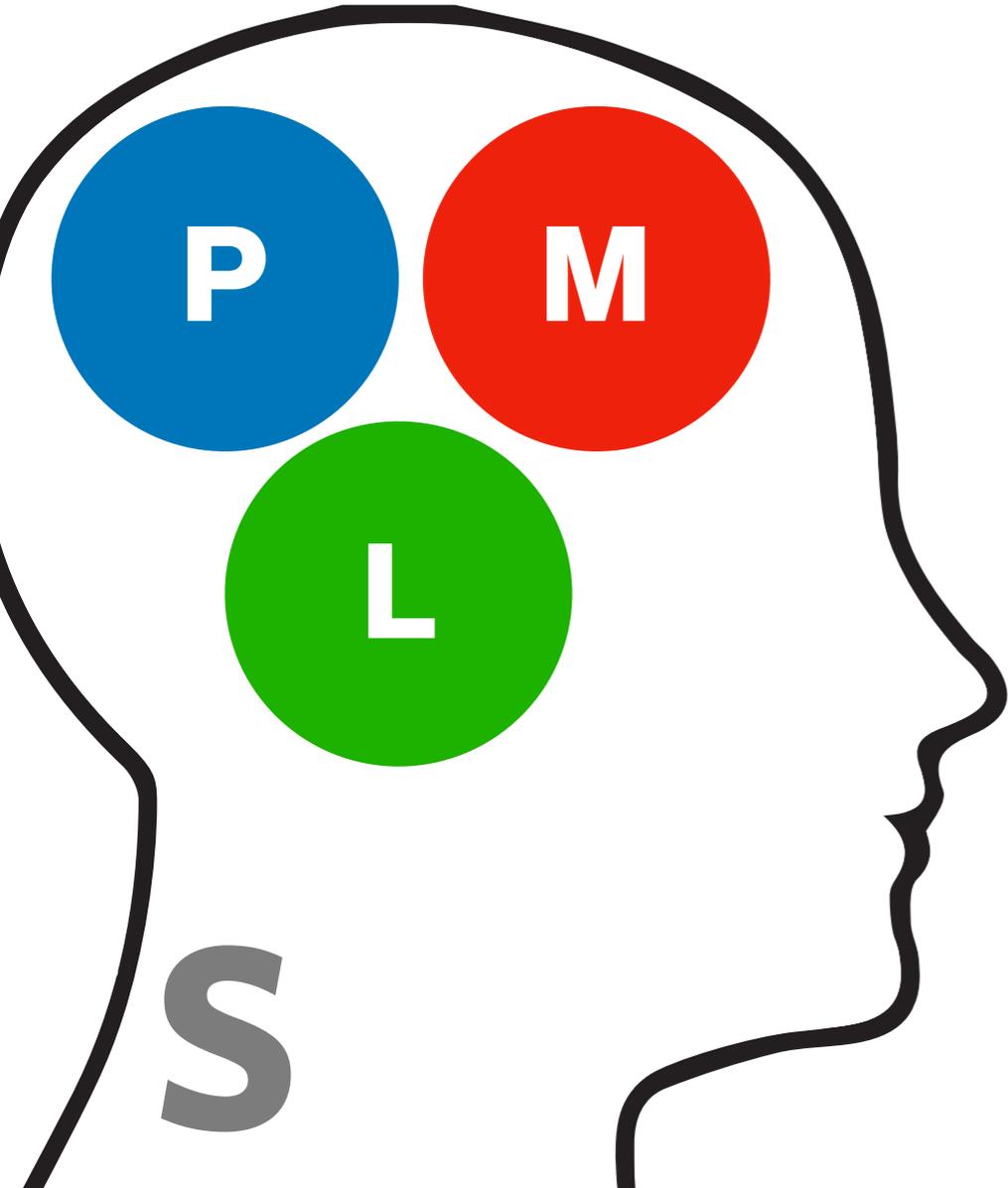
Planning

Mindreading

Language

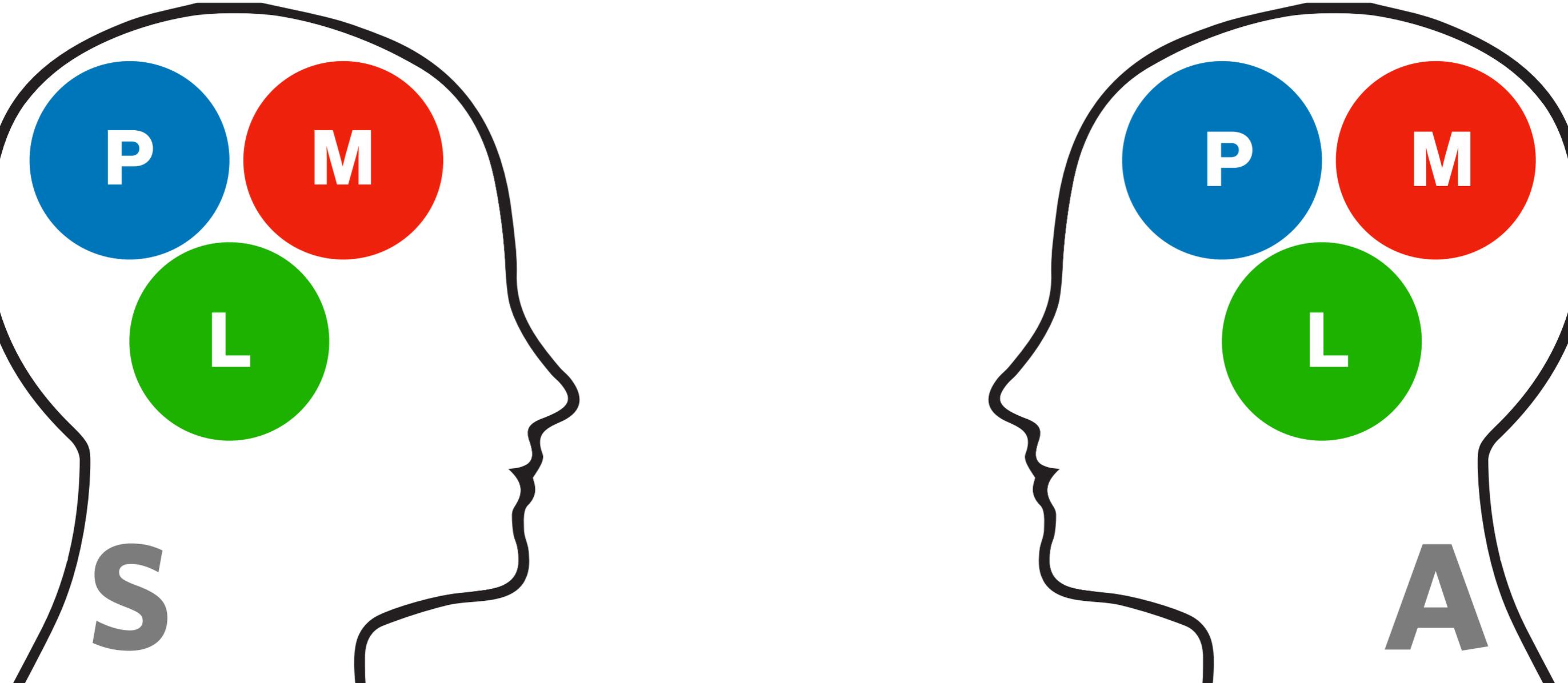


Linguistic Communication



Linguistic Communication

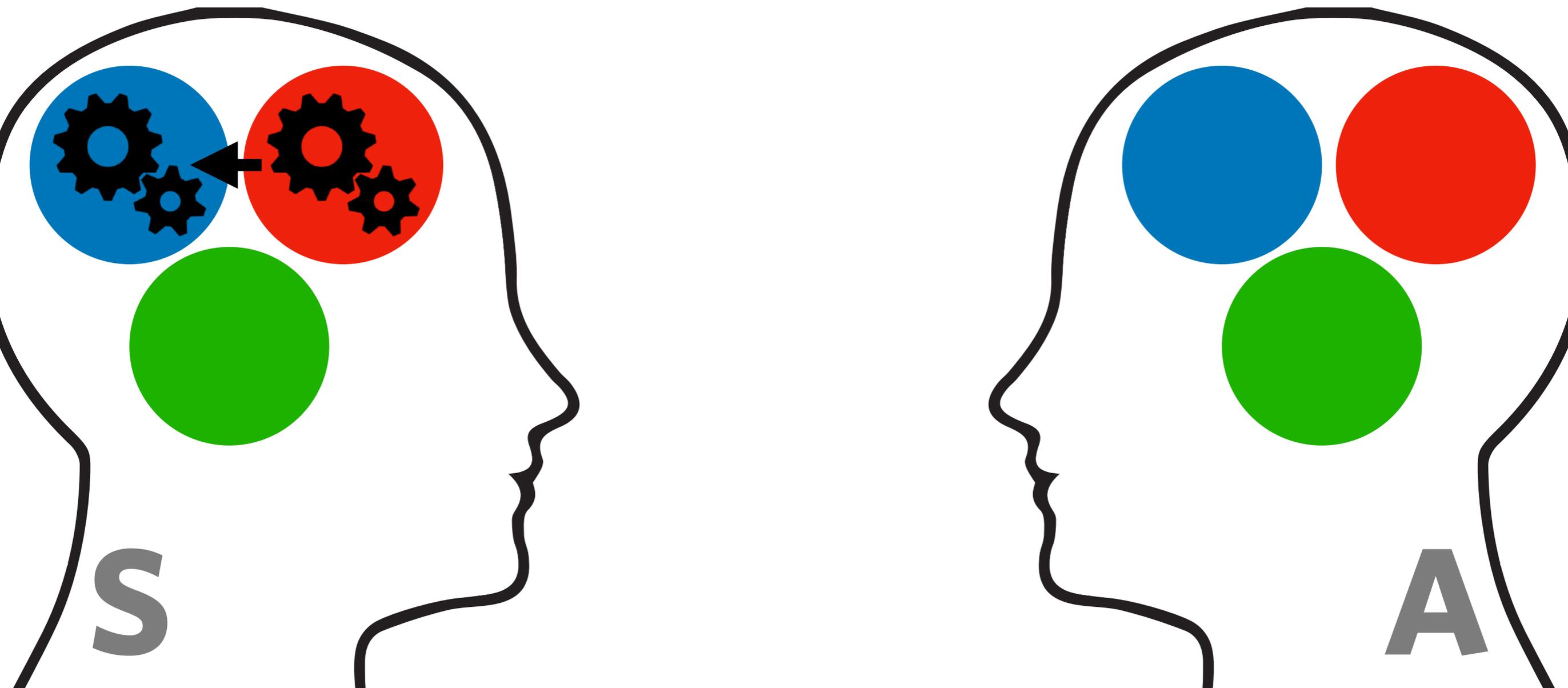
An idealized (and speculative) model.



STEP 1

S formulates a communicative intention

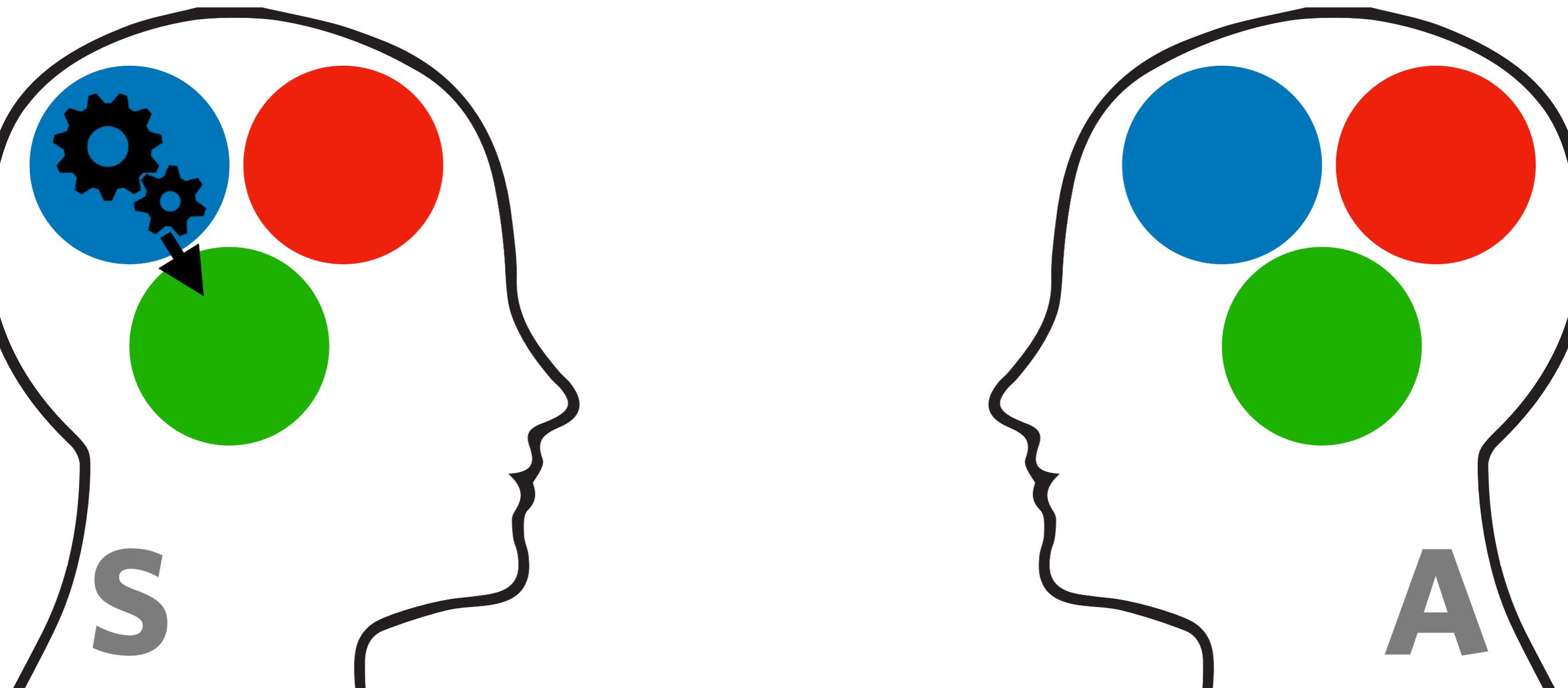
- This intention is a subplan of S's other plans.
- Designing it draws on S's beliefs about A's mental state.



