

Spirituality Explained Scientifically



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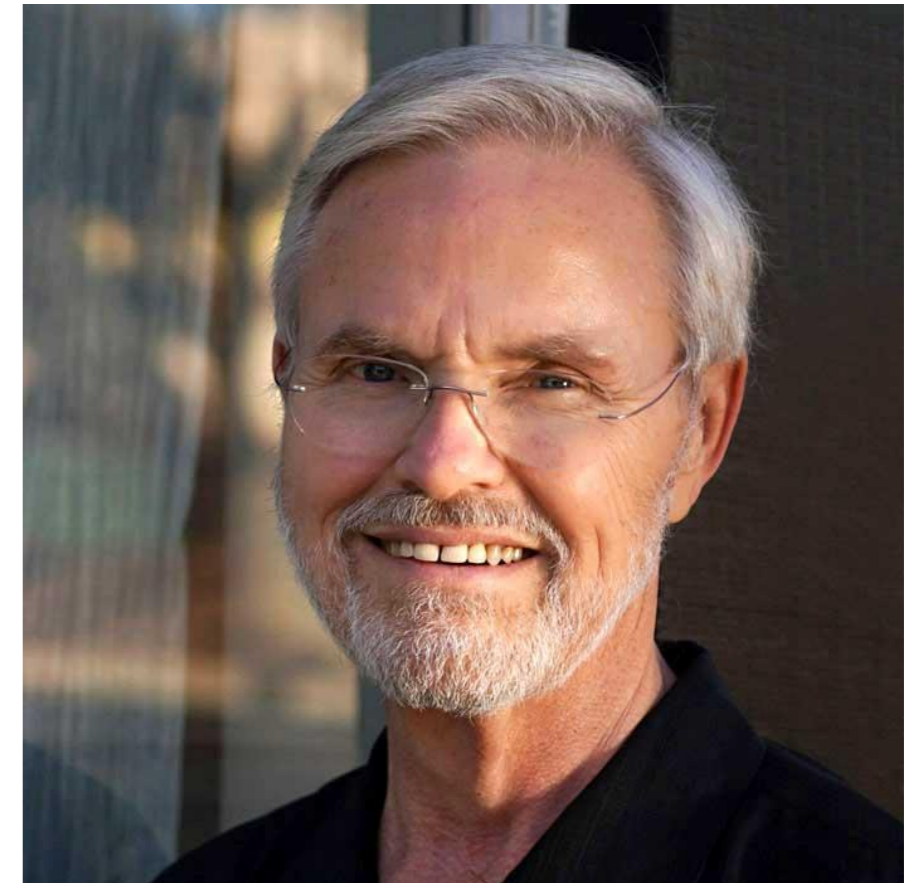
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SF Mensa RG, Emeryville, California

November 19, 2017





Part 1 of 7: The Origin of Spirituality

Part 1. The Origin of Spirituality	4 min
Part 2. World Models & Agents	6 min
Part 3. The Three Agent Model	9 min
Part 4. Ordinary Spirituality Explained	9 min
Part 5. Attention Schema Theory	6 min
Part 6. Agent Awareness Models	6 min
Part 7. Spiritual Enlightenment Explained	5 min



Spirituality

Text in this color is a summary of information that was presented verbally during the presentation.



What is Spirituality?

- My Equation is:

Spirituality = Religion – Dogma

Dogma example = any book that must be believed.

Can be theistic or non-theistic

Cultivates positive values like love and forgiveness.

Uses practices like prayer and meditation.



When and How Did Spirituality Start?

□ Hypothesis:

**Spirituality developed around
40K to 100K years ago when
human consciousness *changed***

100K = when humans began to intentionally bury their dead

40K = when humans carved figurines which could represent a fertility goddess



Consciousness Change was Facilitated by:

Modern Language

Which allowed the development of:

***A Conceptual Model
of the Sensory World***



Consciousness Change was Facilitated by:

Modern Language

Which allowed the development of:

***An Internal Model
of a Conceptual World***

Perhaps, around the time spirituality developed, the conceptual world became mostly abstract. This conceptual world may have contained far more abstract concepts than the concrete concepts that model the physical or sensory world.



“Who We Are” Changed:

- ❑ Ancient humans would have identified with **the body**
- ❑ Whereas modern humans identify with the **conceptual self = “I/Me/My”**



Part 2 of 7: World Models & Agents

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World Models & Agents



Agents

An **Agent** is an **entity**, that

- Has **goals**,
- A way of **sensing** the **world**, and
- A way to make **changes** to the **world**
to **achieve** those **goals**

Humans are agents.



The Good Regulator Theorem:

A theorem⁽¹⁾ from control theory says:

“Every Good Regulator of a System Must Be a Model of That System”

⇒ Good Agents need:

- **A Model of the World**

- **A Self-Model** => if the agent is in the world being modeled.
Humans self-models are the body model and/or

⁽¹⁾ Conant & Ashby, Int. J. Systems Sci., 1970, vol. 1, No. 2, 89-97,
“Every Good Regulator of a System Must Be a Model of That System”

“I/Me/My”



Where Do We Live?

- Are we **humans** living in the **World**?

- Or, are we **Self-Models** living in our **Model of the World**?

...because I/Me/My exists only in the internal conceptual world.

It this is not convincing, consider....



Do We Experience the World OR Our Model of the World?

Blue Light



Red Light

The brain takes the information in these 3 B&W images and constructs this:

Green Light



Colors

**Exist Only in
Our Model of
the World**



What We Experience is **NOT** Sensory Information

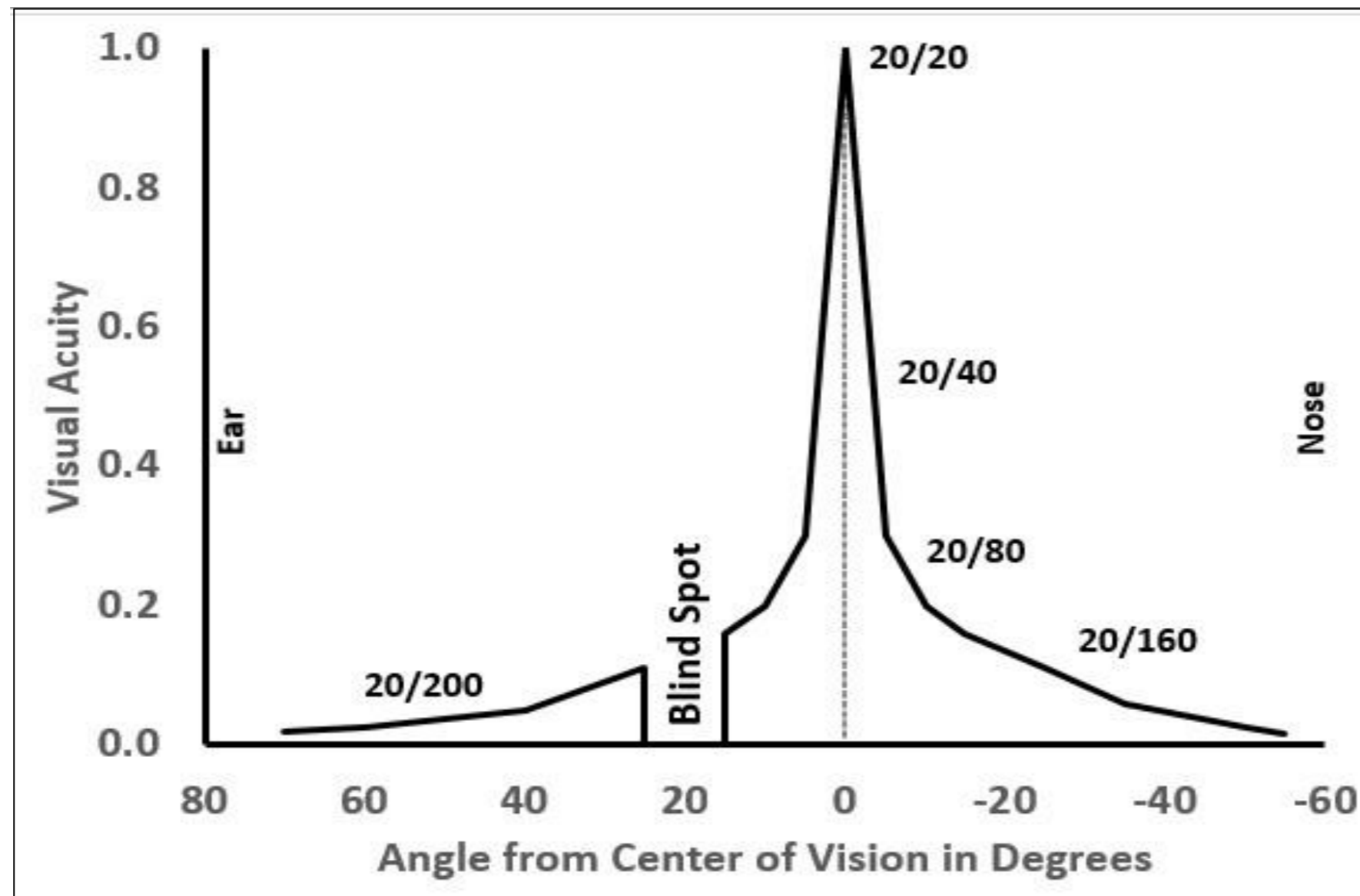


E.g. Visual sensory information is the information the eye sends to the brain.

We experience the entire visual scene as being crisp and in-focus, even out to the edge of vision.

However, this plot dictates that visual sensory information should be blurry in the periphery.

Peripheral Visual Acuity vs Angle





What We **Experience** is

Keep the center of vision on
the center of this image...

NOT Sensory Information



What We Experience is **NOT** Sensory Information

This is the information our eyes are sending to our brain – this is not what we experience.
(Even when using just one eye, we still don't experience the blind spot.)



