ILLUSIONS, MISPERCEPTIONS AND FALSE FOOD PREFERENCES CAUSED BY THE BRAIN

speaker

Michael O'Mahony

Department of Food Science & Technology

University of California, Davis

PREFERENCE TESTS



Taste these two foods.

You might like each one about the same, or you might like one more than the other.

Taste them and see what you think.



Ennis & Collins, 1980, report #80-233, Philip Morris Res. Center, Richmond, Virginia

Response Bias



40 20 40

No Preference Responses

Ennis & Collins, 1980, report #80-233, Philip Morris Res. Center, Richmond, Virginia

CURRENT IDEAS ON TESTING TO SEE WHETHER THE DATA DIFFER SIGNIFICANTLY FROM A 'NO PREFERENCE' SITUATION.

Give two pairs

TARGET PAIR The two products compared for preference

Chi-squared observed frequencies

PLACEBO PAIR The two identical products to measure the effects of the testing situation

Chi-squared expected frequencies









TARGET PAIR

PLACEBO PAIR

No preference

Taste these two foods.

You might like them about the same or you might like one more than the other.

Taste them and see what you think.









TARGET PAIR

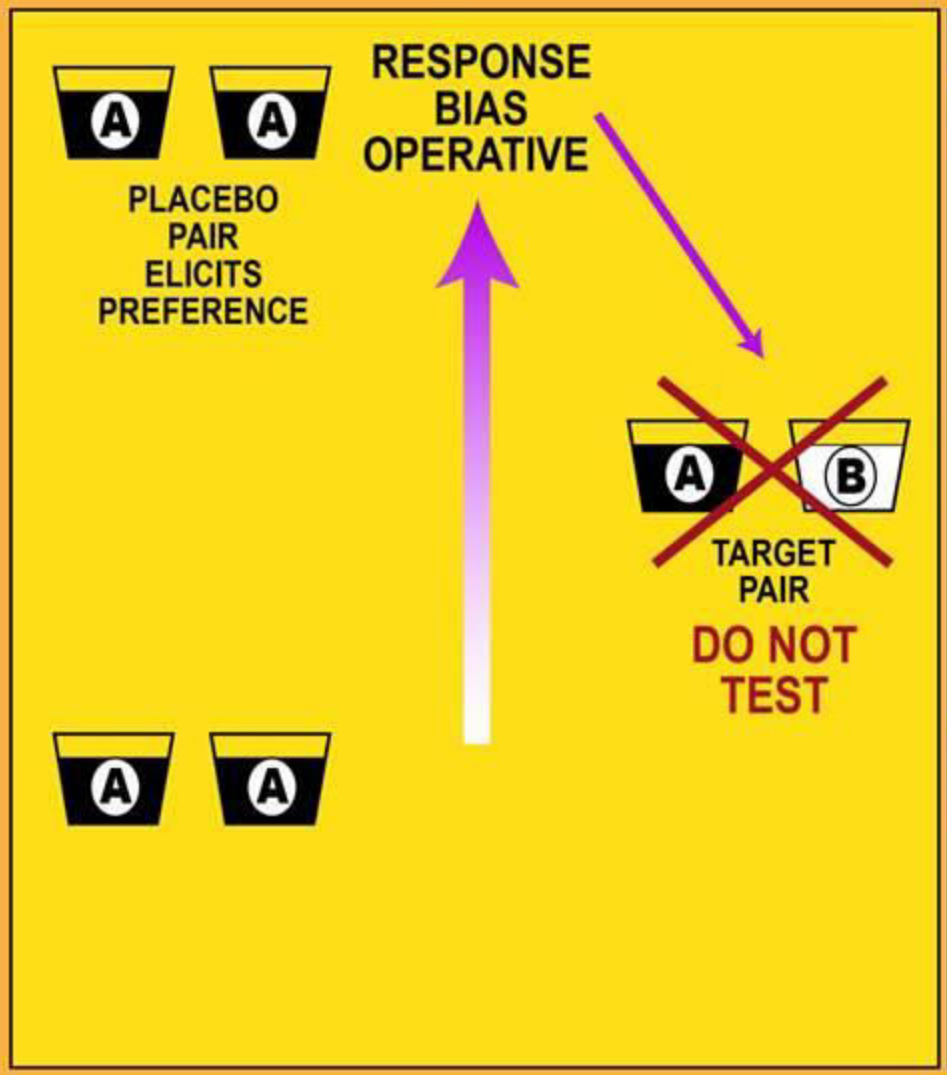
PLACEBO PAIR

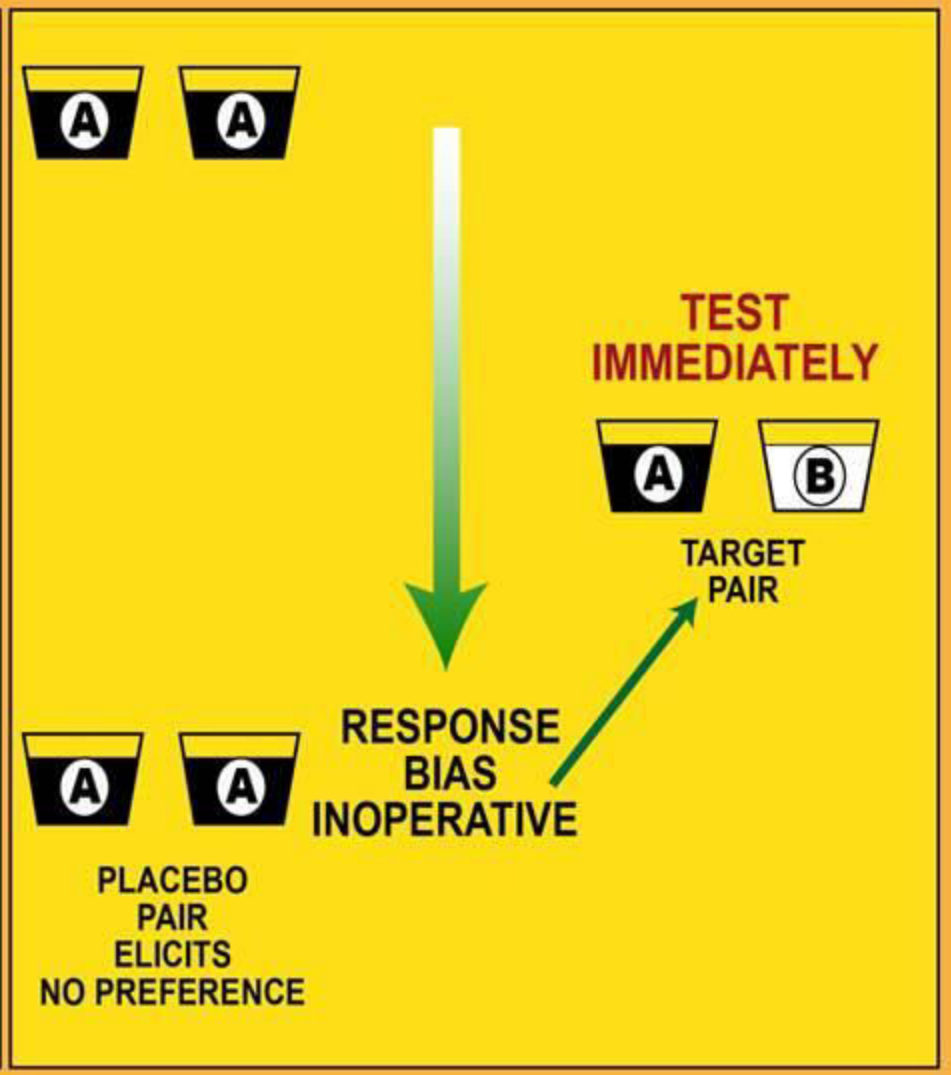
False preferences

If the numbers for the target pair are different from those in the placebo pair, then we can say that NOT EVERY CONSUMER has 'No Preference'.
Some, at least must have a preference.