STEP 2

S's planning system sends instruction to the language system

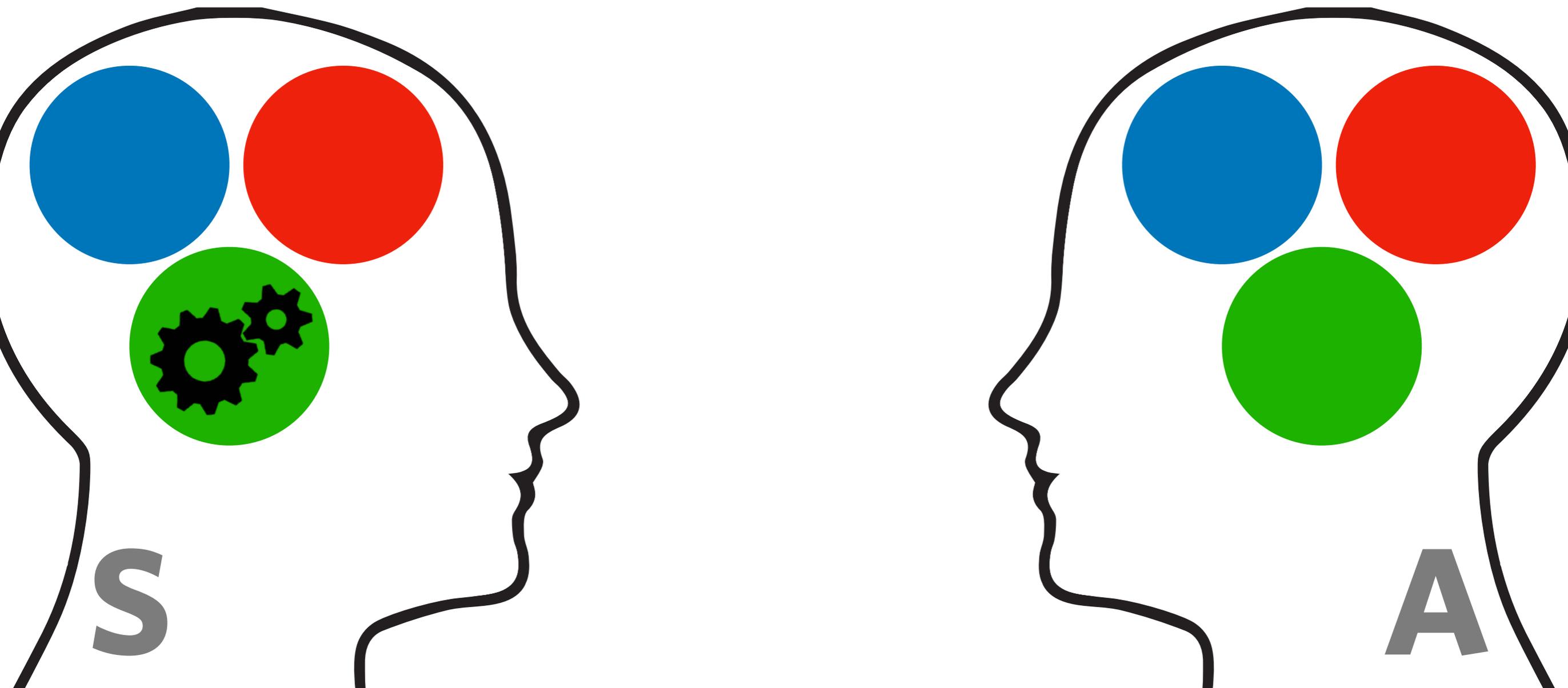
- This instruction is itself a subplan of the communicative intention.
- Interesting question: what information is included in the instruction?



STEP 3

S's language system designs an utterance

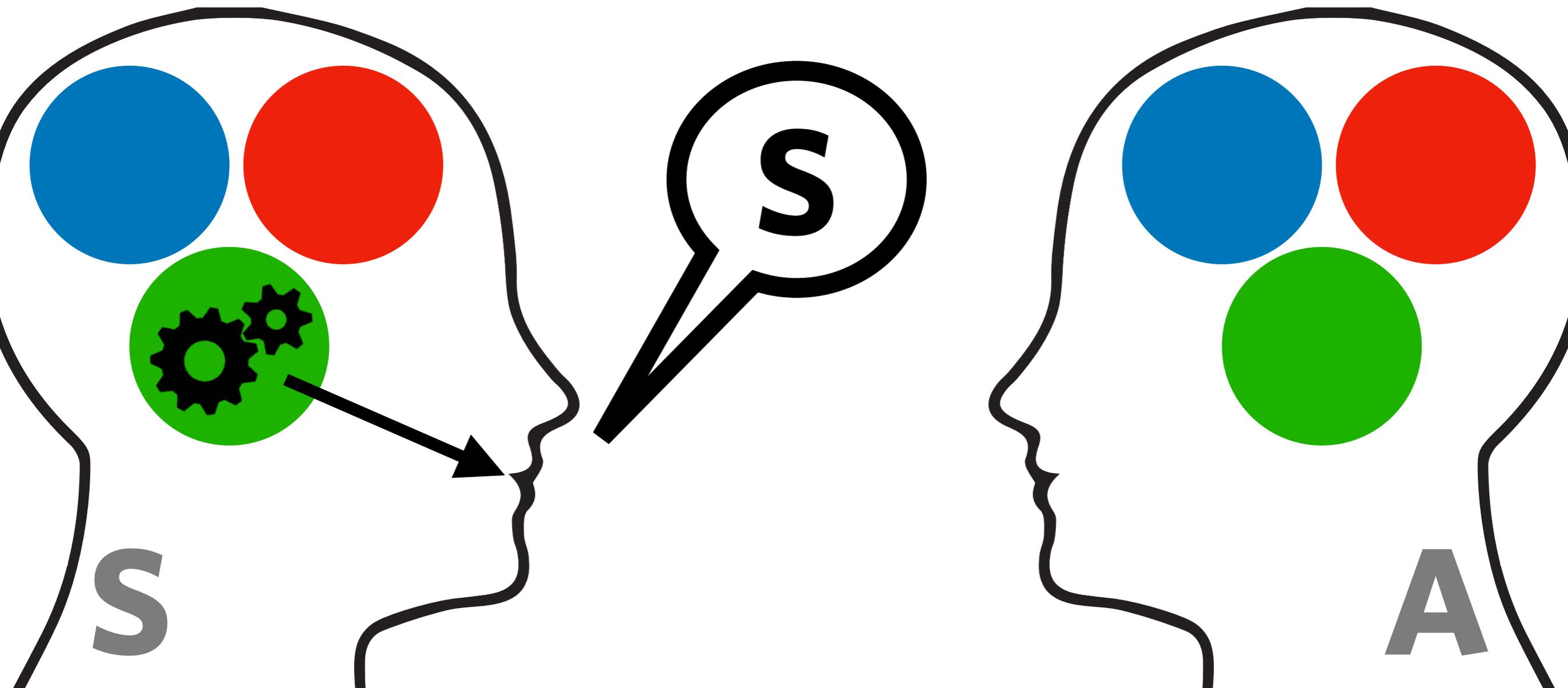
- It transforms its instructions into a phonetic representation, presumably with a semantic representation, an LF, and a PF in between.



STEP 4

S produces an utterance

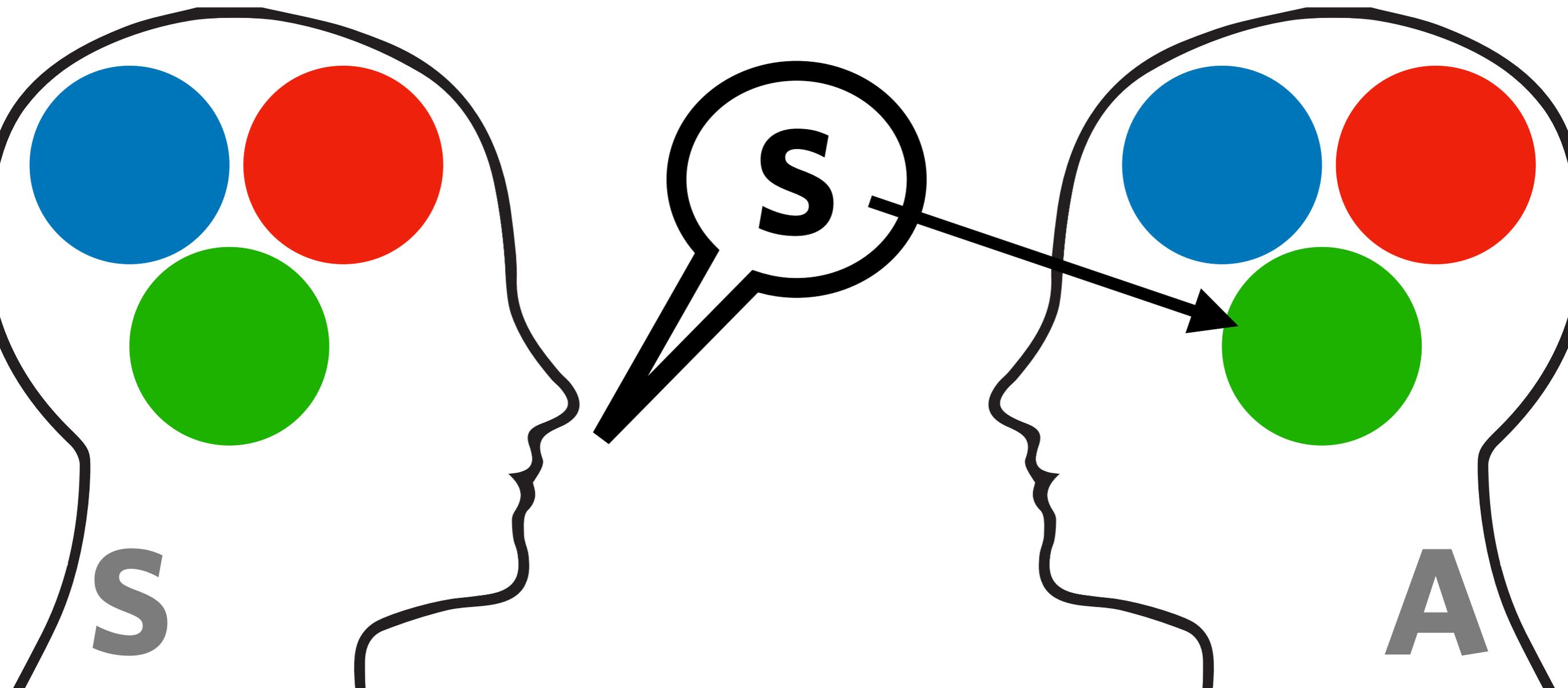
- Phonetic representations → motor instructions → bodily movement.



STEP 5

A senses S's utterance

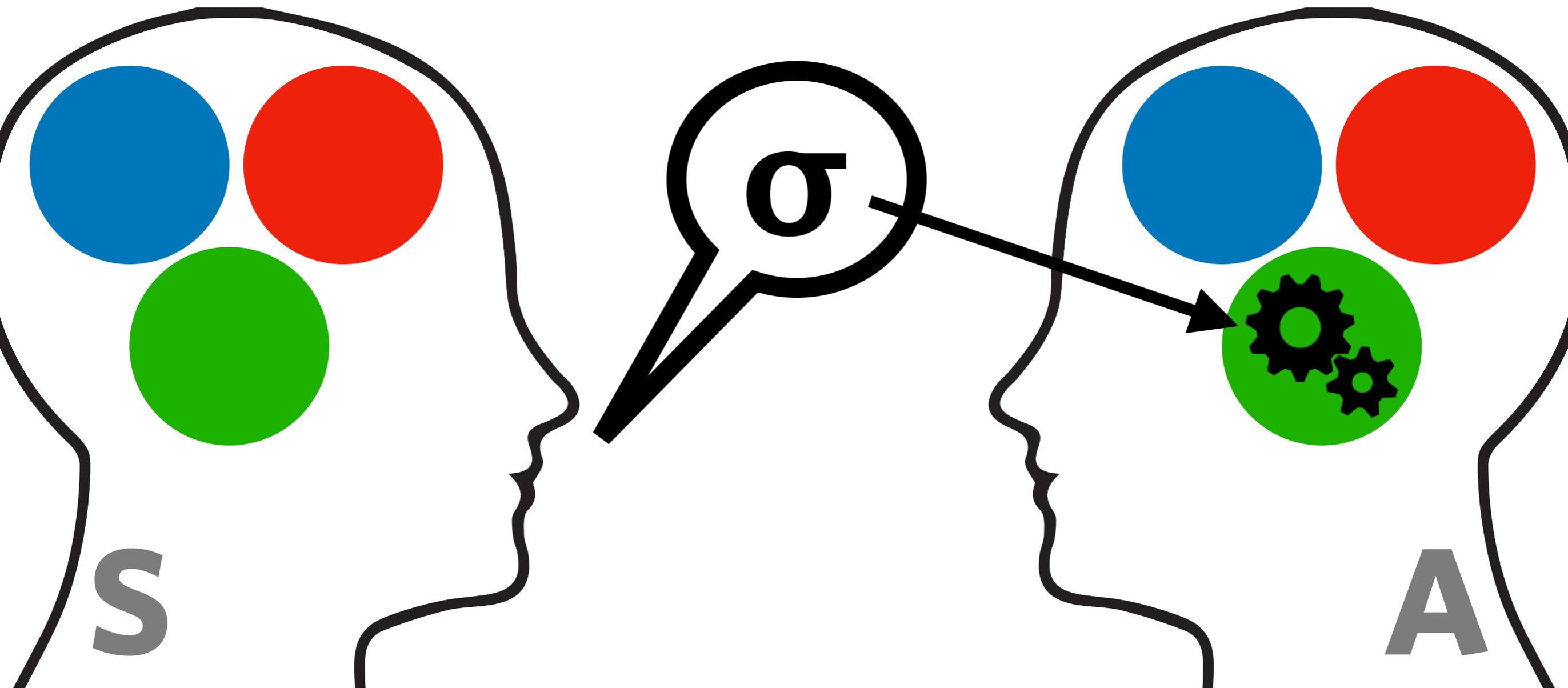
- A's sensory transducers build a phonetic representation of S's utterance, which is sent to A's language system.



STEP 6

Language perception

- A's language system builds a semantic representation of S's utterance.
- This representation is a partial and defeasible specification of S's communicative intention.