What We Experience is the World Model, **NOT** Sensory Information

The World Model knows that the real world is crisp and in focus everywhere, not just at the center of vision.





What We **Experience** is the **World Model**, **NOT** Sensory Information

Another Example: **Rapid Eye Saccades...**

During a saccade, the brain shuts off processing visual information while the eyes are moving - but we are unaware of this momentary blindness. Additionally, the world seems stationary even though the image on the retina shifts dramatically.

You can demonstrate this momentary blindness yourself: look at your face in a mirror and rapidly saccade between focusing on the left and right eye. You will never see either eye move. Do the same experiment with your front facing cell phone camera and you will catch the eyes moving – this is noticeable because of the electronic delays in the phone.



Therefore...

We are **self-models**
living in and **experiencing**
our model of the world



Part 3 of 7: The Three Agent Model

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Three Agent Model



The Three Agent Model:

- **Thinker**

- General Problem Solver + generates inner voice and visualizations

- **Doer**

- Controls the Body + has emotions and feelings

- **Experiencer**

- Creates the World Model + directs attention



Thinker & Doer are **Consistent** With Other **Experimentally Derived** Cognition Models

Psychology: **Dual Process Theory**⁽¹⁾

Thinker	System 2 : slow, deliberative, explicit, & conscious
Doer	System 1 : fast, intuitive, implicit, & subconscious

Neuroscience: **Action-Outcome/Stimulus-Response Model**⁽²⁾

Thinker	Action-Outcome contingency system / Associative Network
Doer	Stimulus-Response habit system / Sensorimotor Network

⁽¹⁾ Daniel Kahneman popularized Dual Process Theory in his 2011 book, "*Thinking, Fast and Slow*."

⁽²⁾ Yin & Knowlton, (2006) *The role of the basal ganglia in habit formation*. Nat. rev. Neuro. 7. 464-76



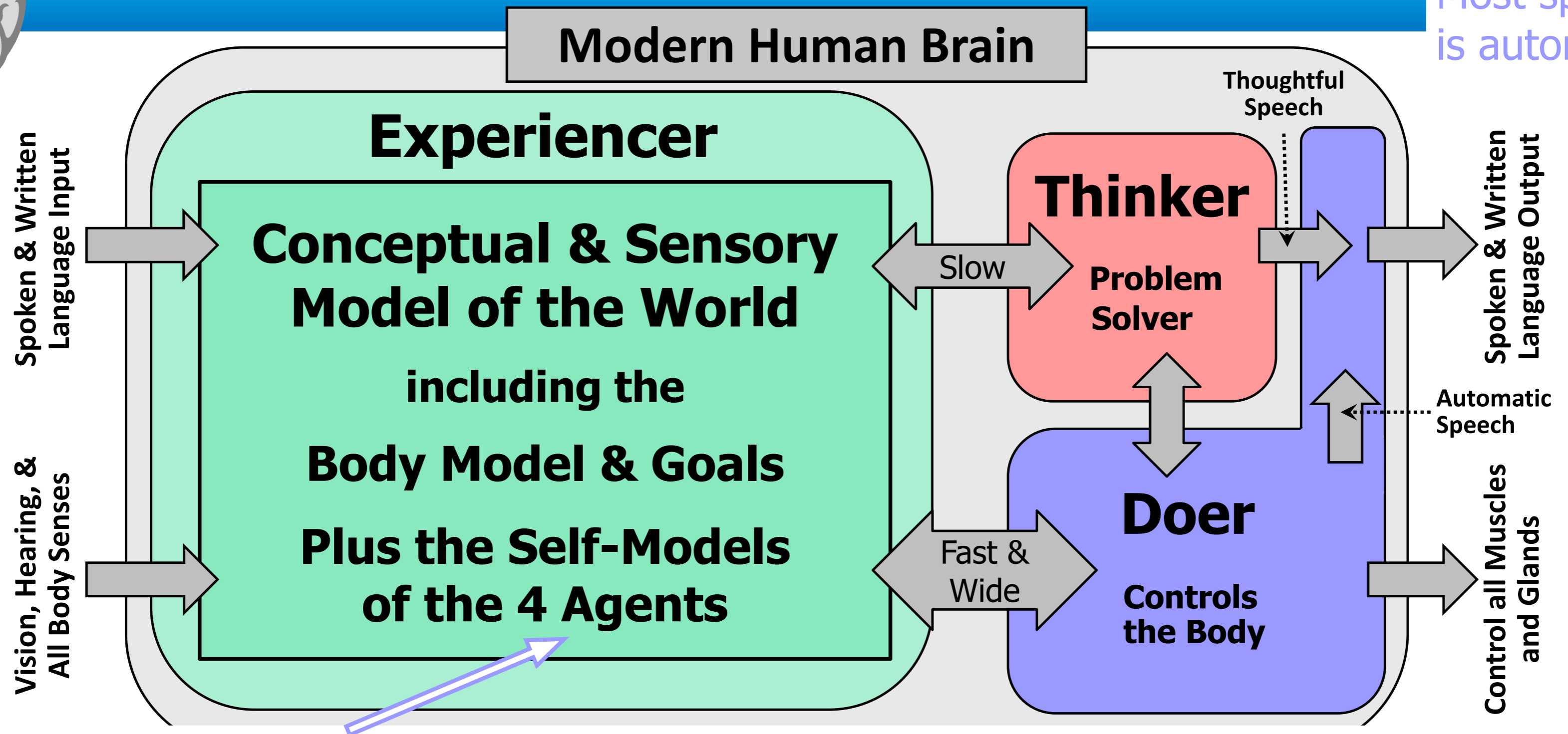
Given a Thinker and a Doer,

- The **Experiencer** is **required** by the Good Regulator Theorem



The Three Agent Model of the Human Brain

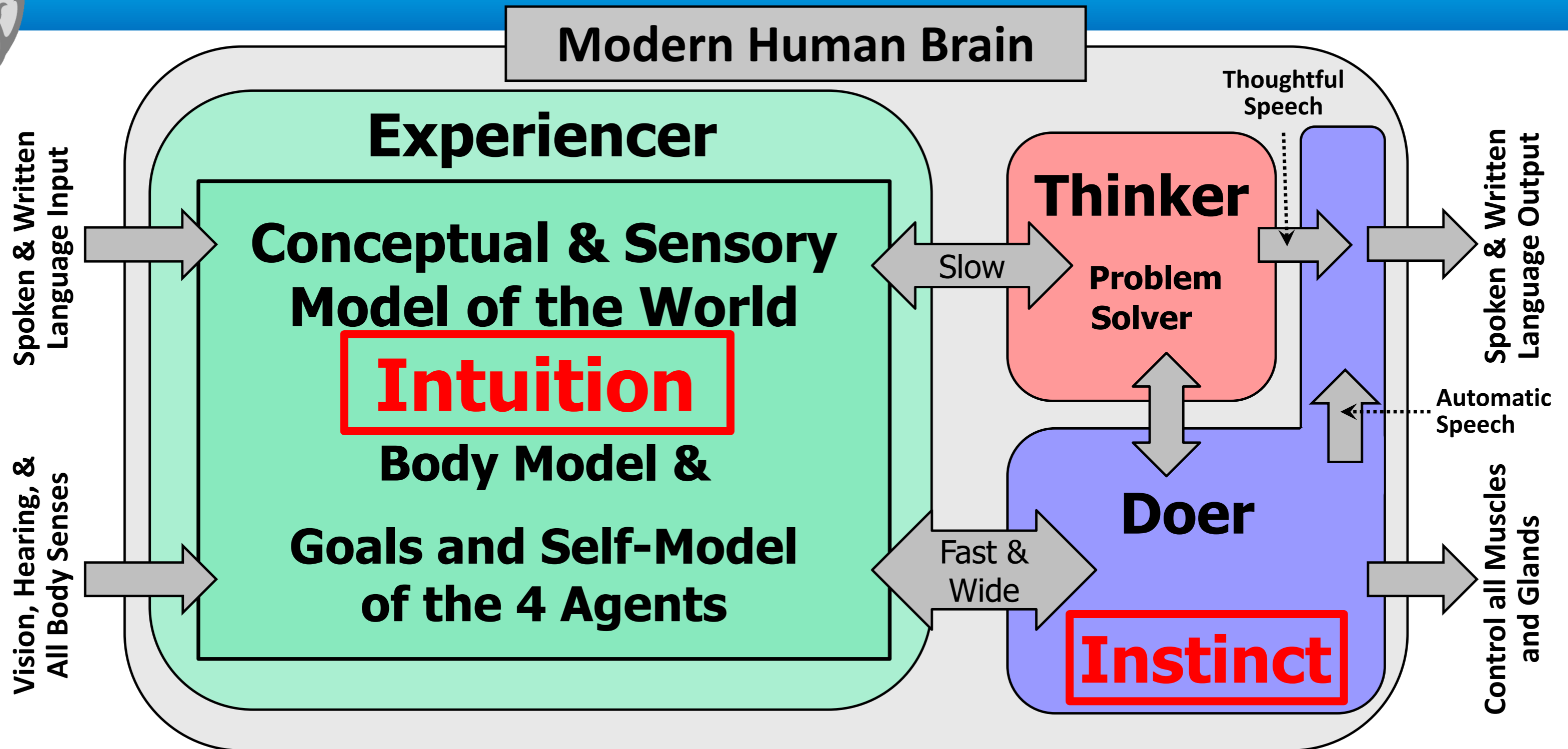
Most speech
is automatic



The 4 agents are the Human as a whole, plus the Thinker, Doer, & Experienter.

The Three Agent Model of the Human Brain

Intuition = understanding how the world works without thinking.
Instinct = understanding what to do in the world without thinking.