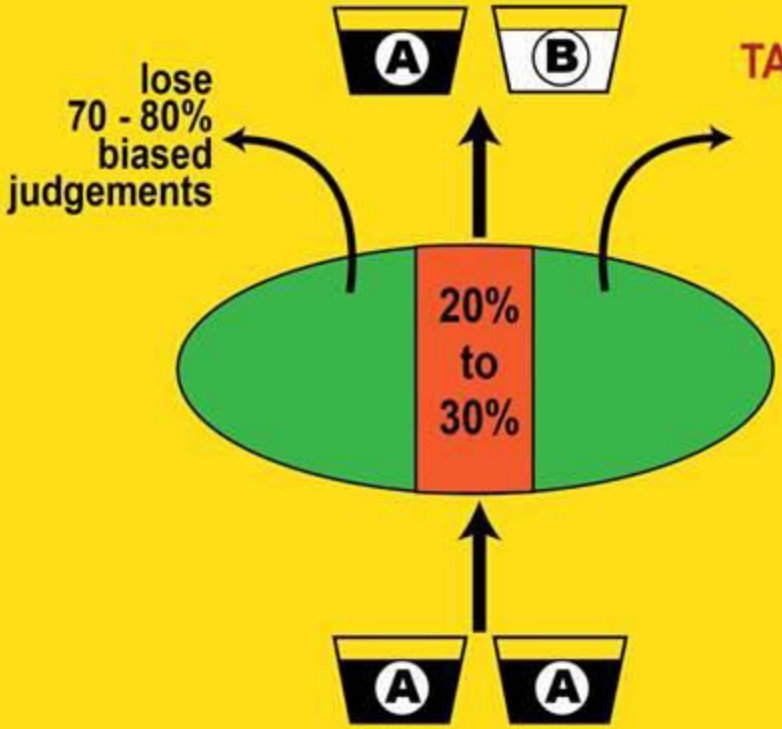
But how many have a real preference and not a false preference caused by response bias ?