Language Perception

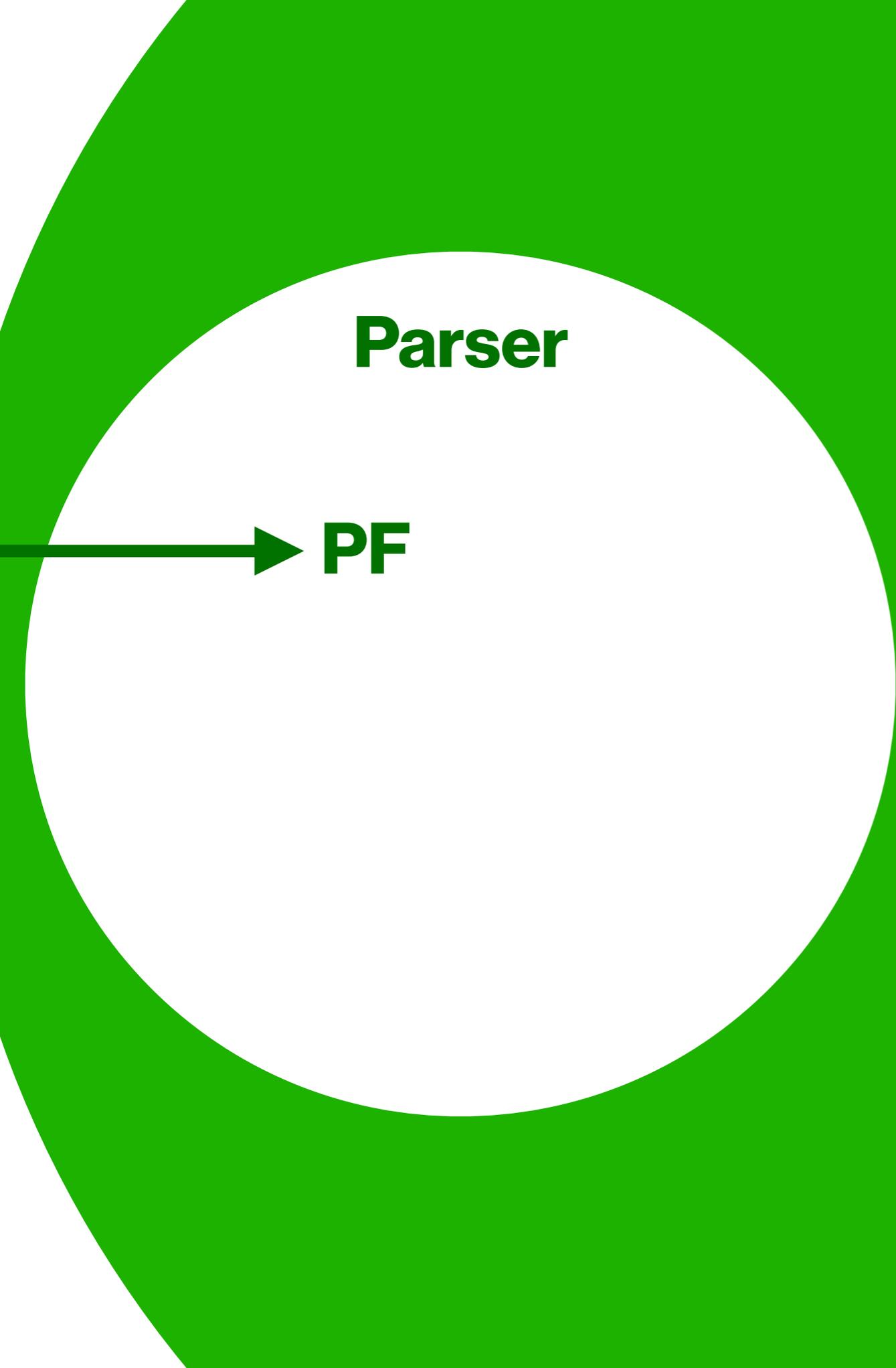
Language Perception

Parser

Language Perception

Parser

PF

A diagram consisting of a large white circle centered on the left side of a solid green background. Inside the circle, the word "Parser" is written in bold green font at the top. Below it, the letters "PF" are written in bold green font. A horizontal green arrow points from the left edge of the circle towards the "PF" text.