Other Connections

- ❑ **Top-down attention:** Thinker or Doer → Experiencer
- ❑ **Bottom-up attention:** Experiencer → Doer & Thinker
- ❑ **Inner voice/visualizations:** Thinker → Experiencer
- ❑ **Emotions & feelings:** Doer → Experiencer
- ❑ **Planned motor actions:** Doer → Experiencer



Sources of the Agent's Goals:

Evolution

The agents' evolutionary goals:
Thinker: Solve problems (see **Note 1**)
Doer: Many goals in 3 categories:
Survive, Reproduce & Be Social
Experiencer: Model the world

Creating

=> Make up: "I must always be right!"
Breakup big goal into smaller goals

Copying

=> Thinker & Doer can copy the
other agent's goals

When Doer copies the Thinker's goal of "I must always be right," the
Doer generates anger when someone says "I" am wrong.

Note 1: The Thinker only
has one evolutionary goal
since evolution designed
it to handle unknown
changing environments
which the Doer instincts
cannot handle.



Human and Sub-Agent Self-Models

Self-Models		
Thinker	It seems like the Experiencer doesn't need a Self-Model since it doesn't change the world; but it does need a Self-Model, as will be.....	I/Me/My
Doer		The Body
Experiencer		(Explained Later)
Human	Some combination of the three sub-agent self-models shown above	



Part 4 of 7: Ordinary Spirituality Explained

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Explanation of “Ordinary” Spirituality

Ordinary = not including “enlightenment”

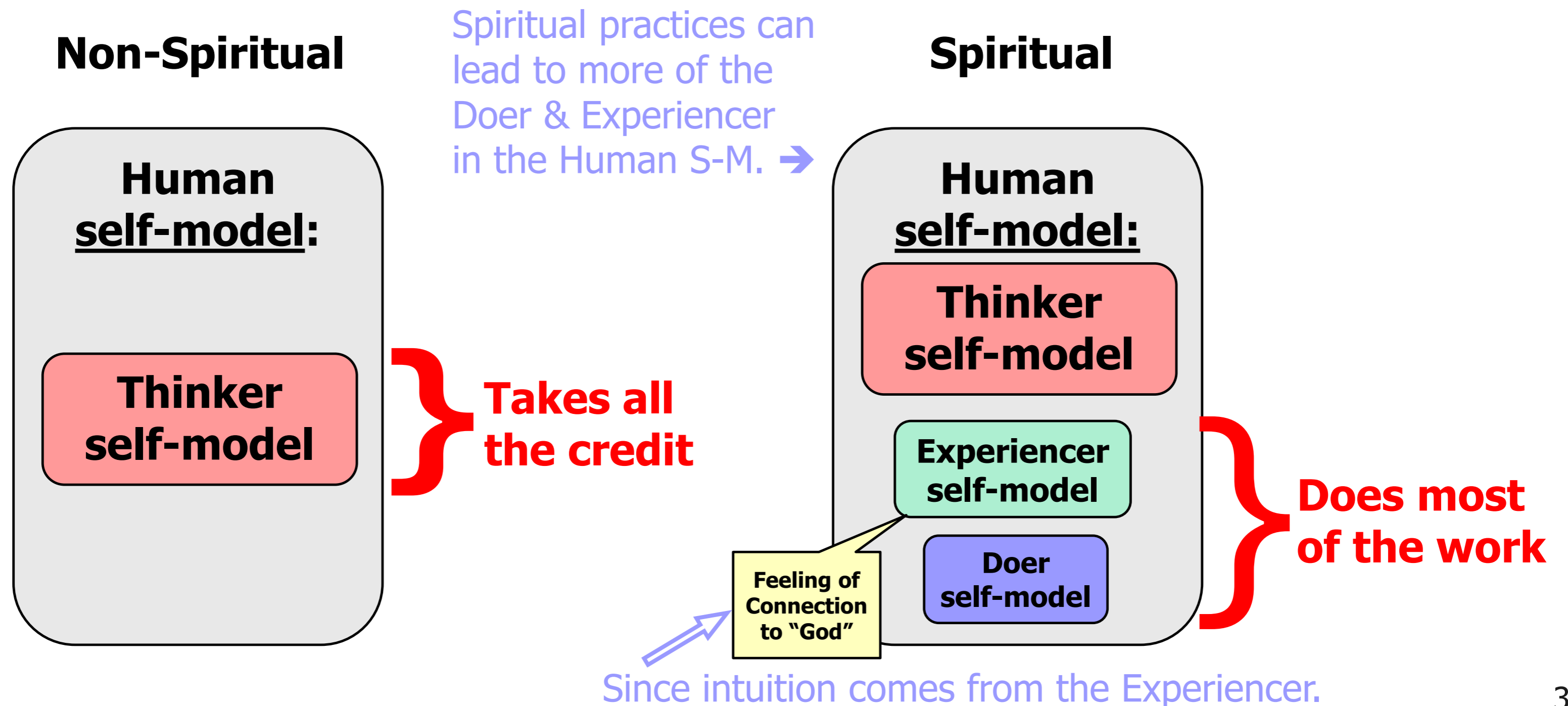


The **Problem** that Spirituality **Fixes**:

Is the Thinker!

The Thinker is great for science & technology, but it is not good at living a happy life. To a hammer everything is a nail. To a problem solver, everything looks like a problem – this leads to a negative critical attitude towards life. If there is no problem, that is a problem, so the Thinker will need to find a problem. If there is no problem here and now, it will find a problem in the past which often leads to a resentment, or it will try to fix a problem in the future which can trigger fears. So, the Thinker is always rehashing & rehearsing – by having conversations with people who are not in the room. Negative emotions are a problem – how do I make sure this doesn't happen again? Positive emotions are a problem – how do I make sure this happens all the time? Thus, a positive emotion can generate a negative emotion such as fear, due to an inability to sustain the positive emotion.

Human Self-Model Changes Due to Spiritual Practices





Social Goals and Spiritual Virtues & Vices

The Doer has strong pro-social goals, which leads to Spiritual Virtues. The Thinker self-model of I/Me/My is almost the definition of self-centeredness which is what the Spiritual Vices are centered around.

Spiritual Virtue	Spiritual Vice
Love	Hate (or Hatred)
Altruism (or Selflessness)	Selfishness
Forgiveness	Resentment (or Regret or Blame)
Humility	Arrogance (or Pride or Self-centeredness)
Compassion (or Empathy)	Indifference
Fairness (or Justice)	Unfairness (or Injustice)
Acceptance	Rejection (or Judging)
Patience	Impatience



How “Ordinary” Spiritual Practices Fix the Thinker Problem

- Forgiveness ameliorates resentments which were caused by the Thinker solving problems in the past.
- Acceptance is what the Experienter does all the time.

- ❑ **Meditation** → Quiets the Thinker and directly experiences the Experienter.
- ❑ **Surrender or Prayer** → Thinker surrenders and asks for help from the Experienter.
- ❑ **Living in the “Now”** → Thinker lives in past & future, the Experienter is always in the “now.”
- ❑ **Forgiveness and Acceptance** → See above...
- ❑ **Trusting** → Trusting “God” ameliorates anxiety caused by the Thinker trying to solve problems in the future.
- ❑ **Gratitude** → Gratitude is the antidote for the Thinker’s negative, critical attitude towards life.



Wise Intuitive Attention Mechanism

Addiction starts with Thinker – “I want to drink.” Doer copies goal “to drink.” Both goals become powerful = addiction. Thinker notices problems and wants to stop, but can’t.

- Can explain AA recovery:

- Thinker surrenders and ask Experienter for help with addiction

Experienter notices the contradictory goals: stop drinking vs drink; and that the Thinker has asked the Experienter for help.

Less automatic Doer drinking & less obsessive thoughts about drinking by the Thinker. → □ Experienter uses wise intuition to decreases attention paid to alcohol ← This helps “cure” addiction...

- Can decrease other “suffering”

→ Such as suffering caused by attachments and aversions



Part 5 of 7: Attention Schema Theory

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Attention Schema Theory



Definitions:

- ❑ **Body Schema** is a model of the **body**
- ❑ **Attention Schema** is a model of our **current state of attention**

Attention Schema, Worlds, & World Models

Attention obviously does not change the real world. Attention also does not change the World Model. But it does change the Current Representation of the World (see next slide).

World:

or

World

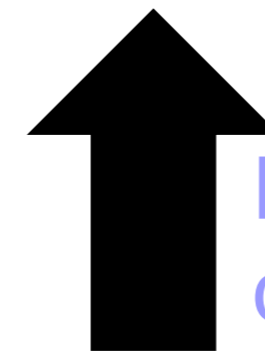
Model:

The WM is required by the Good Regulator Theorem (see pg. 10)

Attention
Schema:



With peripheral
attention on
this house:



Keep eyes fixated
on this house

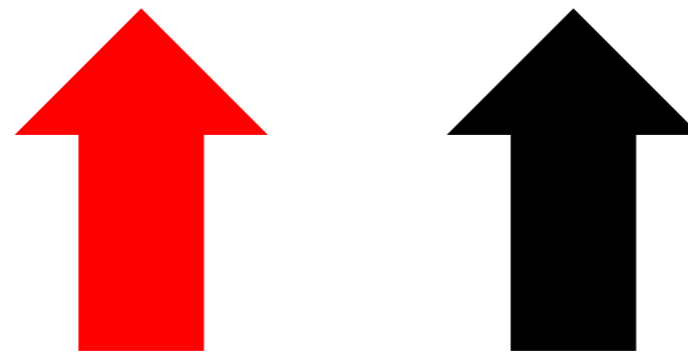
Current Representation of the World (CRW)

Attention causes additional information to be available about the attended object. The CRW has this extra information. Thus the Experiencer's attention changes the CRW, and therefore, the Experiencer's Self-Model is the model of attention = the Attention Schema

Current
Representation
of the World
(CRW):



Attention
Schema:



World Model Equation:

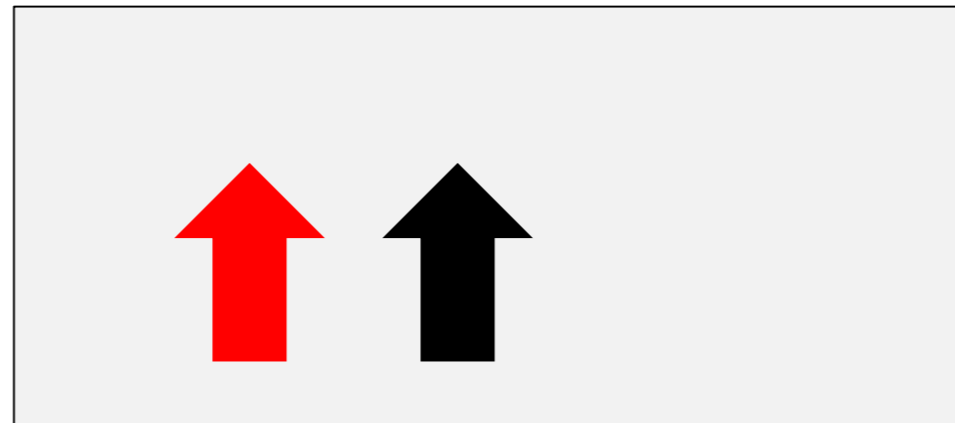
Given any two of these three objects, the third can be computed. For example, in this case, the CRW spotlights of extra information are placed as indicated by the AS.

**World
Model**



WM

**Attention
Schema**



AS

**Current
Representation
of the World**



CRW

World Model Equation:

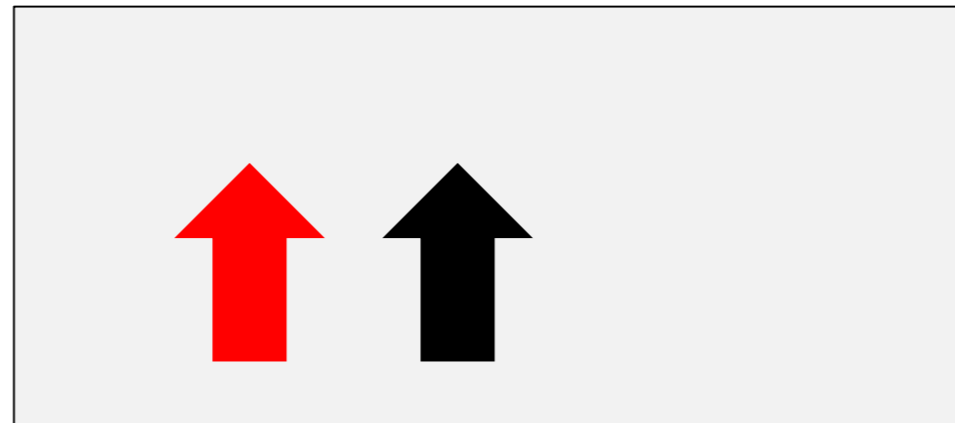
Here the AS can be found by subtracting the WM from the CRW

**World
Model**



WM

**Attention
Schema**



AS

**Current
Representation
of the World**



CRW

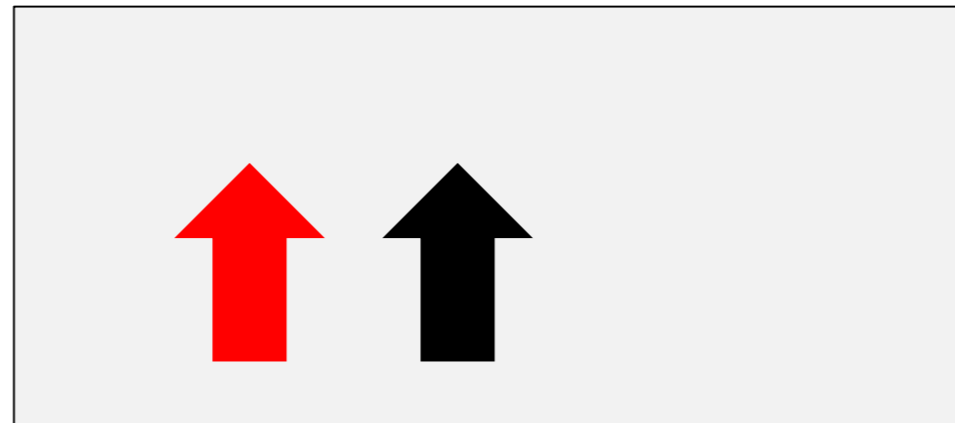
World Model Equation:

Thus the WM is some function of AS combined with CRW. In other words the information content of the WM equals the information content of AS + CRW.

World Model



Attention Schema



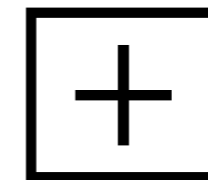
Current Representation of the World



WM

=

AS



CRW



Human and Sub-Agent Self-Models

Self-Models	
Thinker	I/Me/My
Doer	The Body
Experiencer	Now we can "explain:" (Explained Later)
Human	<i>Some combination of the three sub-agent self-models shown above</i>



Human and Sub-Agent Self-Models

Self-Models	
Thinker	I/Me/My
Doer	The Body (Body Schema)
Experiencer	Attention Schema
Human	<i>Some combination of the three sub-agent self-models shown above</i>

Attention Schema Theory (1):

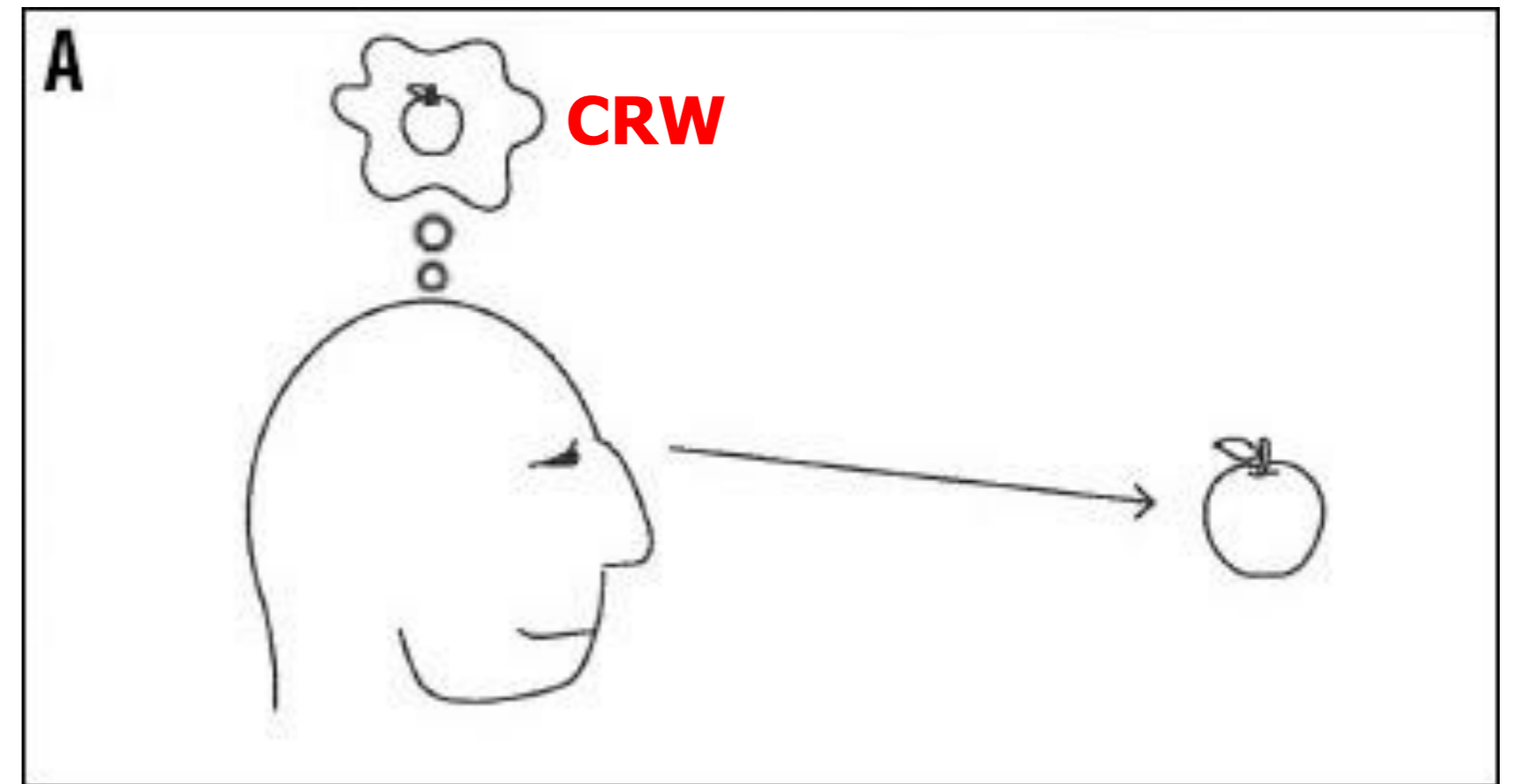
(A) Visual **attention** is captured by the image of an apple.

- This is **information**, not **awareness**

CRW = Current Representation of the World

The images on this slide and the next slide is from Fig 1 A/B of the Graziano & Webb paper.

The "black" text on these two slides is a summary of the very long caption of that figure.