TURN TO PSYCHOLOGY:
SIMPLY ELIMINATE THE RESPONSE BIAS





Unacceptable preference protocol



PLACEBO PAIR

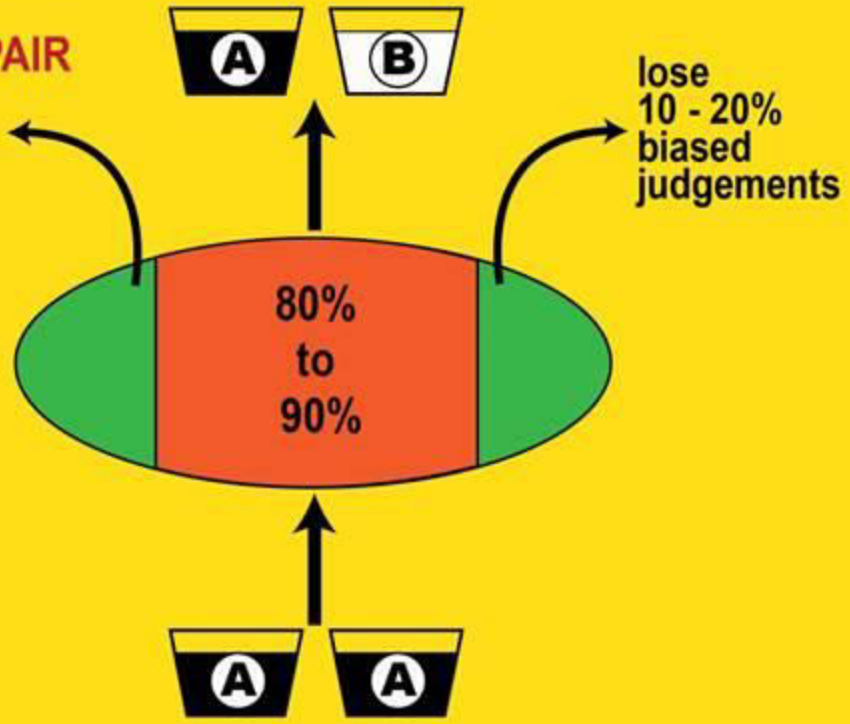
20- 30% No Preferences

Binary choice subroutine engaged and provides preference responses

RESPONSE BIAS OPERATIVE

TARGET PAIR

Acceptable preference protocol



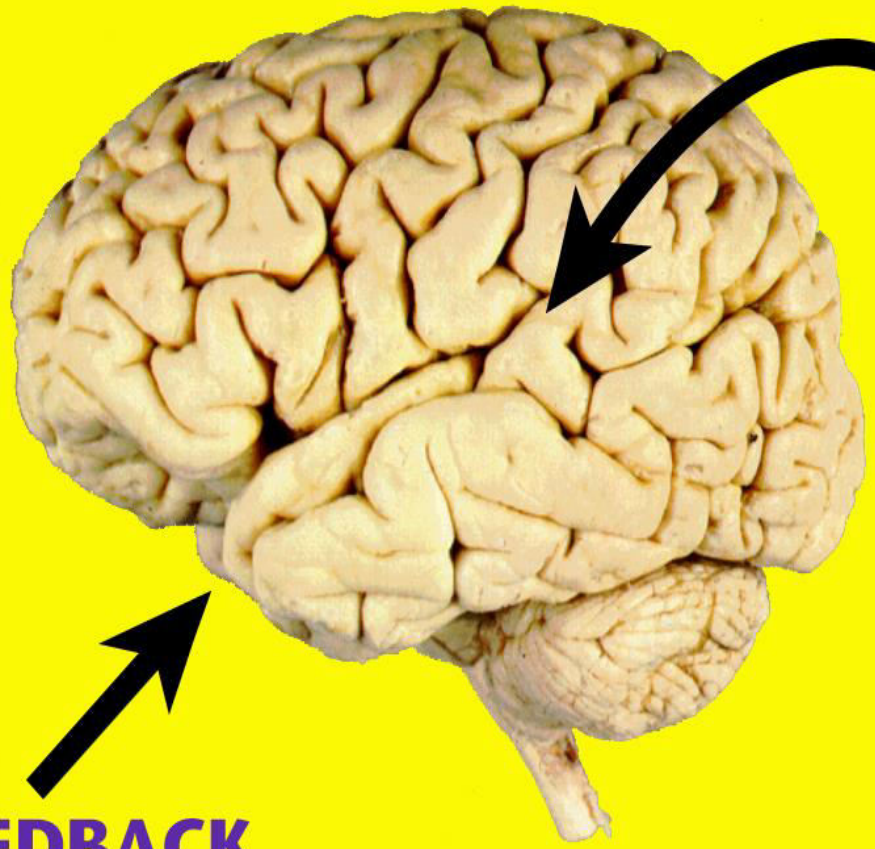
PLACEBO PAIR

80- 90% No Preferences

Preference responses produced by central processing

RESPONSE BIAS INOPERATIVE

PERCEPTION OF FOOD