Language Perception

Parser

PF

Phonological
Competence



Language Perception

Parser

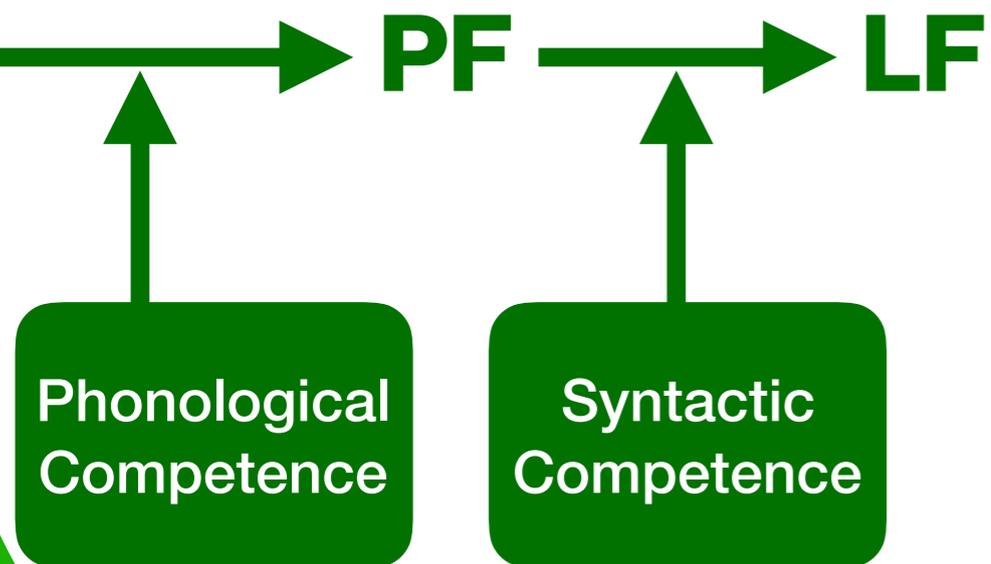
PF → **LF**

Phonological
Competence



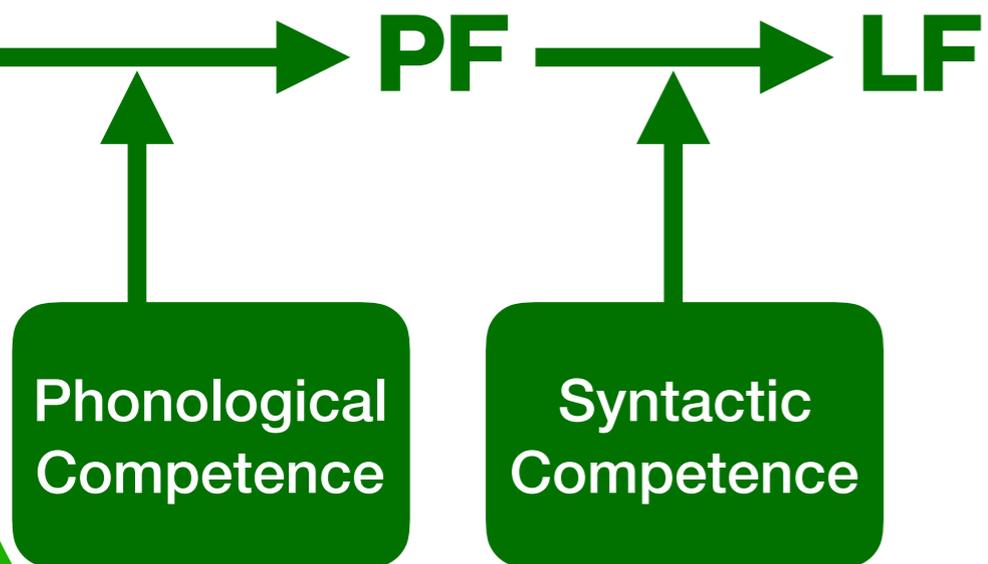
Language Perception

Parser



Language Perception

Parser

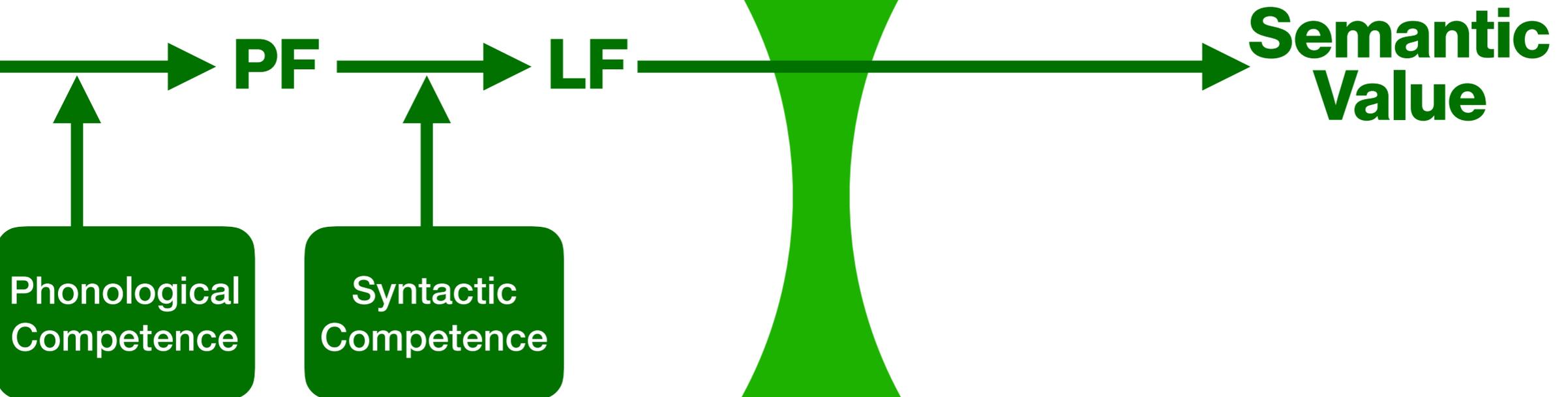


Semantic Processor

Language Perception

Parser

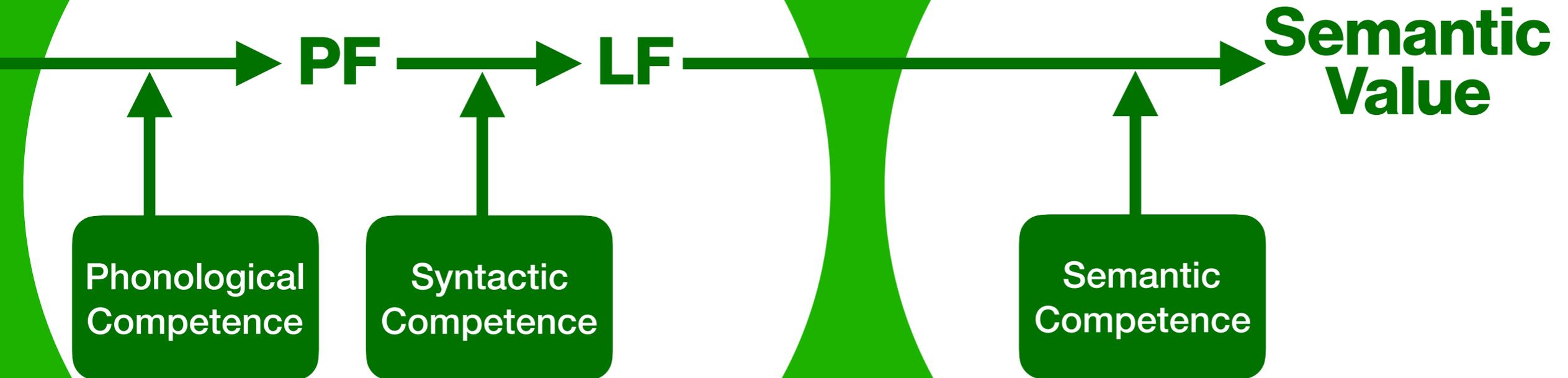
Semantic Processor



Language Perception

Parser

Semantic Processor



Language Perception

Parser

Semantic Processor



Phonological
Competence

Syntactic
Competence

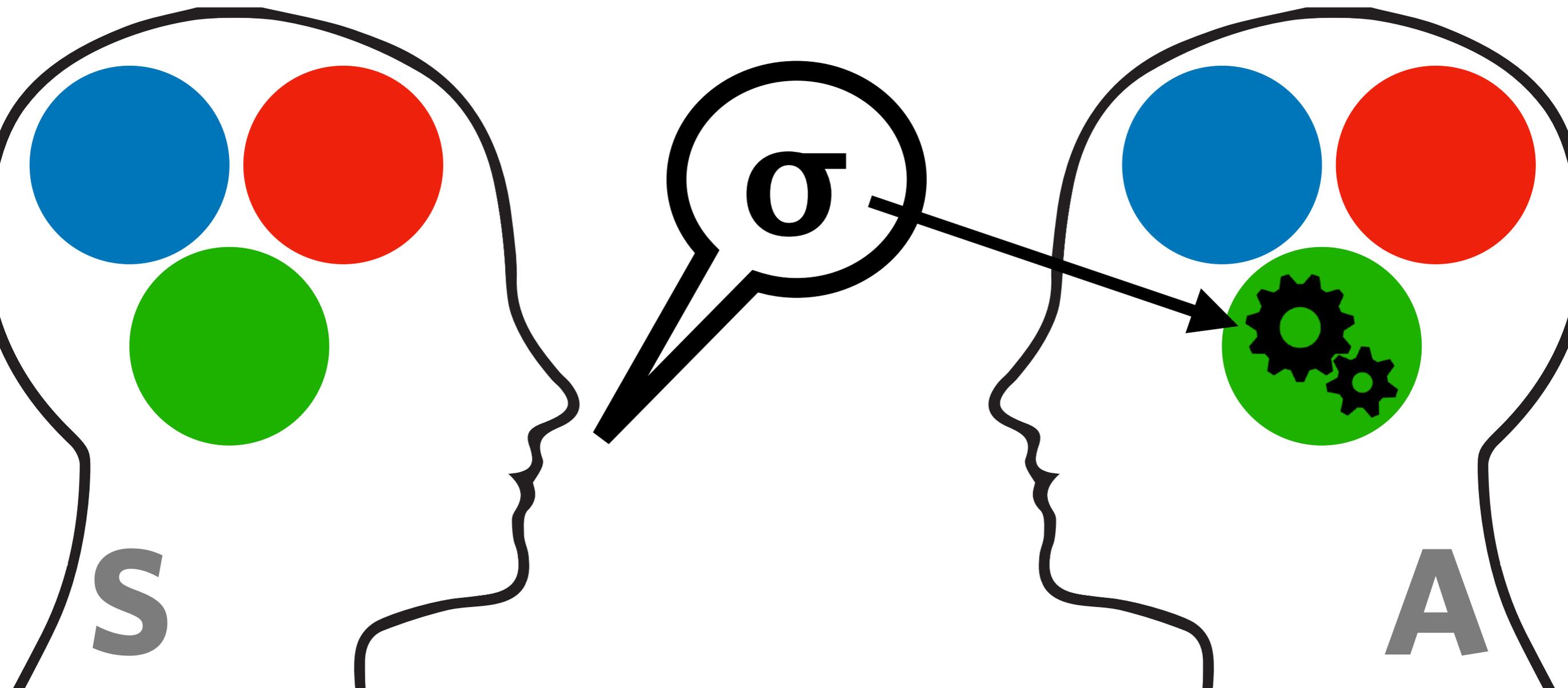
Semantic
Competence

Language Perception

STEP 6

Linguistic processing

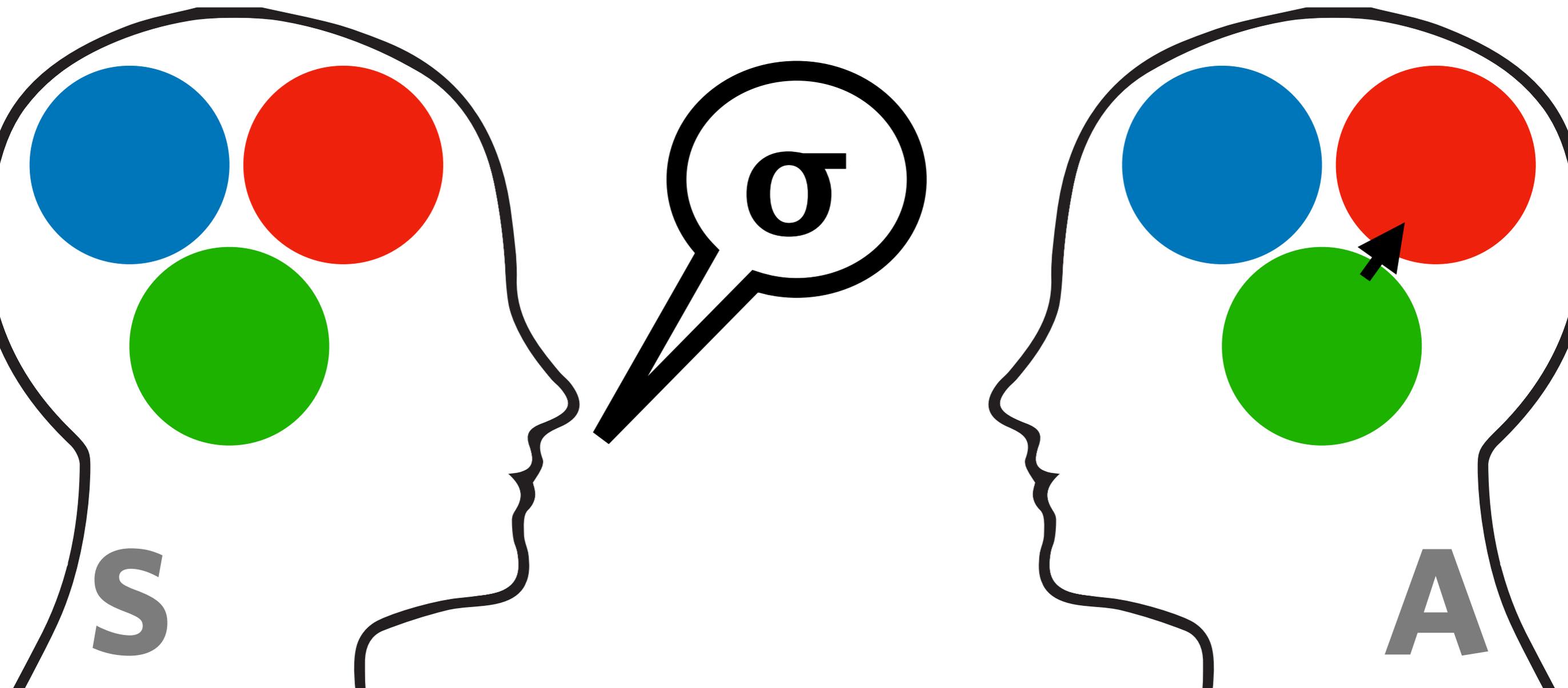
- A's language system computes the semantic value of the sentence S uttered.



STEP 7

language system → mindreading system

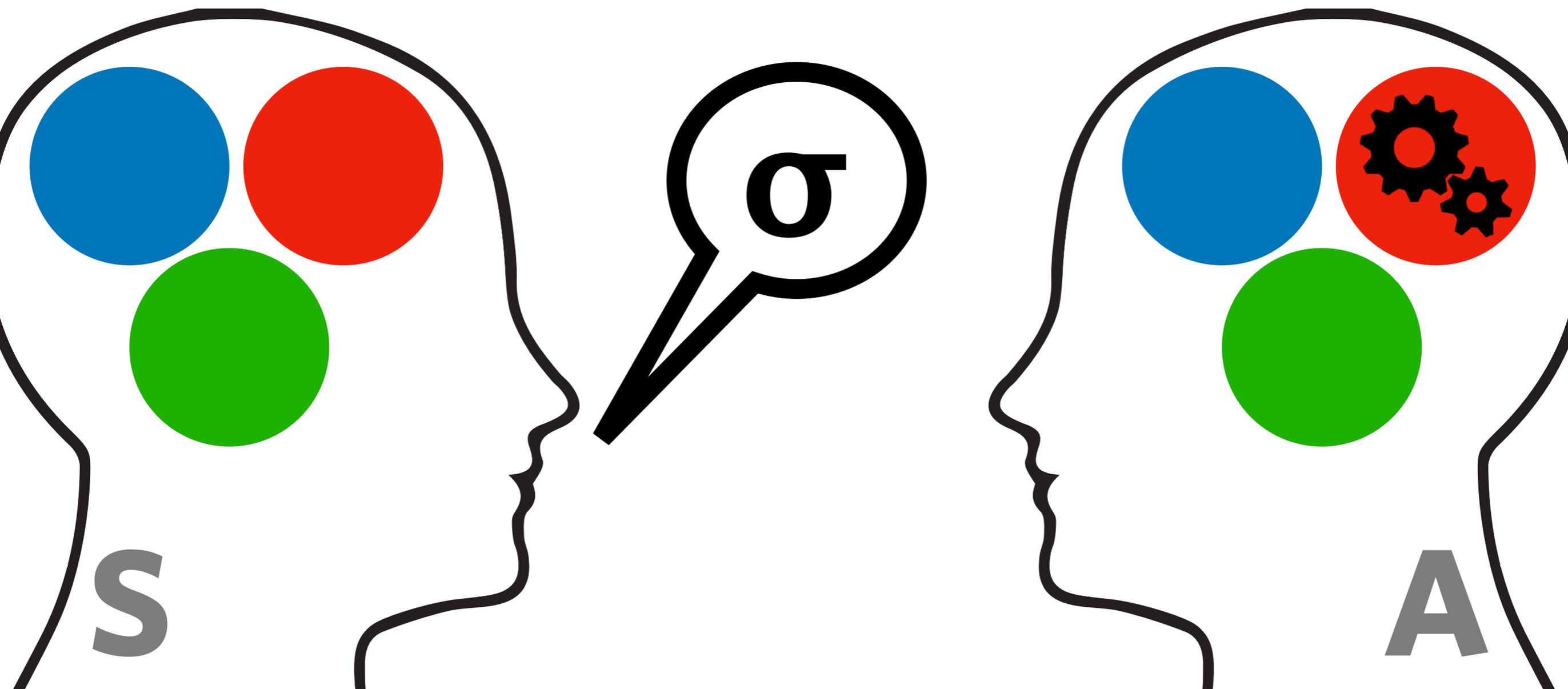
- The language system provides the mindreading system with partial and defeasible evidence of what S communicatively intends.



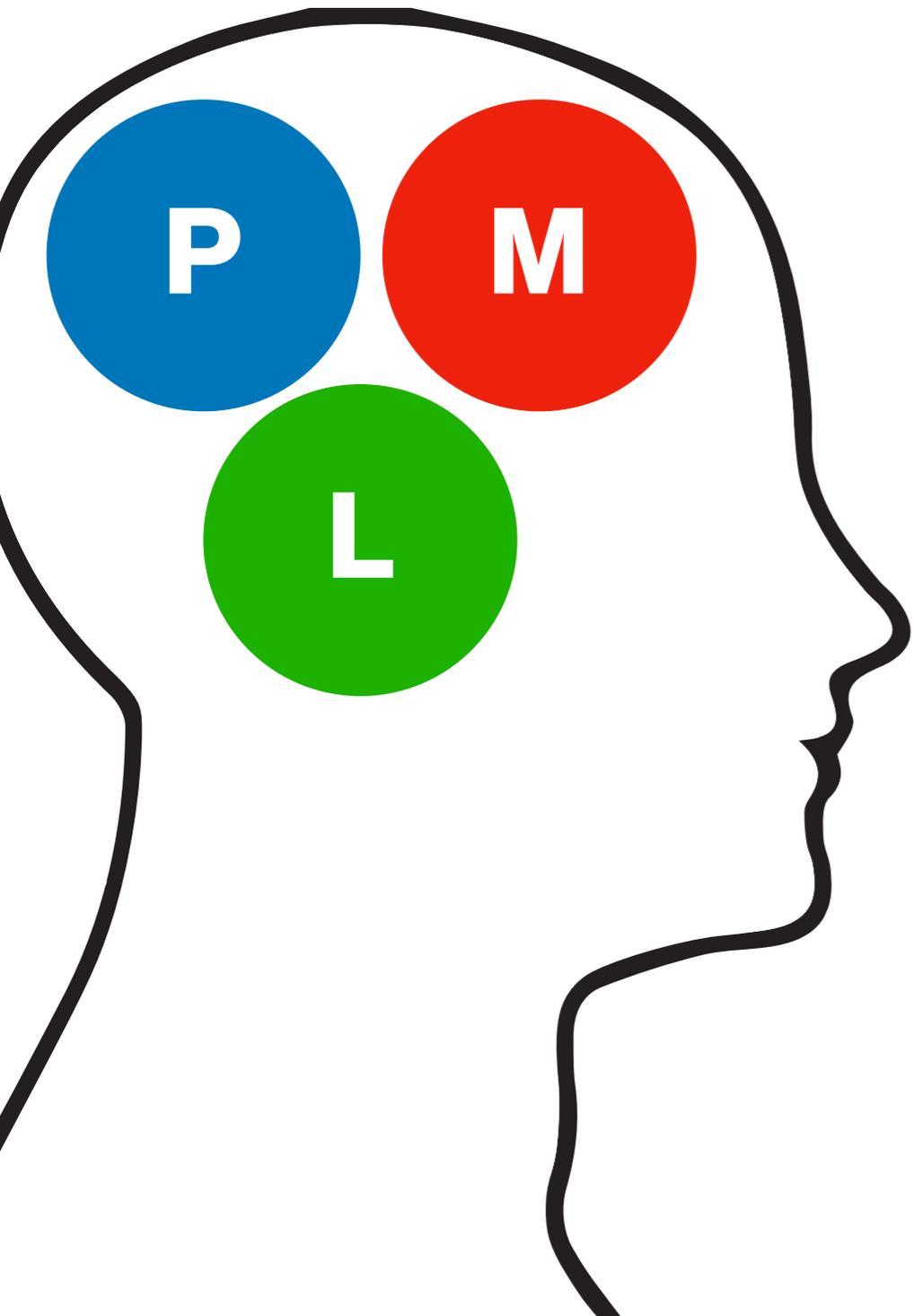
STEP 8

Pragmatic Inference

- A's mindreading system uses this linguistic evidence (and whatever else it's got) to infer S's communicative intention.



Semantics vs. Pragmatics?