(1) Graziano & Webb, (2015) *The attention schema theory: a mechanistic account of subjective awareness*. Front. Psych., 6, 500

Attention Schema Theory (AST):

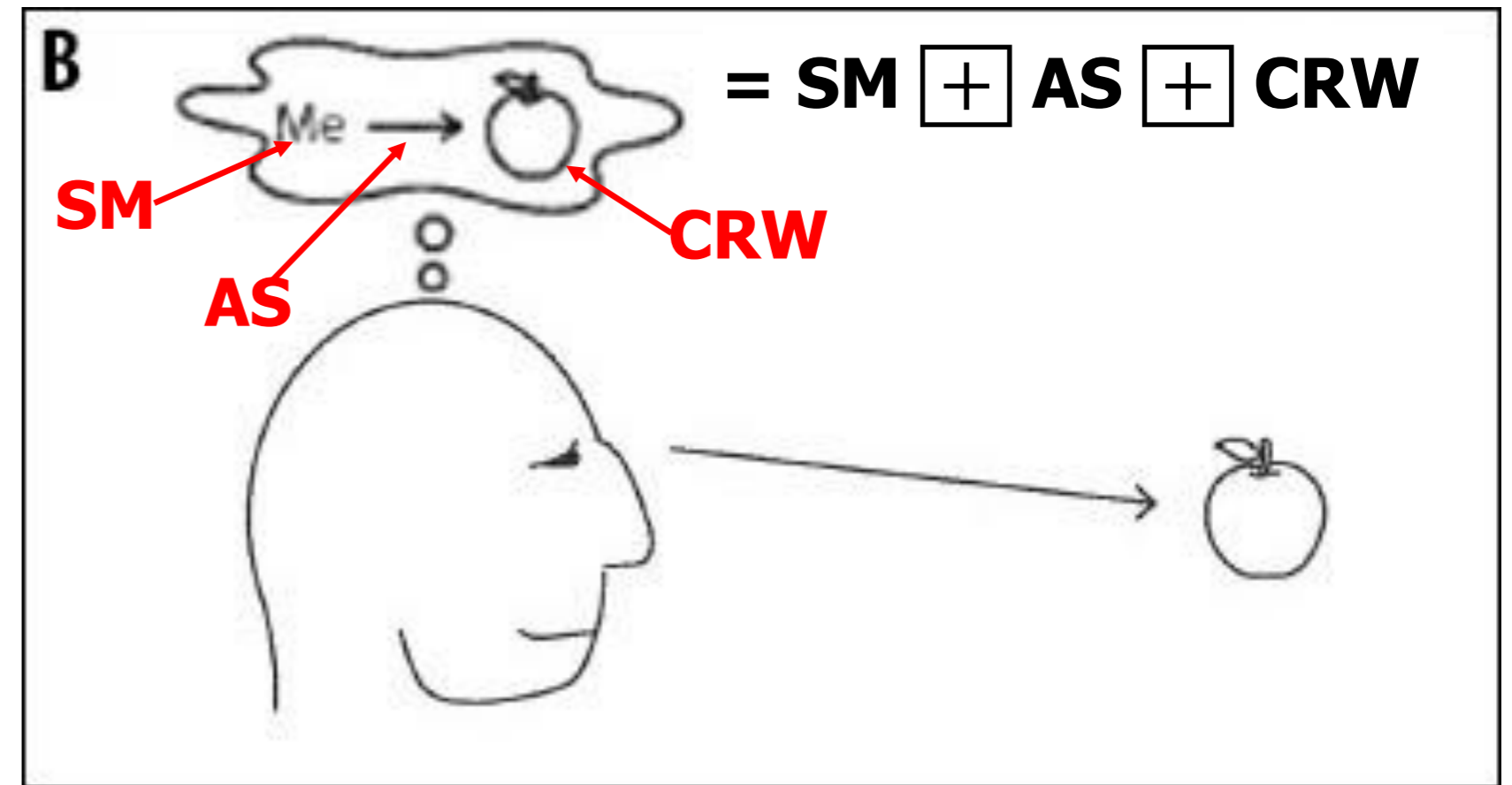
If the Thinker, Doer & Experiencer were three separate brains, only the Experiencer would be conscious since it is the only brain with an AS, CRW and WM. The Thinker is not conscious, it just appears to be. In reality, the Experiencer infers the activity of the Thinker by experiencing the inner voice and noting changes to Working Memory. Similarly, the Experiencer is aware of the Doer through its feelings and emotions. See pages 20 - 25.

(B) Subjective **awareness** requires additional models, such as:

- Visual stimulus [**CRW**]
- Self-model [**SM**]
- Attention Schema [**AS**]
 - **AS** links **SM** and **CRW** together

The overall **model of awareness** is:

SM $\boxed{+}$ **AS** $\boxed{+}$ **CRW**



**Only the Experiencer is
Conscious according to AST!**



Part 6 of 7: Agent Awareness Models

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Agent Awareness Models



Thinker Awareness Model

"I/Me/My" + "am aware of" + "the Apple"
(in words)