CENTRAL PROCESSING

SMELL
TASTE
TOUCH
IRRITATION
MUSCLE FEEDBACK
TEMPERATURE
VISION
SOUND

BRAIN

100,000, 000, 000 cells….hundred billion

3,200, 000 Km of wires….1,787,200 miles

1,000,000,000,000,000 connections….million billion

1.5 L 1.5Kg….3.3lbs

power 10watts….nightlight





COMPUTER serial processing

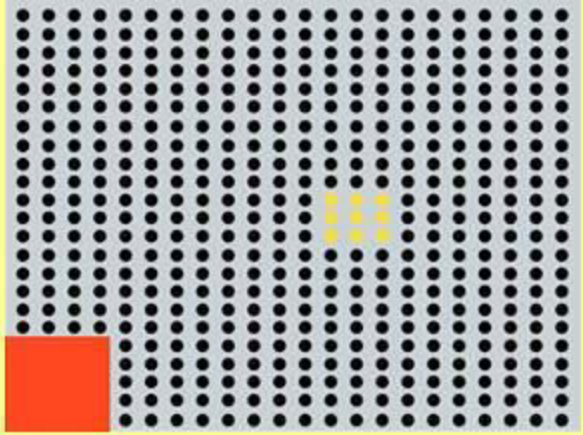
Need 10 megawatts….

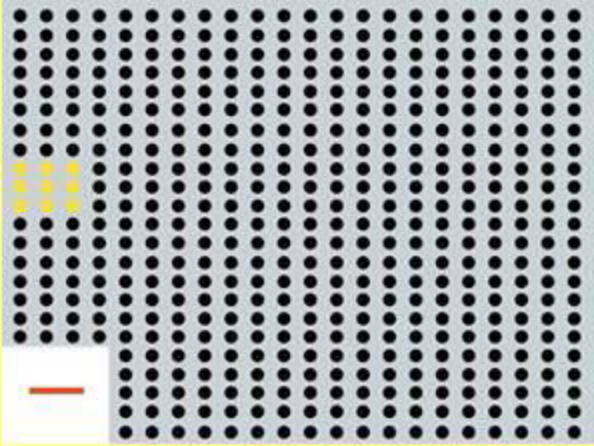
could power a town

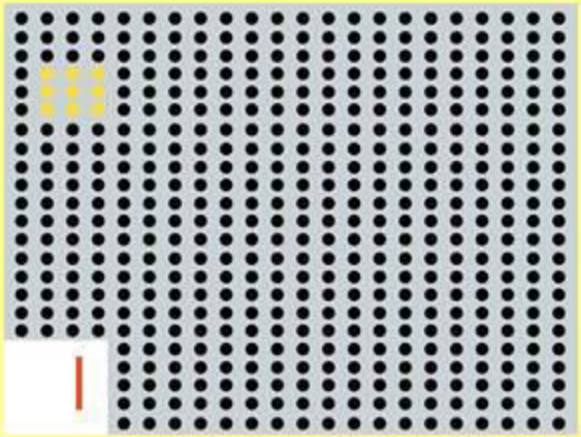
Silicon brain….