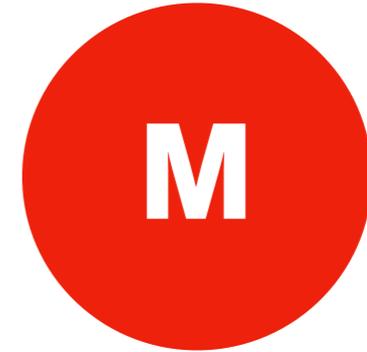
Semantics

is the study of a subsystem of



Pragmatics

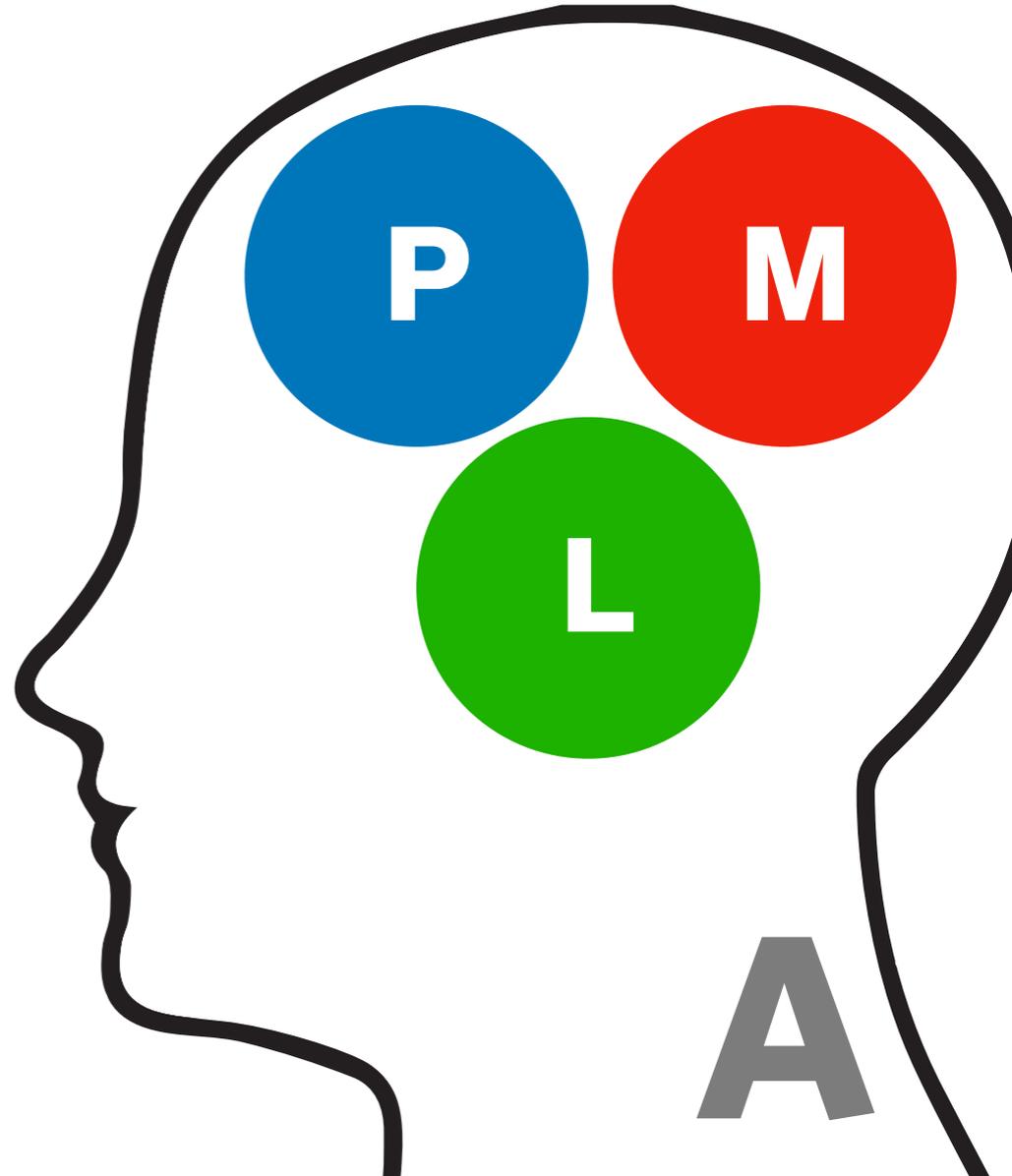
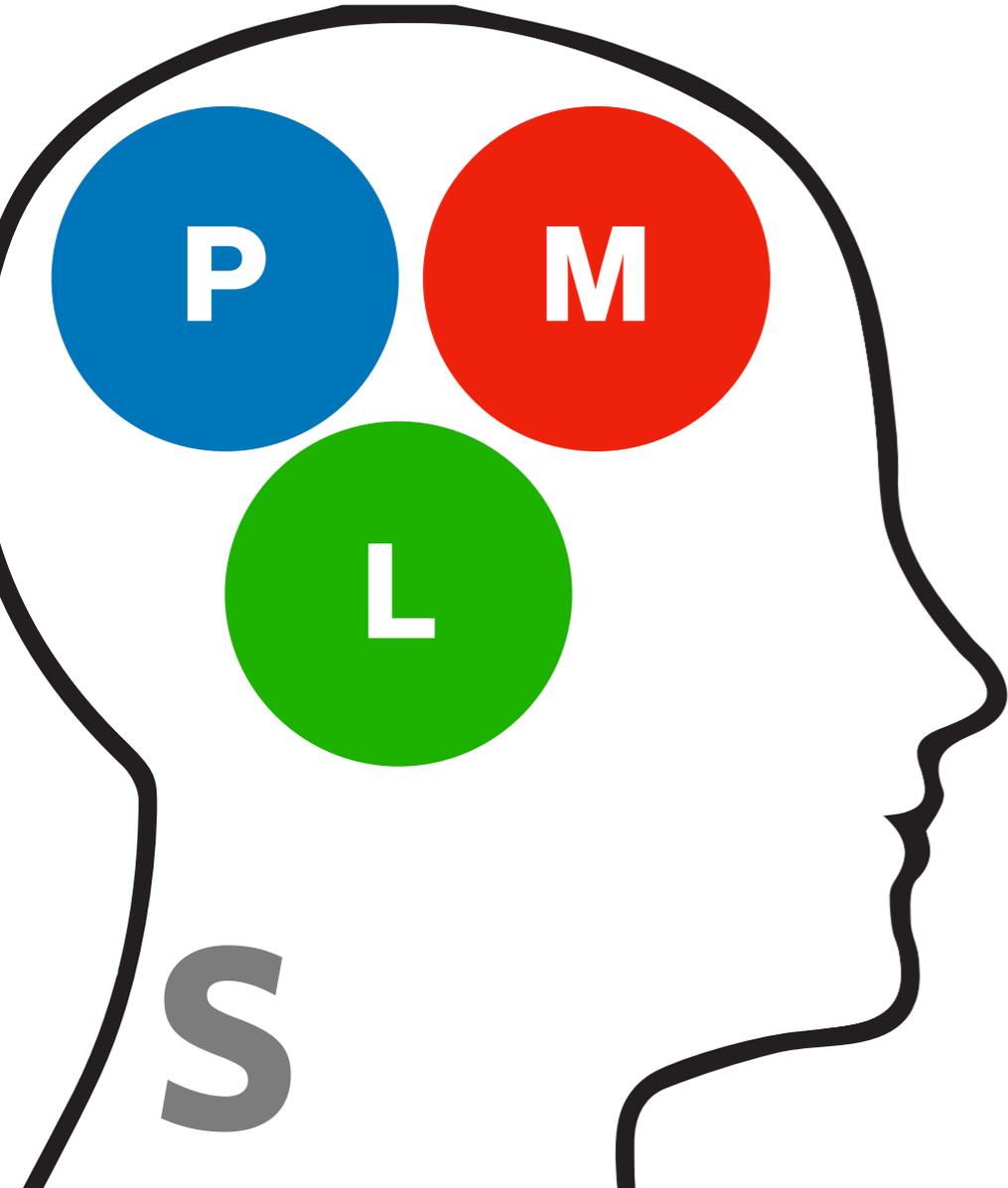
is the study of certain activities of



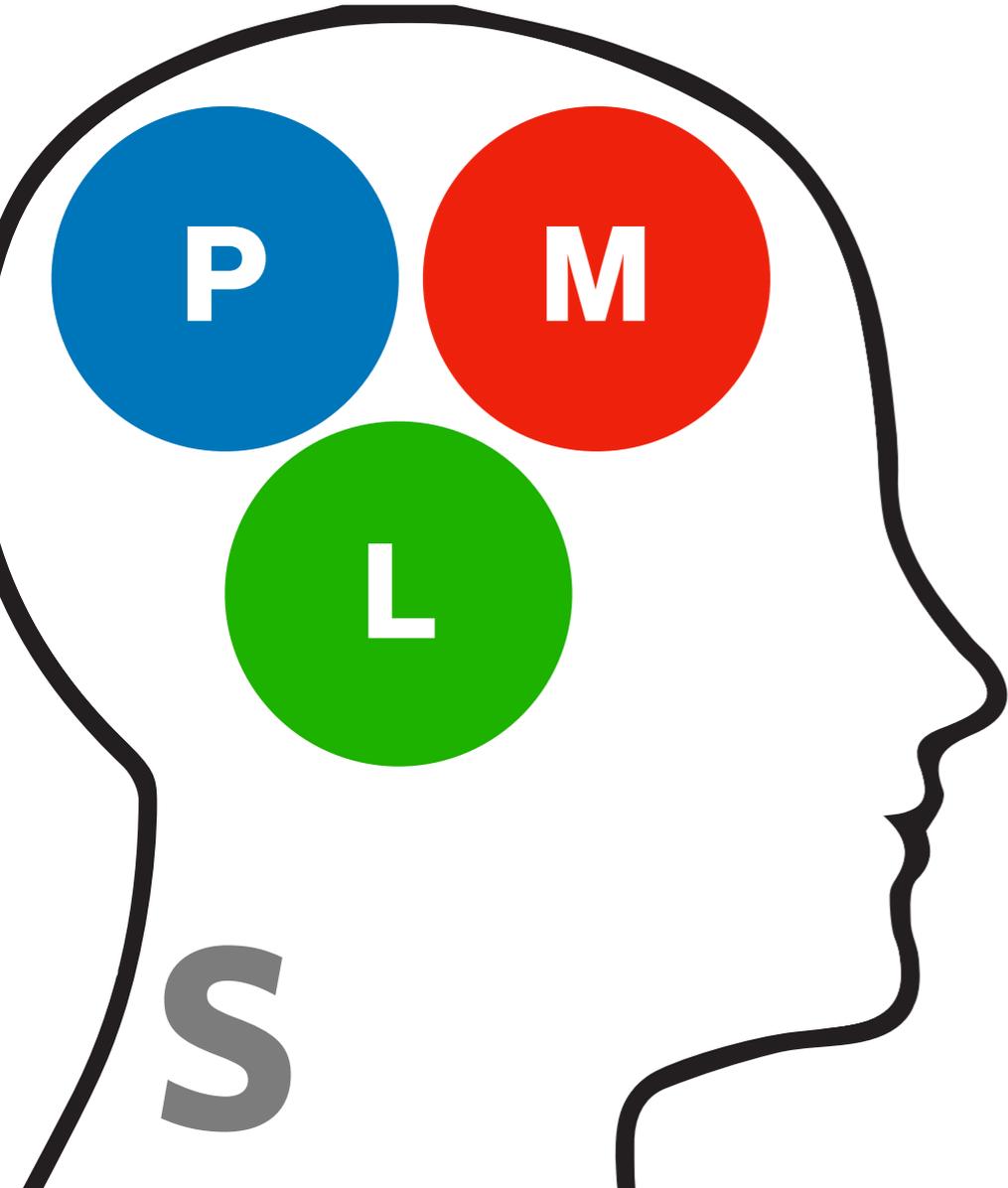
The *semantics-pragmatics interface* is the interface between language and the other two systems.