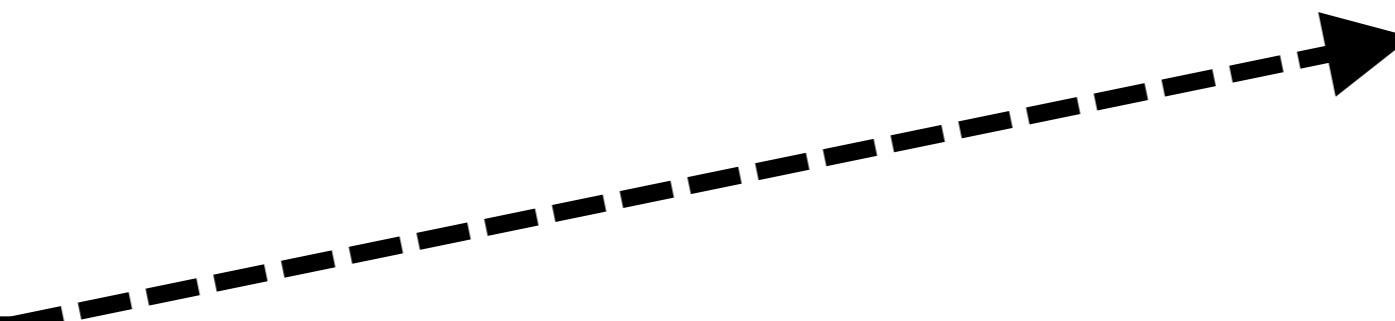
I/Me/My

Attention Schema

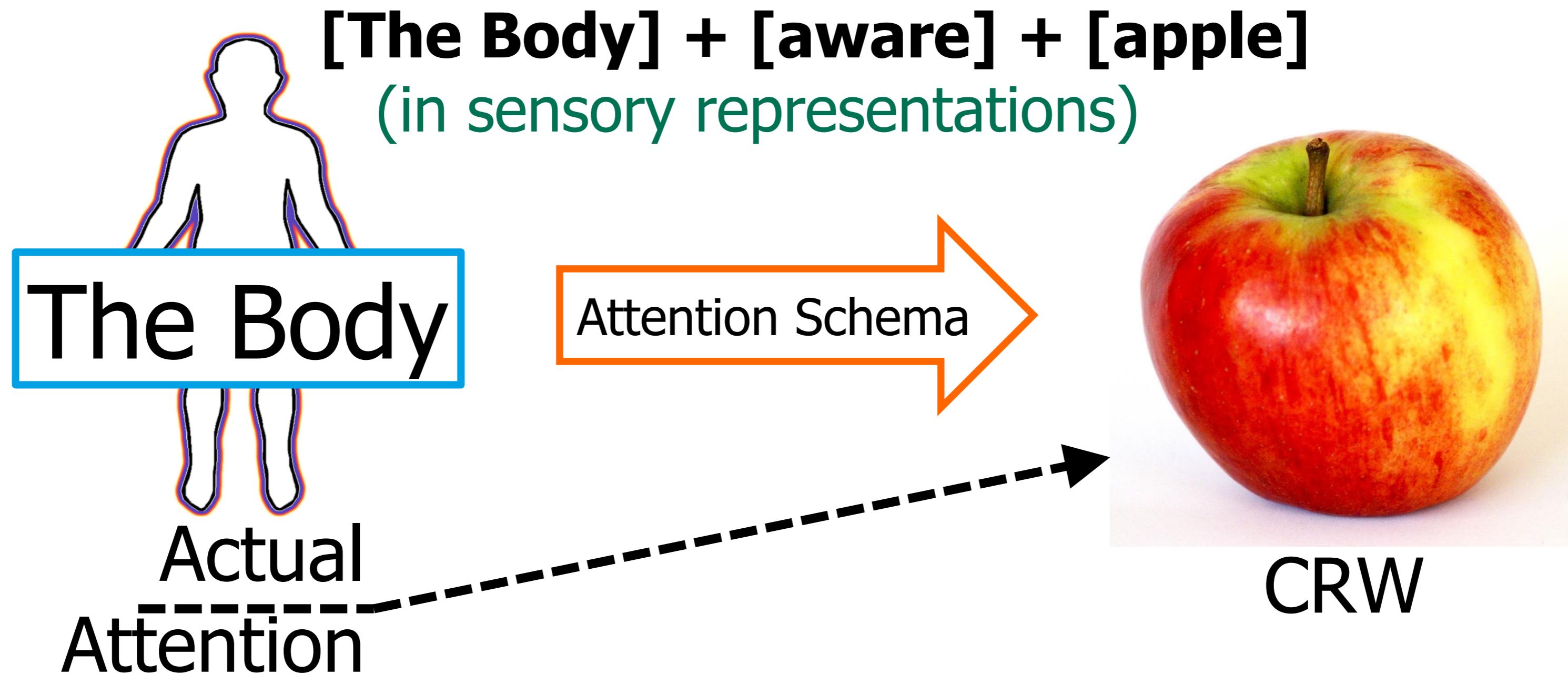


CRW

Actual
Attention



Doer Awareness Model



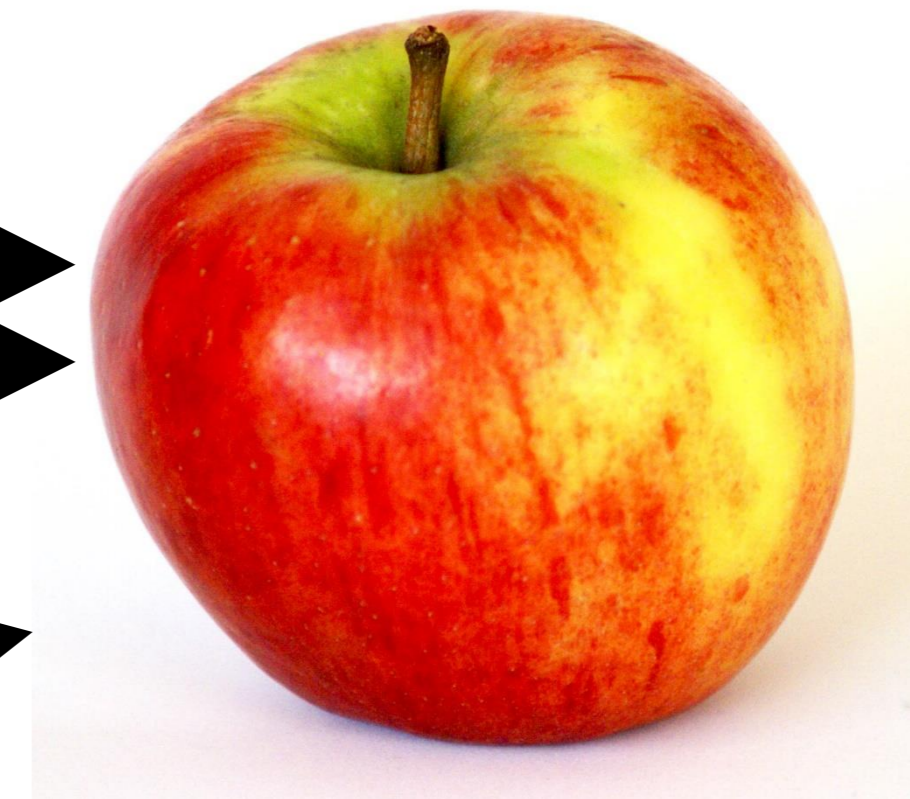


Experiencer Awareness Model

The Experiencer's
Self-Model is this AS:

Attention Schema

Attention Schema



But both of these Attention Schemas are really
the same AS since they both point to the apple.

Actual
Attention

CRW



Experiencer Awareness Model

[aware] + [apple]
(in sensory representations)

Selfless Awareness

Attention Schema

Merging the two Attention Schemas
results in Selfless Awareness!

Actual
Attention



CRW

Preview: Buddhists claim "No Self"
which is consistent with this selfless awareness.



Experiencer Awareness Model

[World Model] *or* **[aware] + [apple]**
(in sensory representations)

Selfless Awareness



Actual
Attention

The AS + CRW
has the same info
content as the WM

CRW
CRW

$$WM = AS \boxed{+}$$

CRW

Preview: Advaita claims "No Subject-Object duality" which is consistent with this "World Model" awareness.



Awareness Models for the Agents:

Notice that according to AST, AS is equivalent to "Awareness". This means the Experiencer's Self-Model (the AS) is actually "Awareness" itself! See next slide...

Awareness Model = SM $\boxed{+}$ AS $\boxed{+}$ CRW	
Thinker	"I/Me/My" + "am aware of" + "the Apple" (in words)
Doer	[The Body]+[aware]+[Apple] (sensory representations)
Experiencer	[aware]+[Apple] [World Model] (sensory representations)

SM=Self-Model **AS**=Attention Schema **CRW**=Current Representation of the World



Human and Sub-Agent Self-Models

This means any time we experience awareness we are actually experiencing the Experiencer's self-model (the Attention Schema)!

Self-Models	
Thinker	I/Me/My (autobiographical self + simple body model)
Doer	The Body (Body Schema)
Experiencer	Awareness (AKA Attention Schema)
Human	<i>Some combination of the three sub-agent self-models shown above</i>



Three Kinds of Consciousness for 3 Agents

Converting the "Agent Awareness Table" into a consciousness table. Note that TC=Thinker+Experiencer and DC=Doer+Experiencer so that they are conscious.

Consciousness Models	
Thinker Consciousness (TC)	"I am aware of X" (expressed in words)
Doer Consciousness (DC)	[Body]+[aware]+[X] (sensory experience)
Experiencer Consciousness (EC)	[Aware]+[X] or [World Model] (sensory experience)



Agent Self-Awareness Models



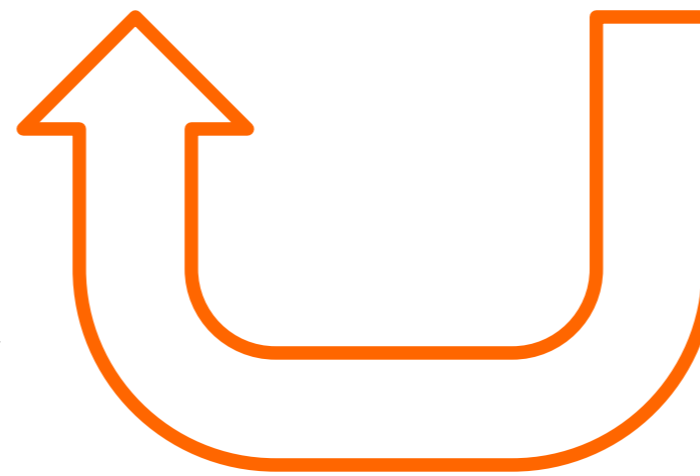
Thinker Self-Awareness

Actual

Attention →

I/Me/My

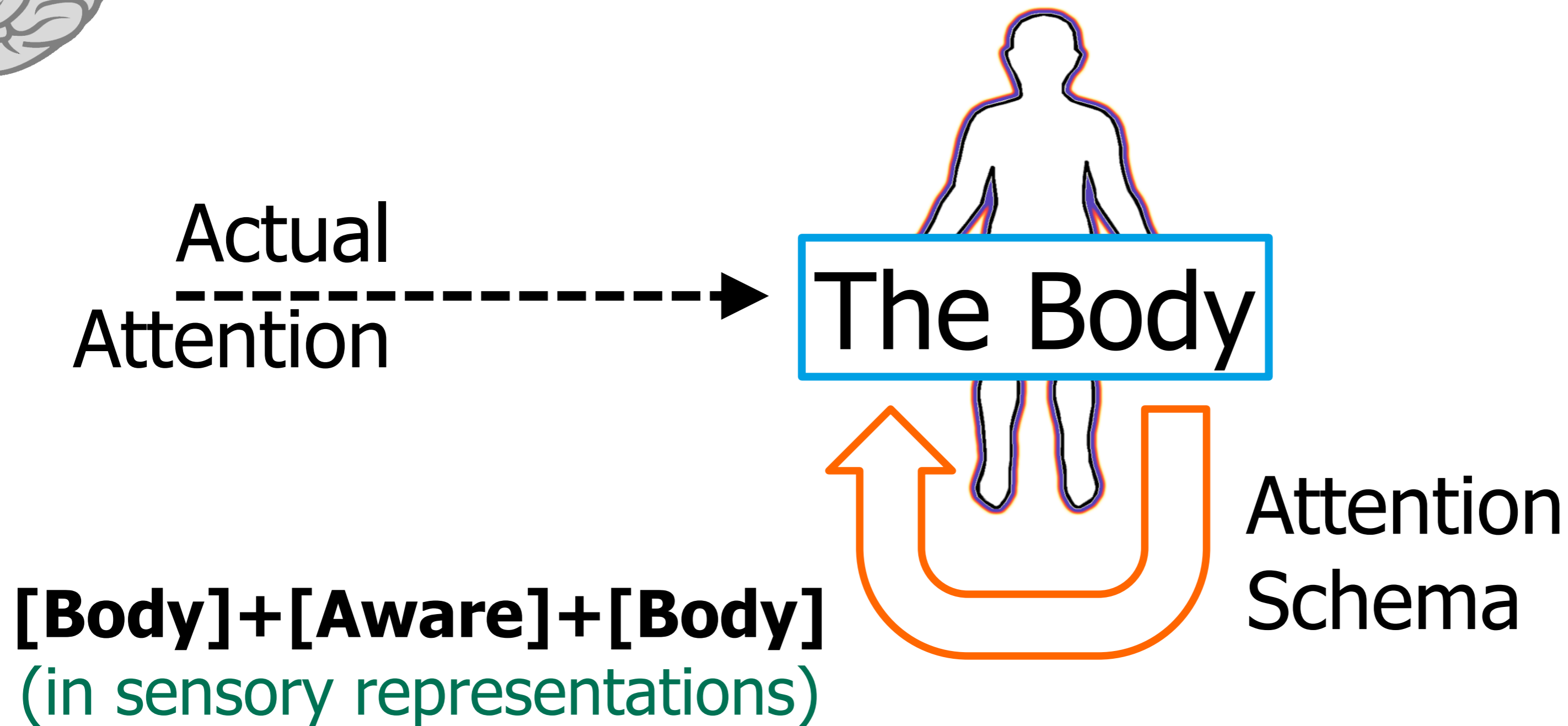
"I" + "am aware of" + "Me"
(in words)