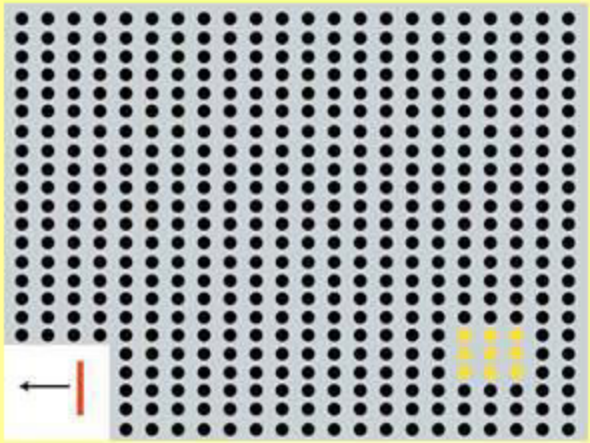
heat produced would melt it.

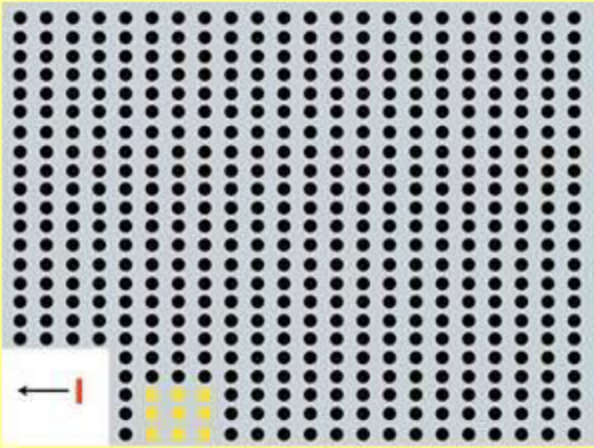


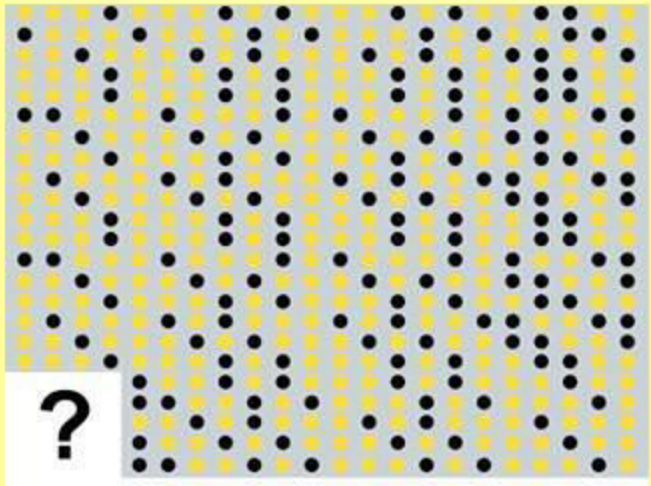




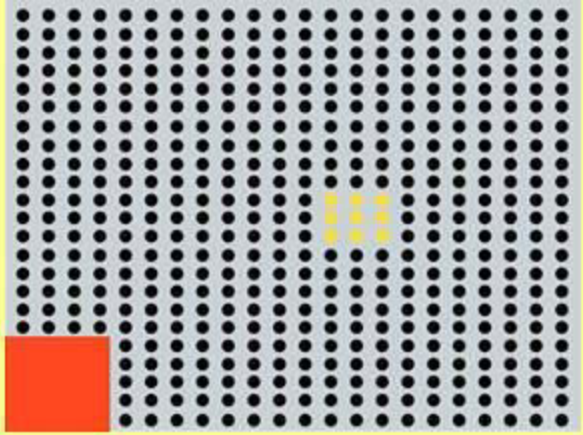