Non-Communicative Language Use

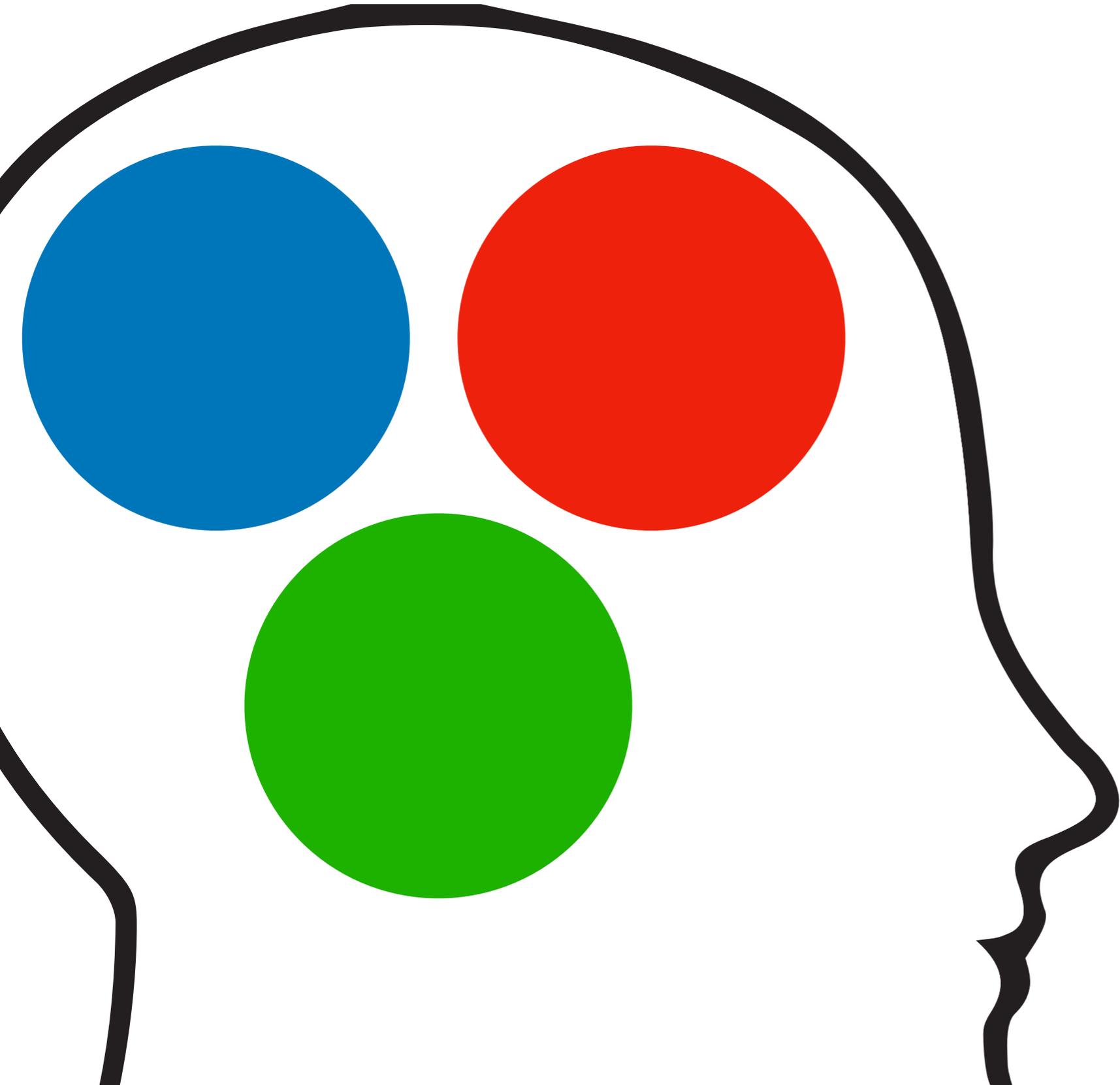
Non-Communicative Language Use



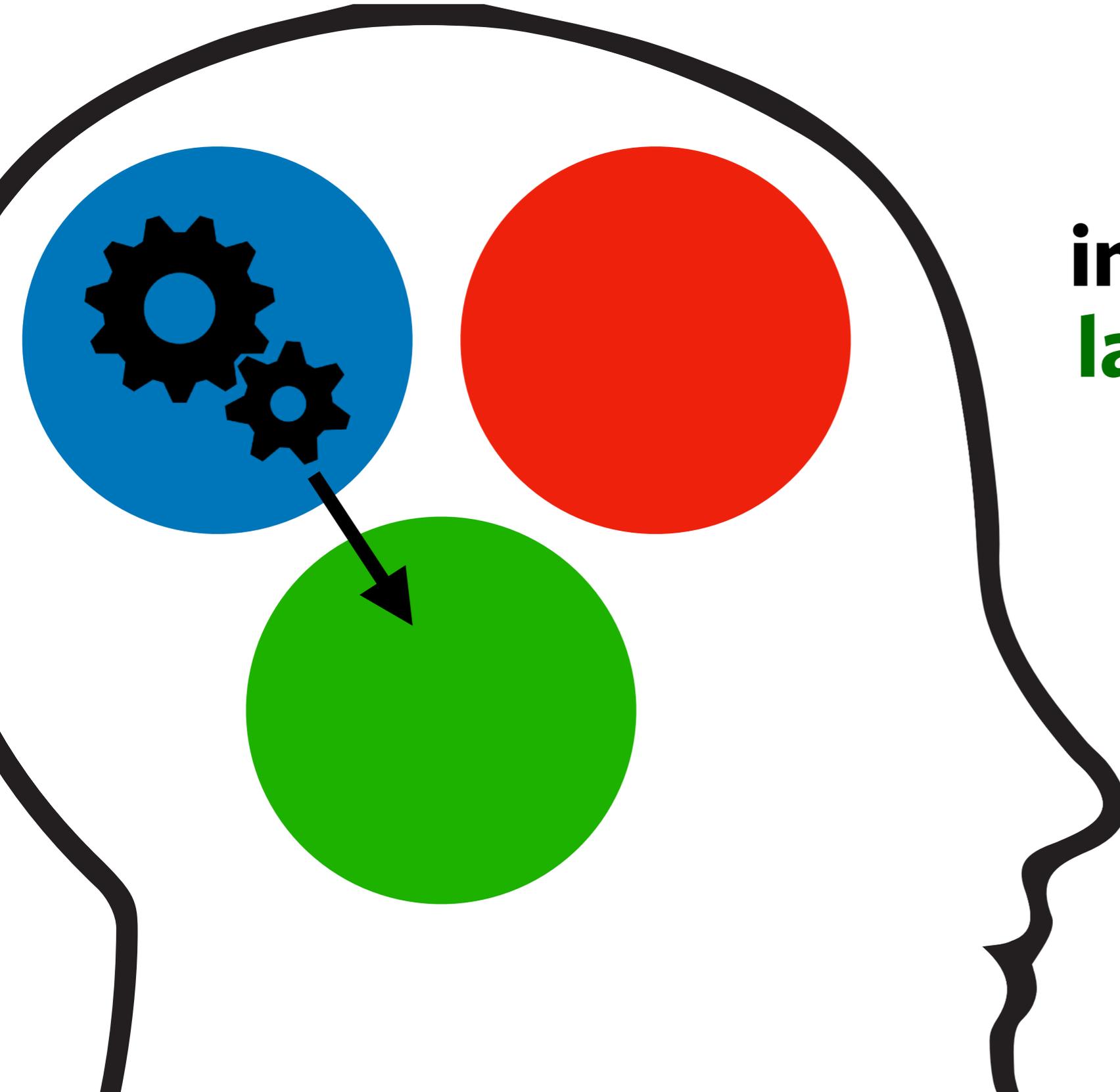
Non-Communicative Language Use



Non-Communicative Language Use

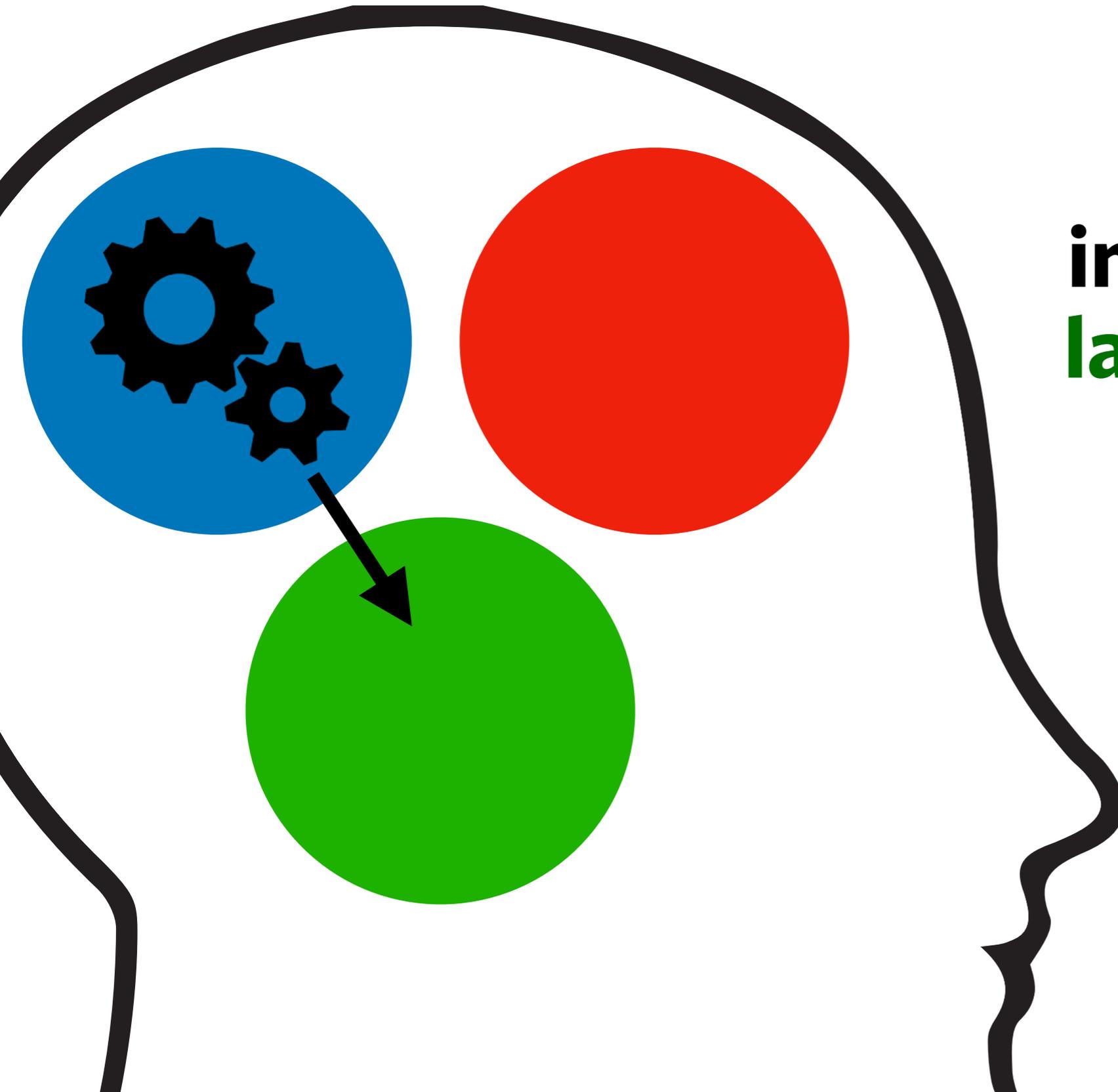


Non-Communicative Language Use



The **planning** system sends instruction to the **language** system

Non-Communicative Language Use



The **planning** system sends instruction to the **language** system.

These instructions are a subplan of *S*'s prior intention.

Planning

PRIOR INTENTION

**Intention to communicate
that Grice was right**

Planning

PRIOR INTENTION

**Intention to communicate
that Grice was right**



SUBPLAN

**Instruction for language
system to say that Grice
was right**

Planning



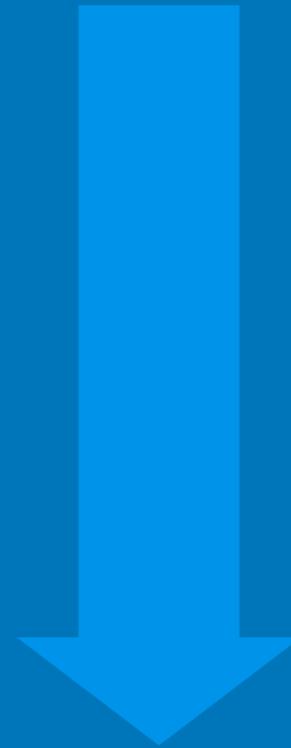
SUBPLAN

**Instruction for language
system to say that Grice
was right**

Planning

PRIOR INTENTION

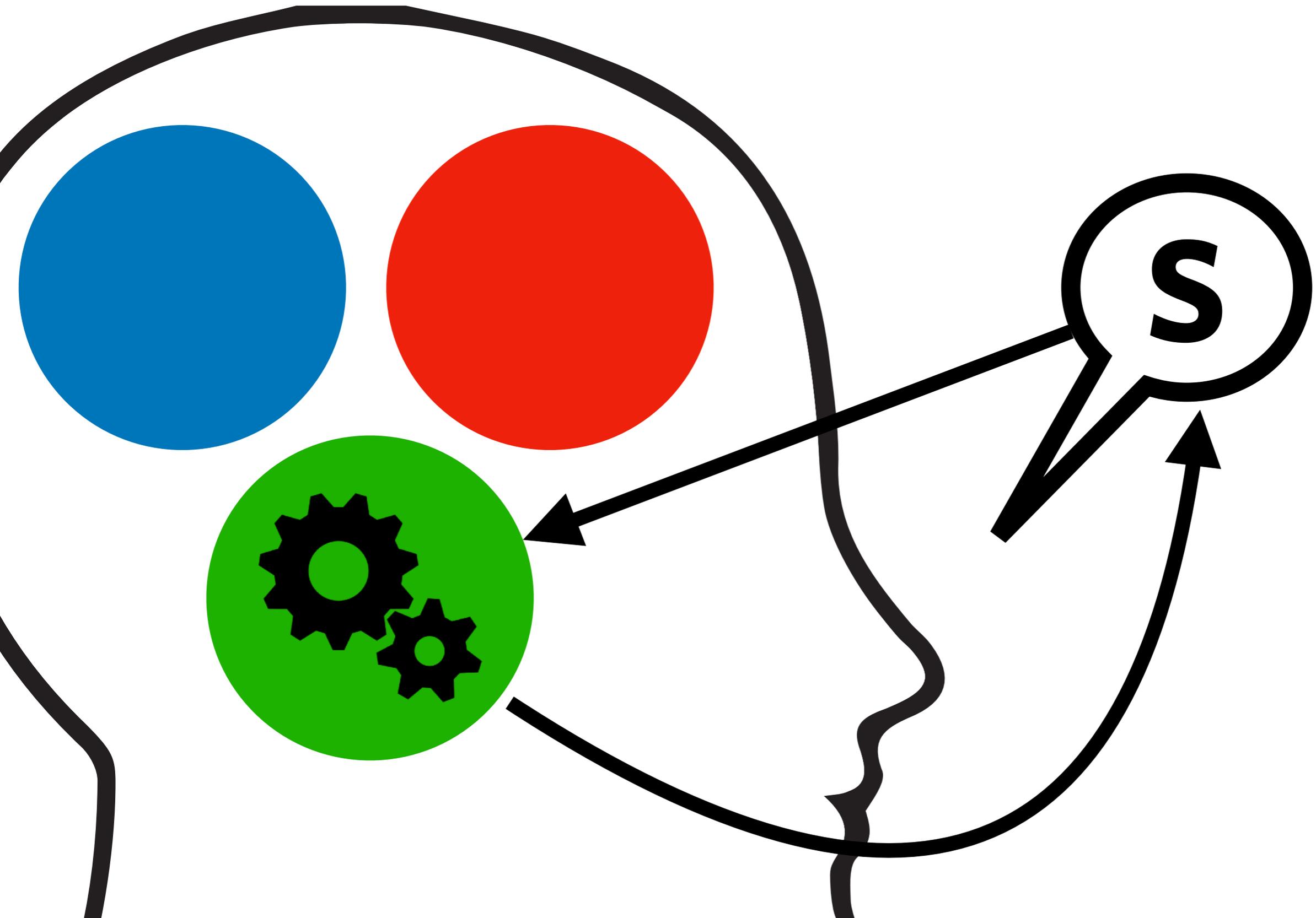
Intention to *practice* saying
that Grice was right