Attention
Schema

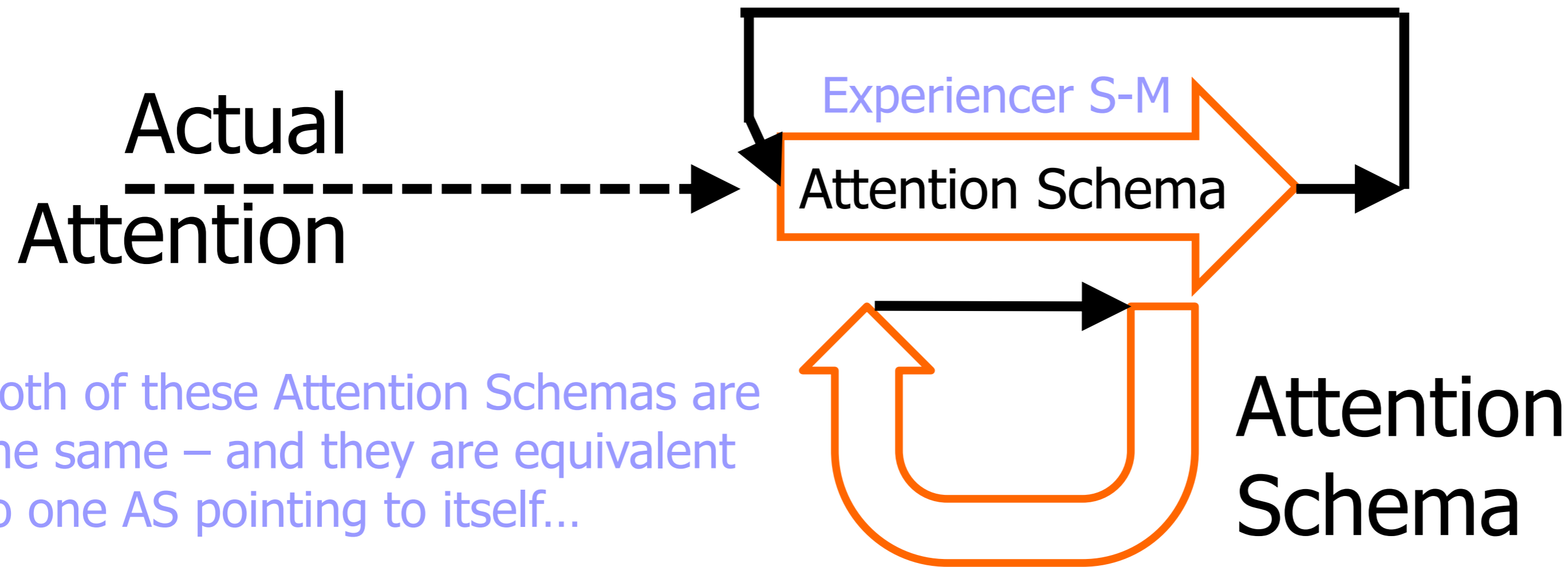


Doer Self-Awareness





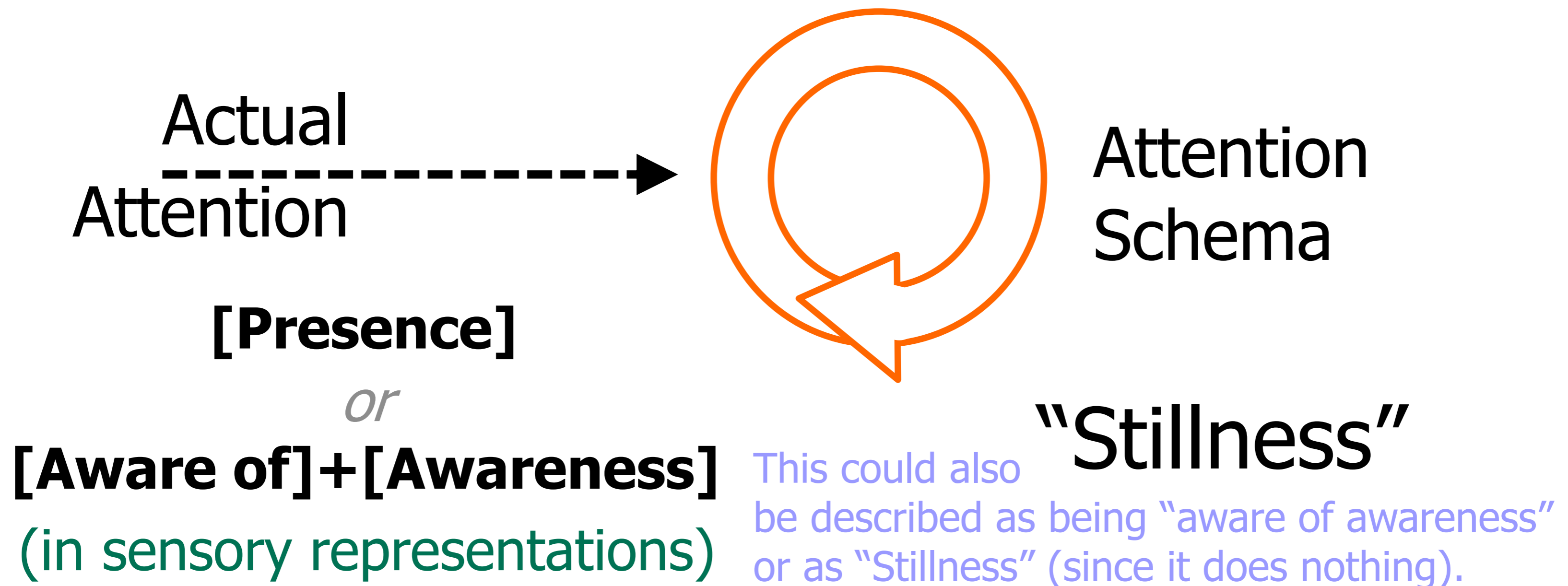
Experiencer Self-Awareness



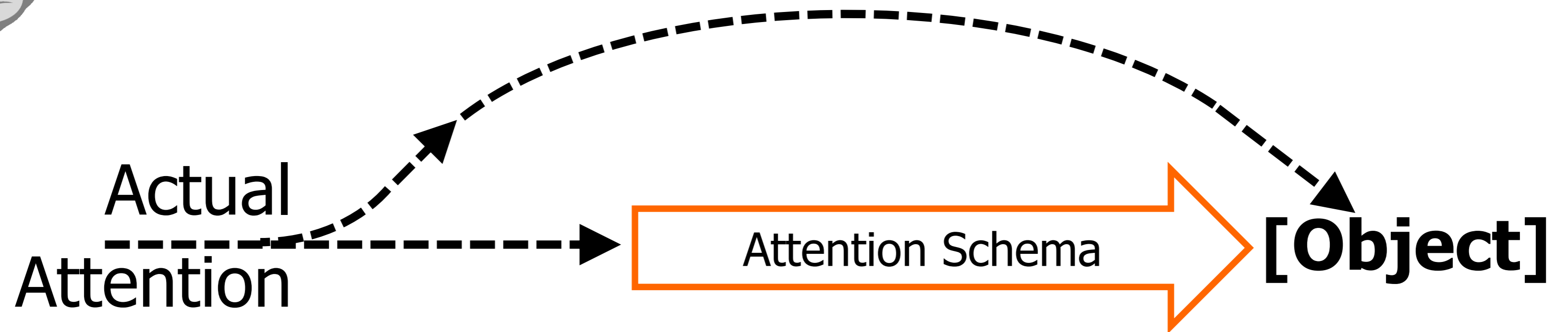


Experiencer Self-Awareness

AS is an abstract concept. Unlike other abstract concepts, this AS loop has no connection to any other concepts and it has no location in space. Whenever Actual Attention is directed at the AS, it is found to exist. Thus, "Presence" is a reasonable description of something that is abstract (non-physical), with no location, but exists.



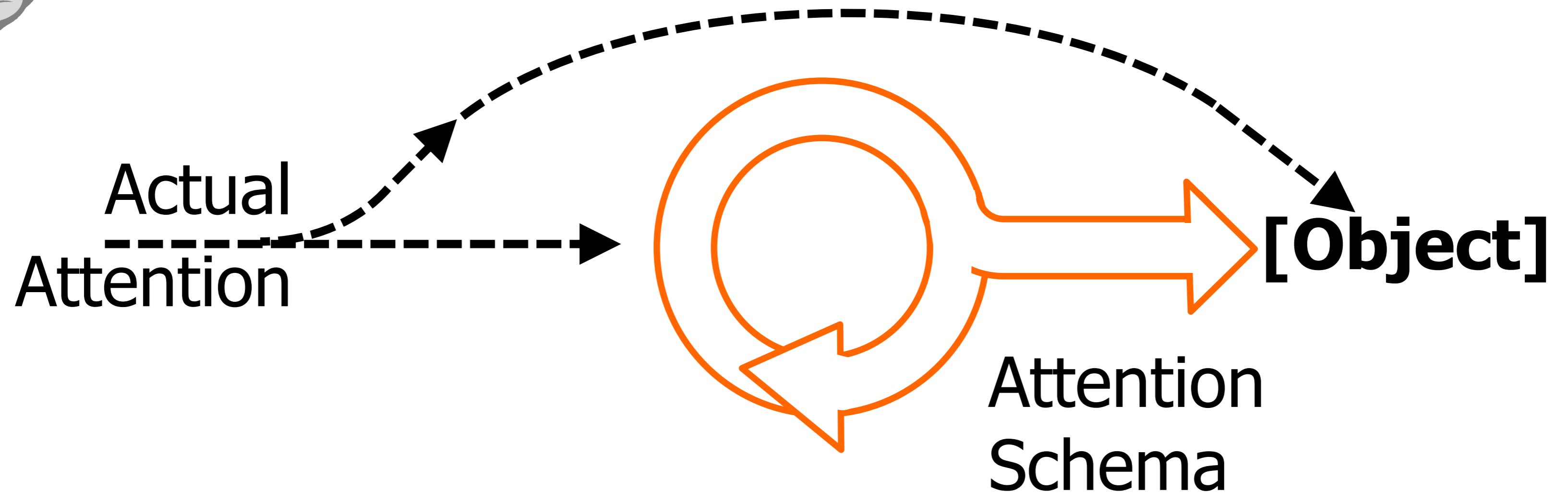
Being Aware of Awareness of an Object



Actual attention is directed at an object and at our awareness of that object.