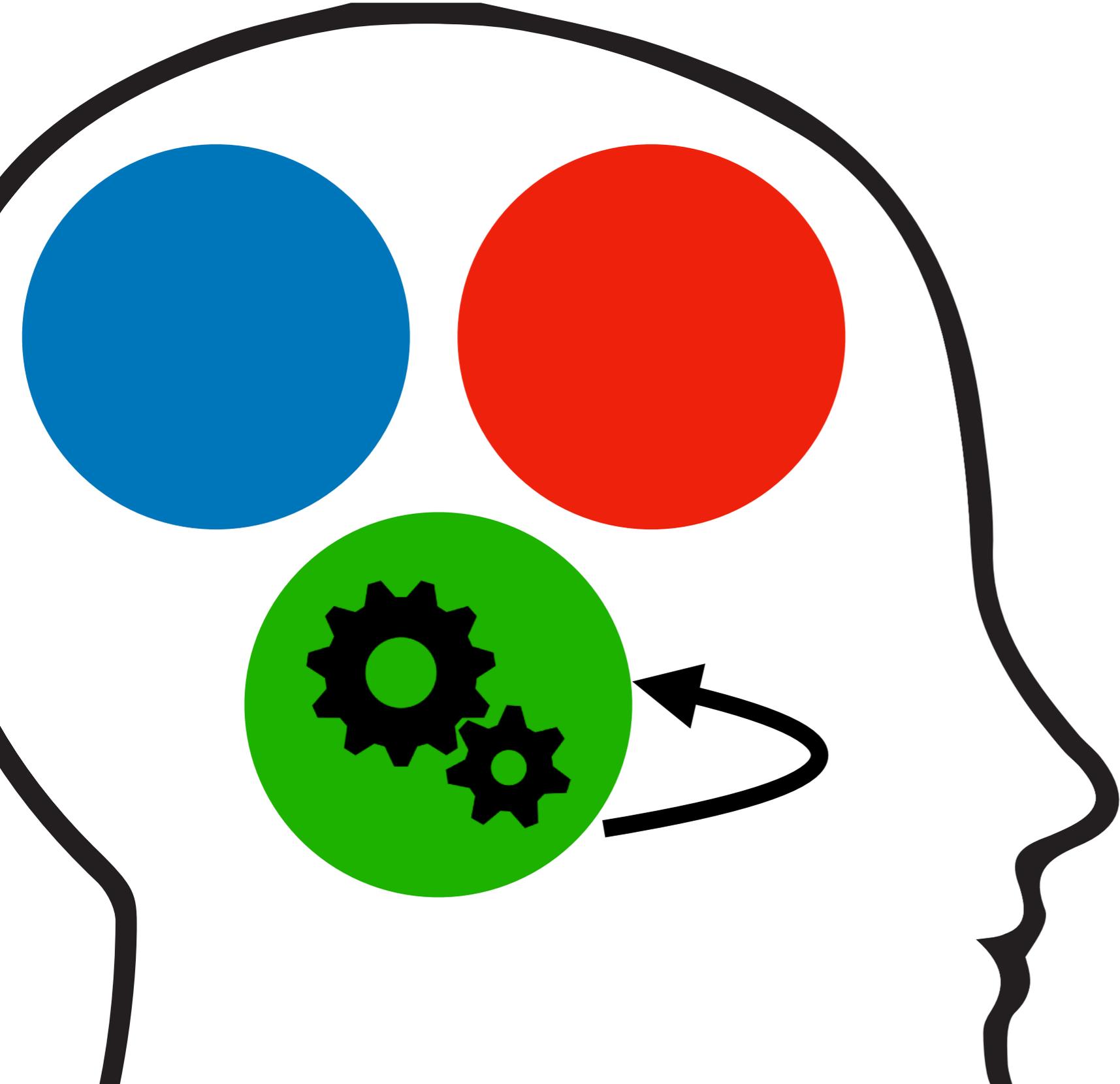
SUBPLAN

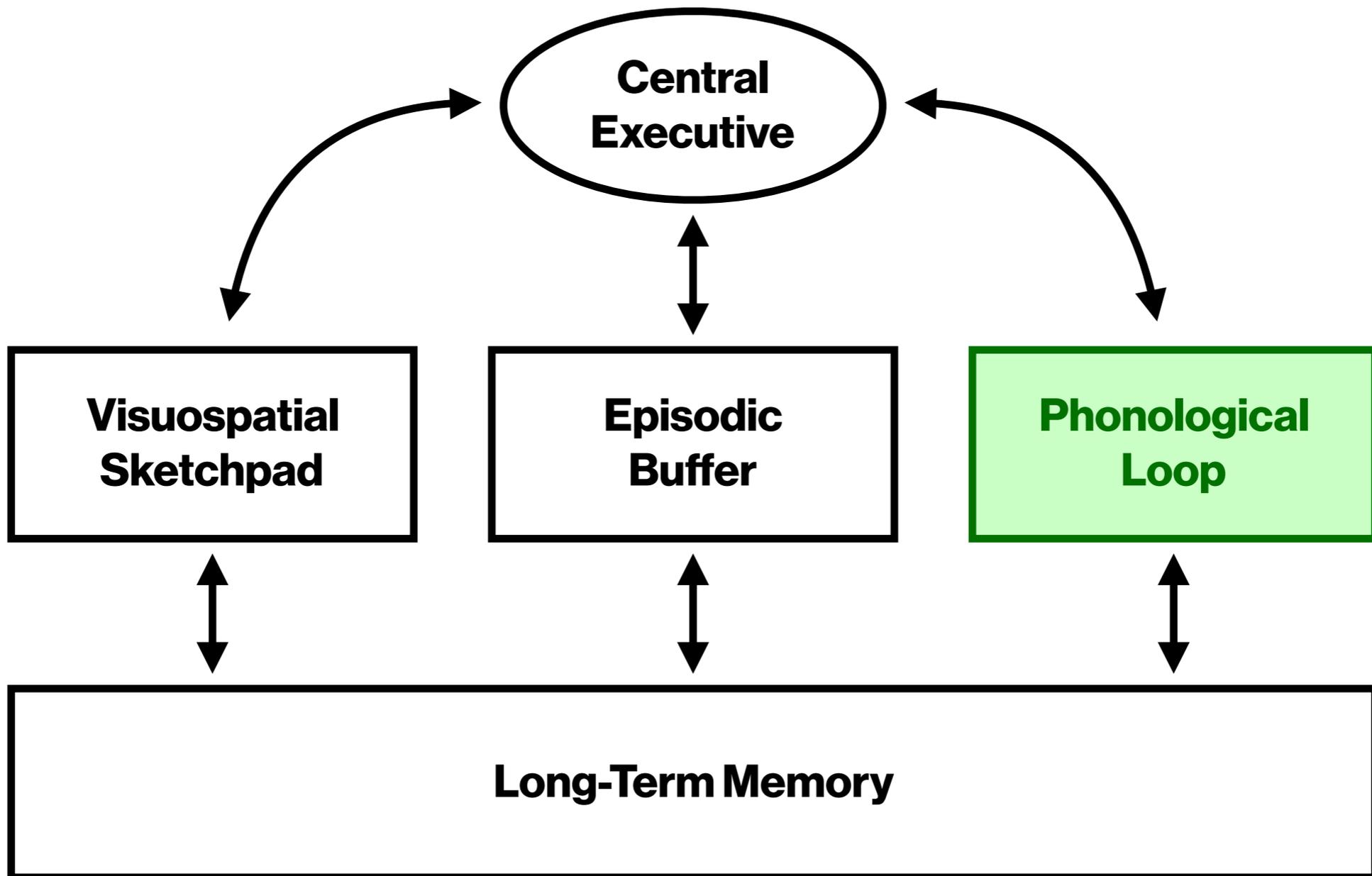
Instruction for language
system to say that Grice
was right

Non-Communicative Language Use



Non-Communicative Language Use

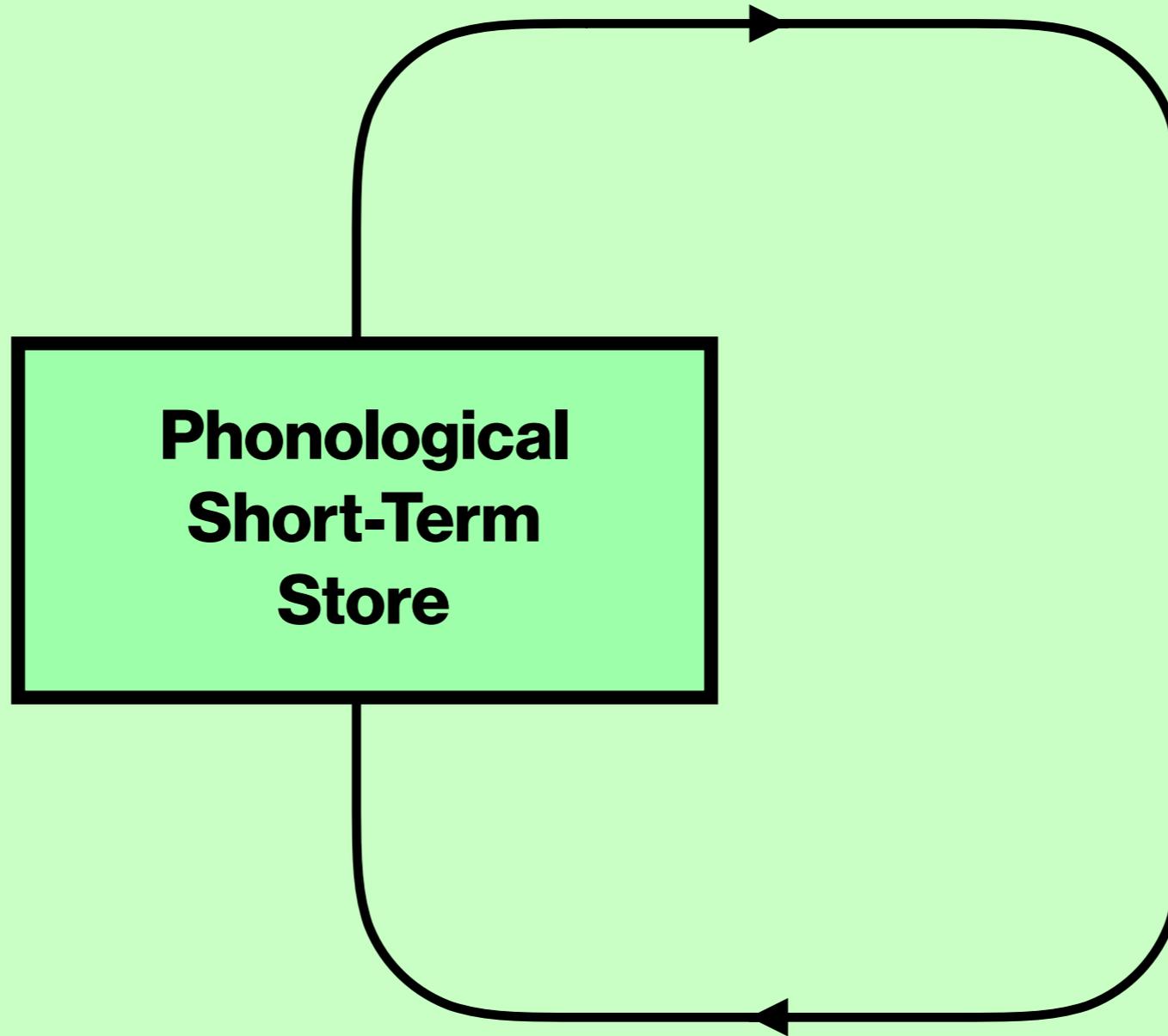




Alan Baddeley's (2000) model of working memory

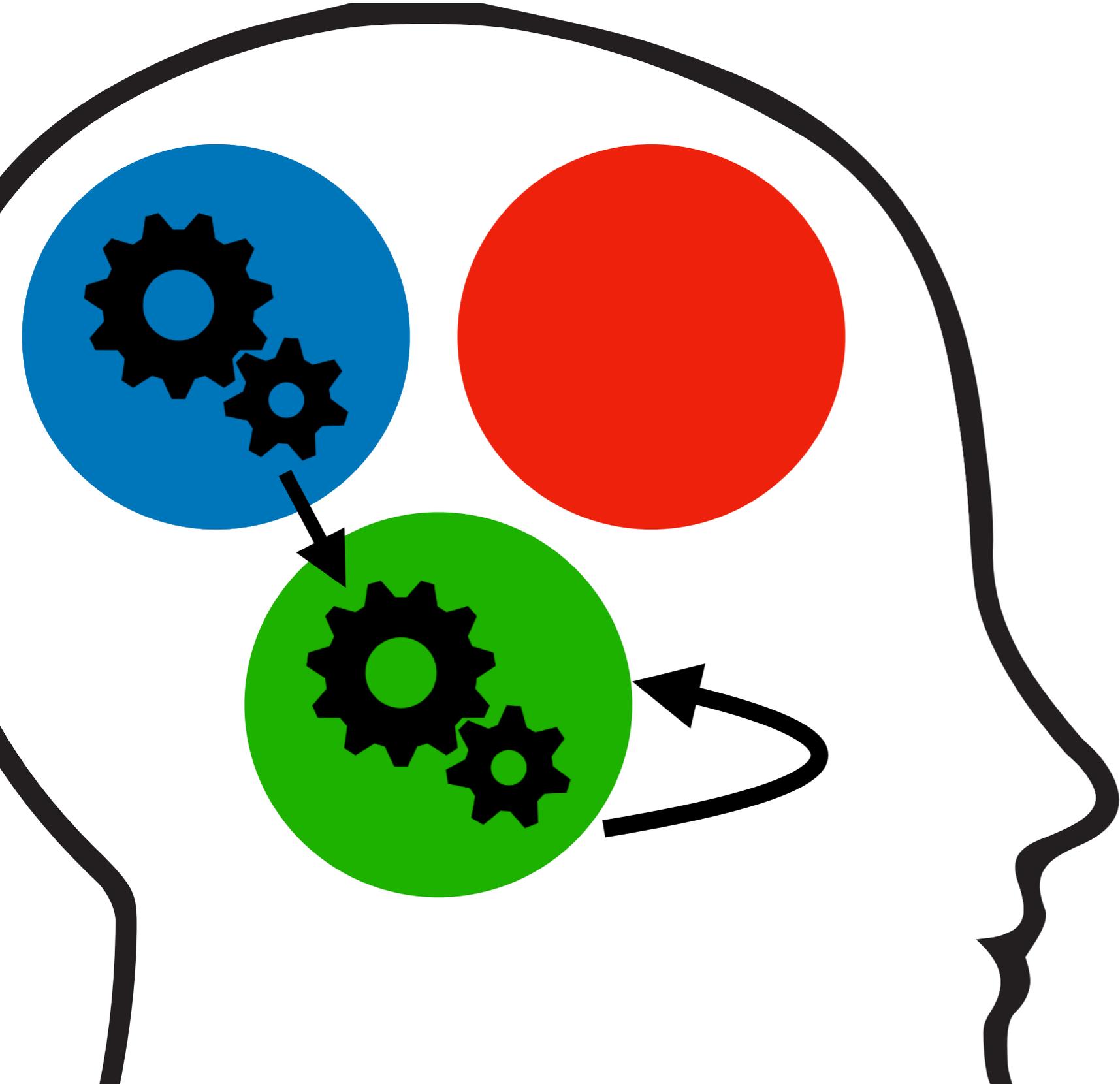
Phonological Loop

Articulatory Loop



**Phonological
Short-Term
Store**

Non-Communicative Language Use



Planning

Grice was right
Grice was right

Planning

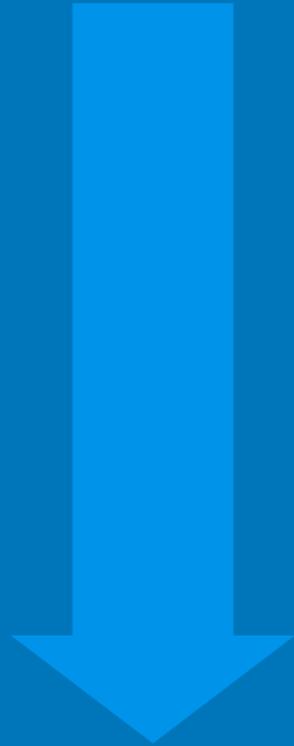
PRIOR INTENTION

Intention to practice saying
that Grice was right .