Being Aware of Awareness of an Object

This results in an AS loop that also points to an object



[Presence]+[Awareness]
(in sensory representations)

Note that this kind of awareness would be easier to achieve in a meditation than the pure "Presence" awareness of the Experiencer's self-awareness state.

Preview: Some nondual teachers claim "Presence Awareness" is the answer to "Who am I?"



Part 7 of 7: Spiritual Enlightenment Explained

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Spiritual “Enlightenment”



What is Spiritual “Enlightenment”

Enlightenment is **NOT** about “**Perfection**” (1)

See footnote (1) : Ingram rejected all models that have any kind of “Perfection.”

❑ Enlightenment is **Nonduality** = No subject-object distinction

The only enlightenment model Ingram fully accepts is the Nonduality model.

❑ There are anywhere from 2 to more than a dozen **stages** of Enlightenment

(1) Daniel L Ingram, “**Mastering the Core Teachings of the Buddha**” (2008) see the 31 different models in the “Models of the Stages of Enlightenment” chapter.



Buddhism (1)

Trainings in:

- ❑ Morality
This is “ordinary” spirituality
- ❑ Concentration
- ❑ Insight
- ❑ More Morality
Even if “Enlightened,” more morality is needed since there is no perfection.

Insights:

- ❑ Impermanence
- ❑ Suffering ... from attachments and aversions
- ❑ No Self This is the Nondual insight, since “no self” means there is no subject-object distinction.

(1) Daniel L Ingram, “**Mastering the Core Teachings of the Buddha**” (2008)



Hindu Advaita Vedanta

Trainings in:

- ❑ Contemplation
- ❑ Self-inquiry
- ❑ Self-mastery
- ❑ Textual studies
- ❑ Ethical refinement

Insight is Nonduality:

- ❑ Atman = Brahman
- ❑ No Subject-Object Distinction

Atman = the human “true self” or soul.
Brahman = all of reality

The “Self-inquiry” practice was emphasized by

Ramana Maharishi and a number of modern nondual teachers have embraced that practice.



Self-Inquiry

“Who Am I?”

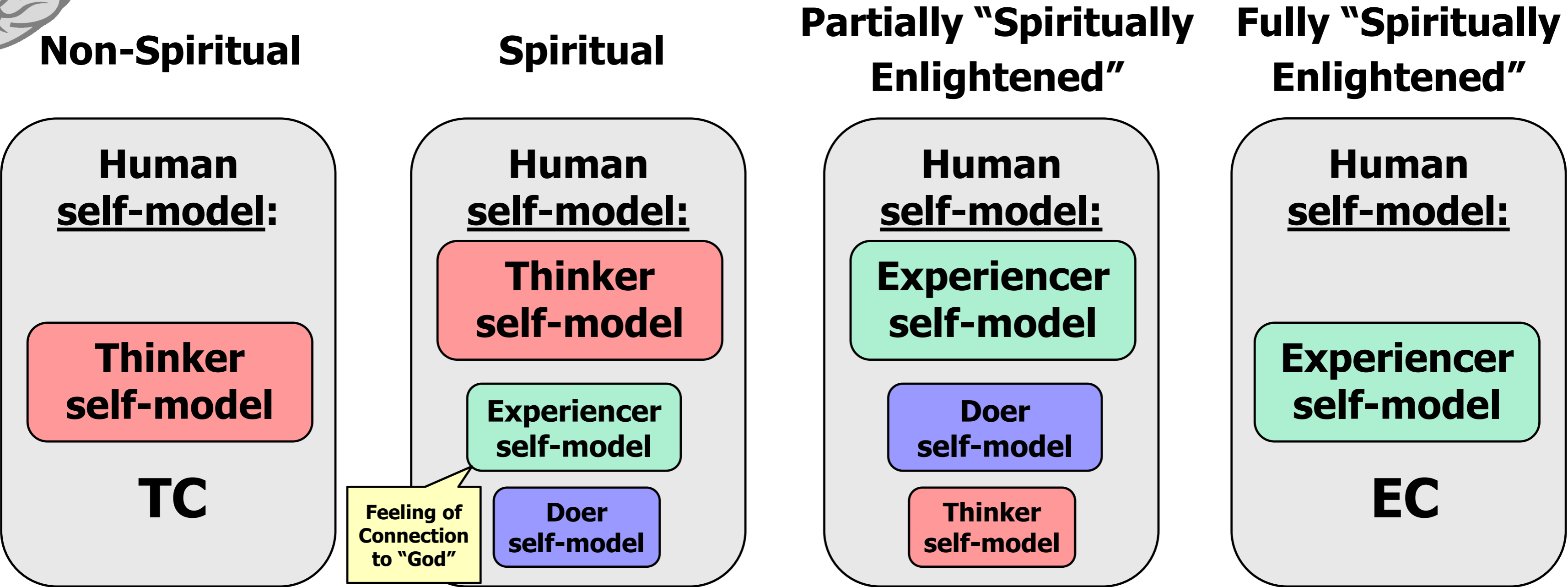
- Not the Ego (AKA Thinker)
- Not the Body (AKA Doer)
- The answer is: “Presence Awareness”⁽¹⁾
 - “Stillness” is also often mentioned

This book title is the answer to the “Who Am I?” question:

⁽¹⁾ Answer from John Wheeler in his book “*Presence Awareness, Just This and Nothing Else*” - Note, this is not John Wheeler the physicist



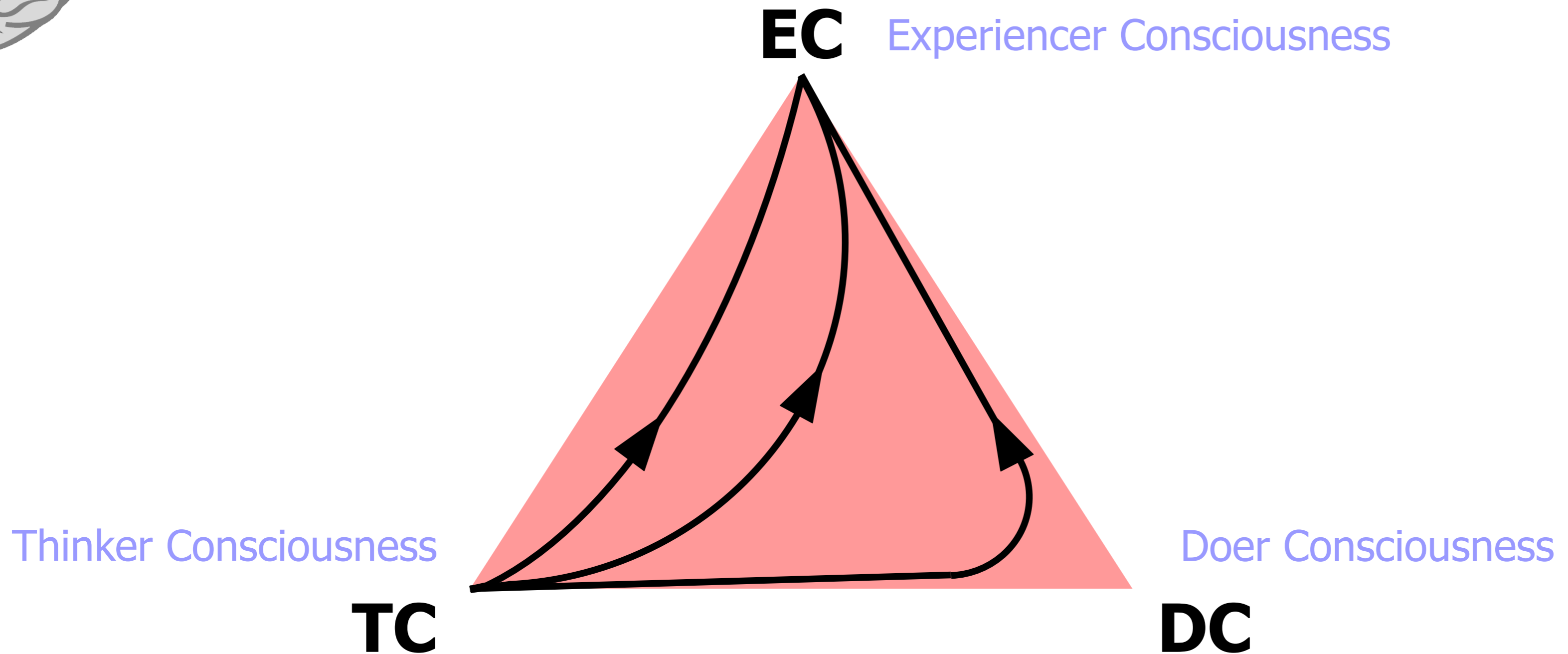
Human Self-Model Changes Due to Spiritual Practices



Animals & Ancient Humans = DC



Many Paths to Enlightenment





Enlightenment / Nonduality Insights

Tradition	Insights	TC	DC	EC
Buddhism	No Self Only the EC has Selfless Awareness	✗	✗	✓
Hindu Advaita Vedanta	Atman = Brahman EC awareness=WM	✗	✗	✓
	No Subject-Object Distinctions	✗	✗	✓
Self-Inquiry	Who Am I? = Presence Awareness	✗	✗	✓
	Stillness	✗	✗	✓



Conclusion

The Experiencer Consciousness State **is** the “Enlightened” State



Thank You!

- ❑ Thanks for directing your **Top Down Attention** to my Presentation!
- ❑ I hope that your **Experiencer intuitively understood how** the three agent model of consciousness **explains spirituality**.



The End

- ❑ I welcome feedback!
- ❑ Check out **www.SpiritualityExplained.com**
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 - ❑ Contact me at: **frank@SpiritualityExplained.com**