Planning

PRIOR INTENTION

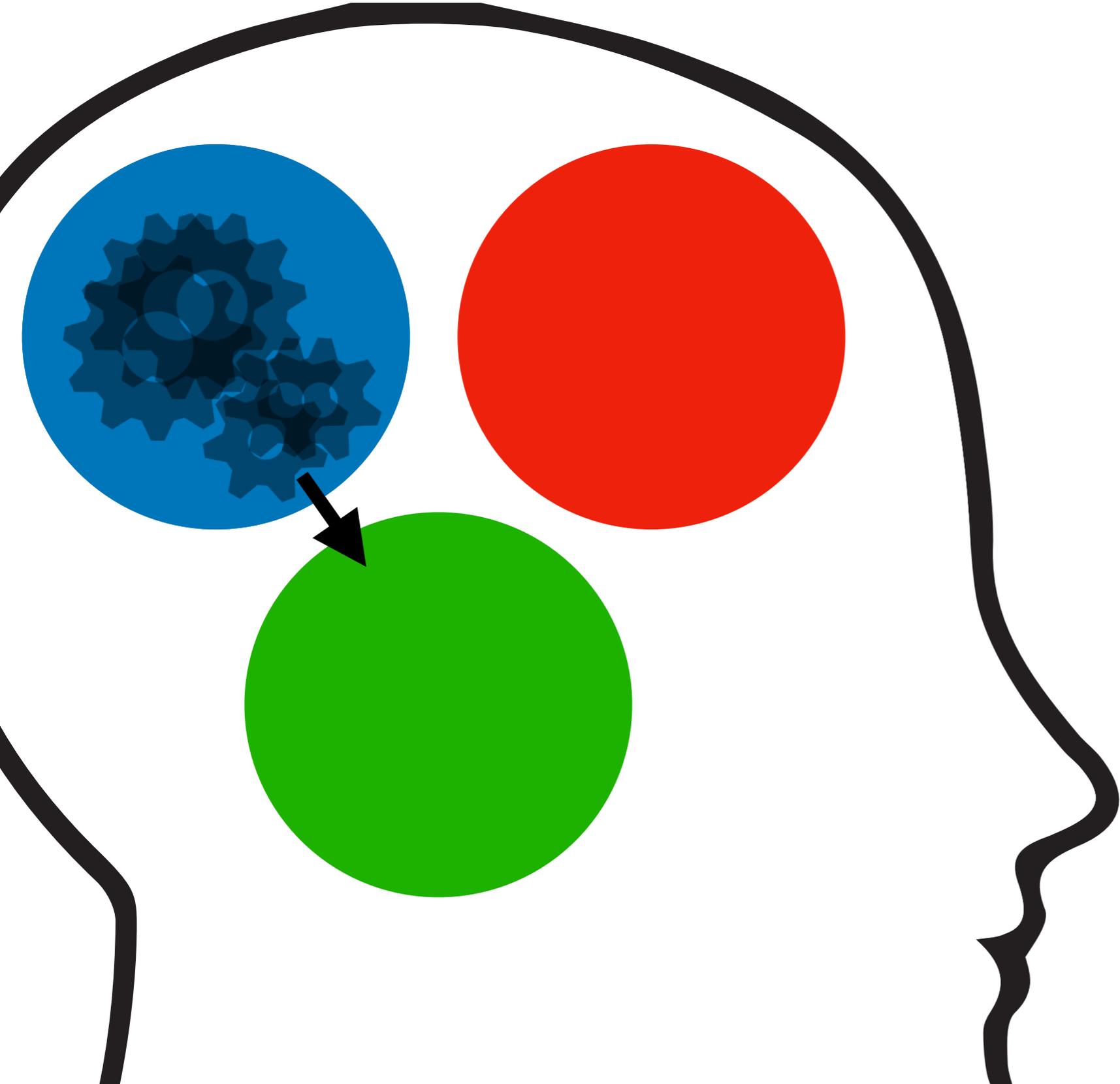
Intention to practice saying
that Grice was right .



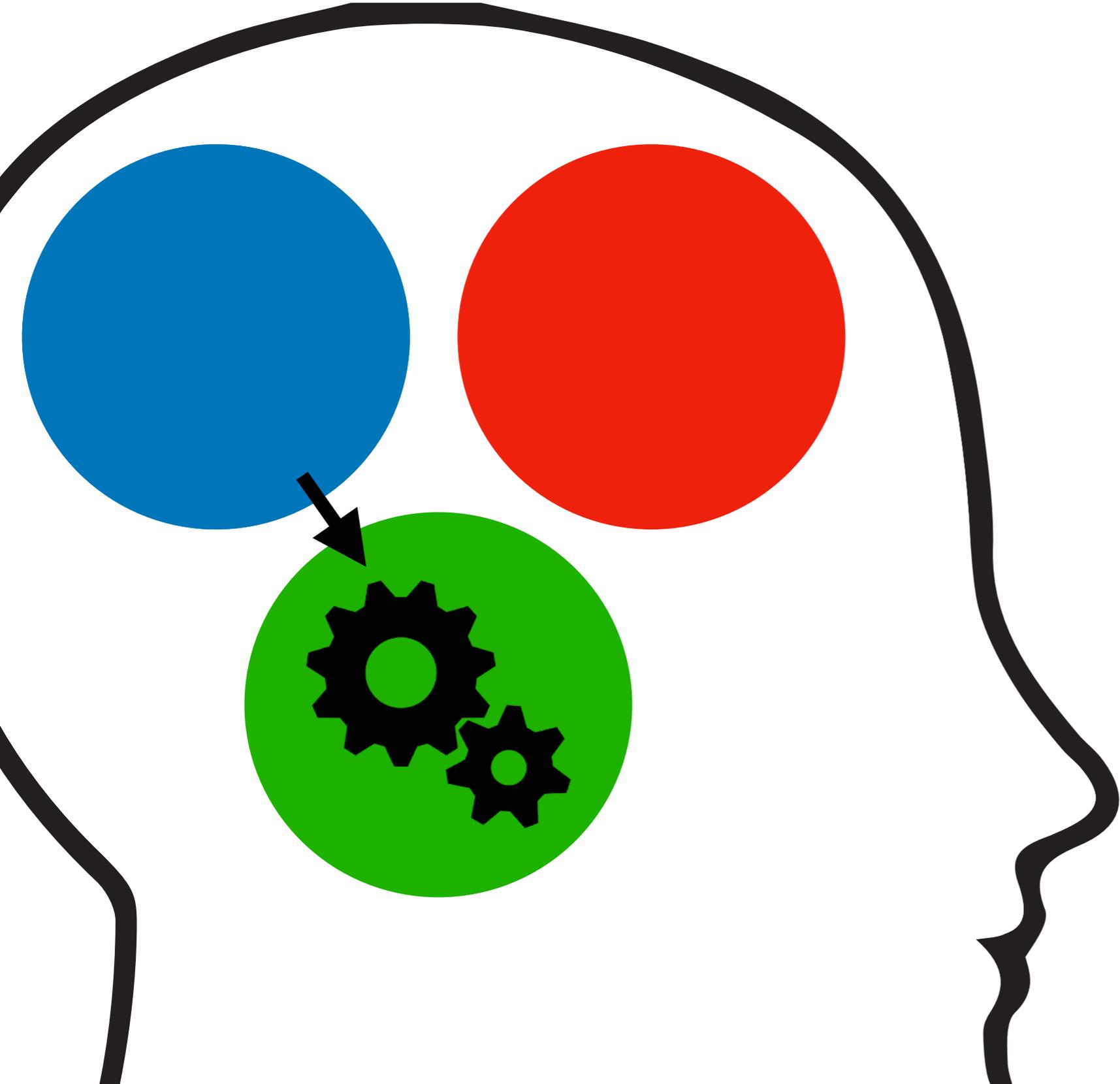
SUBPLAN

Instruction for language
system to say that
Grice was right

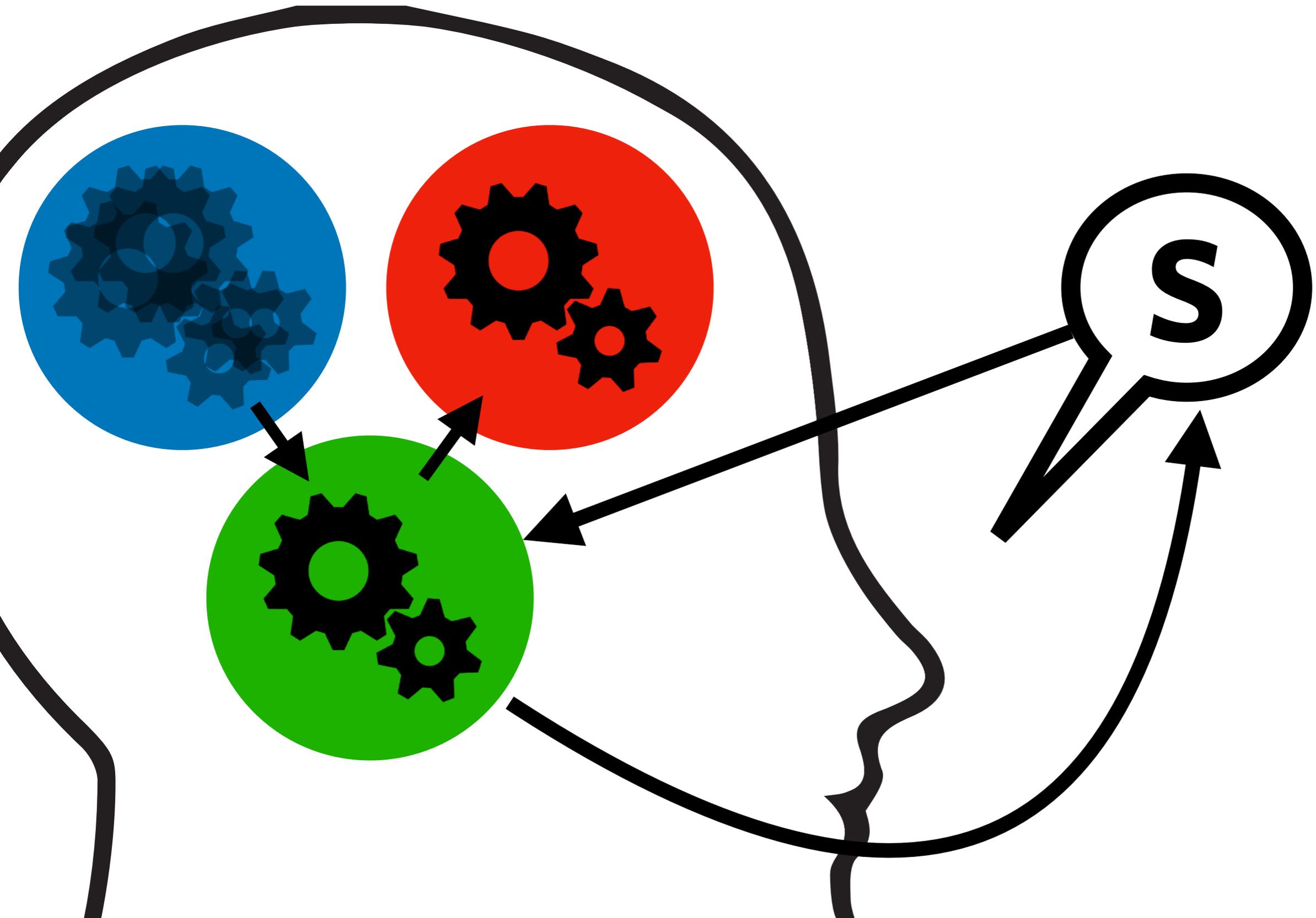
Non-Communicative Language Use



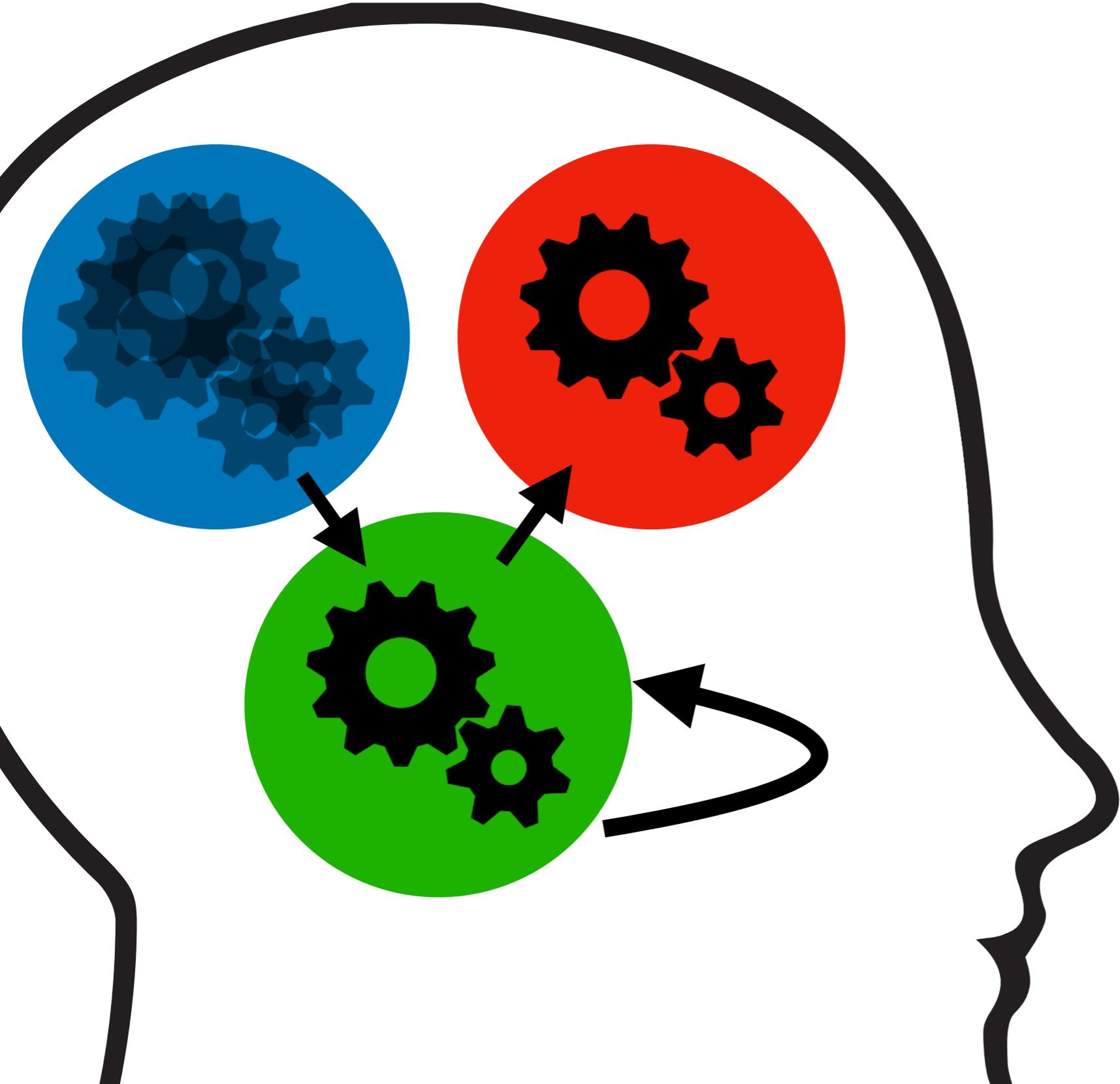
Non-Communicative Language Use



Non-Communicative Language Use



Non-Communicative Language Use







Conclusions

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The theory that we communicate by intention recognition is flexible and promising.

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...**if** we adopt a methodology that seeks the mechanisms underlying our communicative capacities.

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Conclusions

The theory that we communicate by intention recognition is flexible and promising.

...**if** we adopt a methodology that seeks the mechanisms underlying our communicative capacities.

But if we do, we can explain non-communicative language use by appeal to the very same mechanisms needed to explain communicative language use.



Thank you.



Thank you.

Thank you.