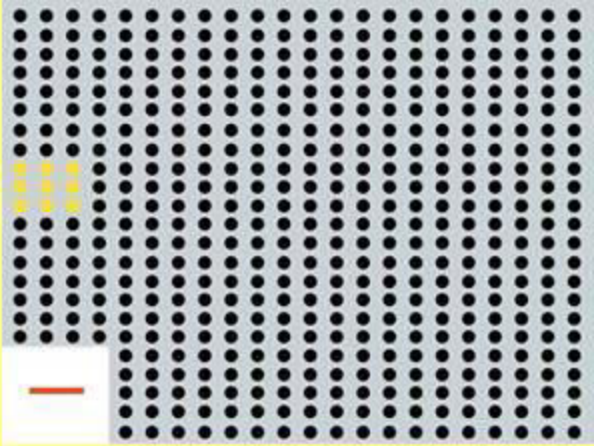


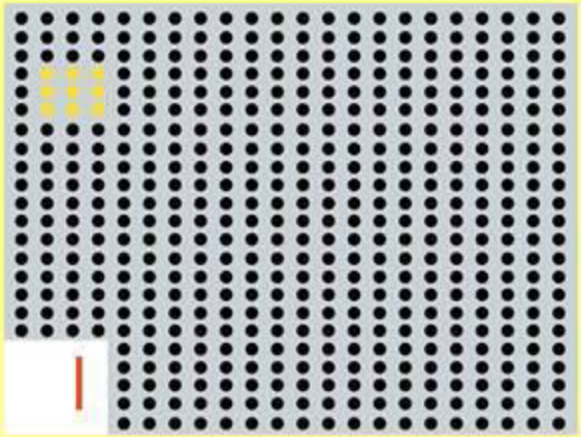


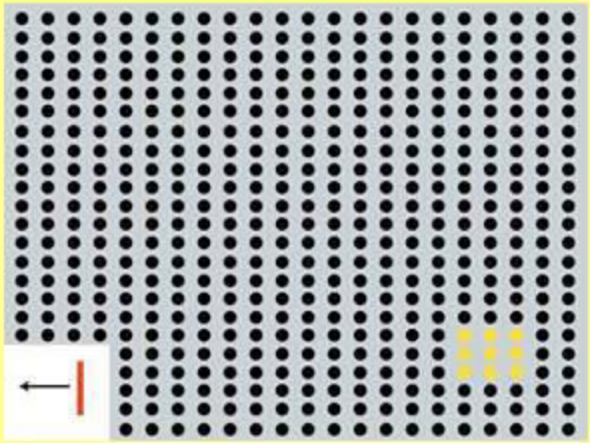


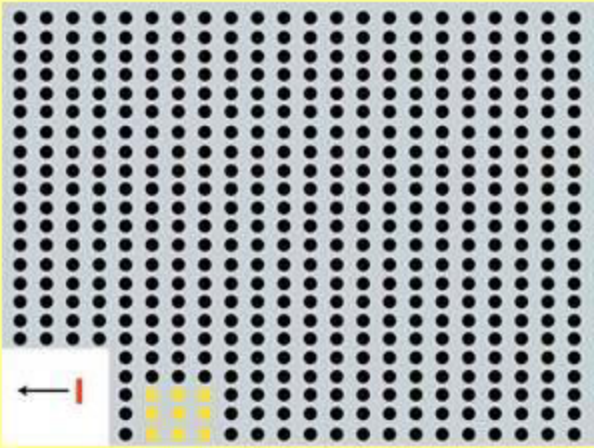


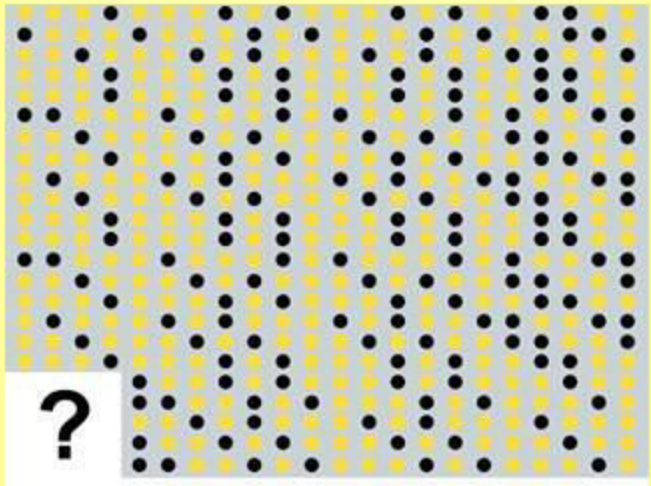




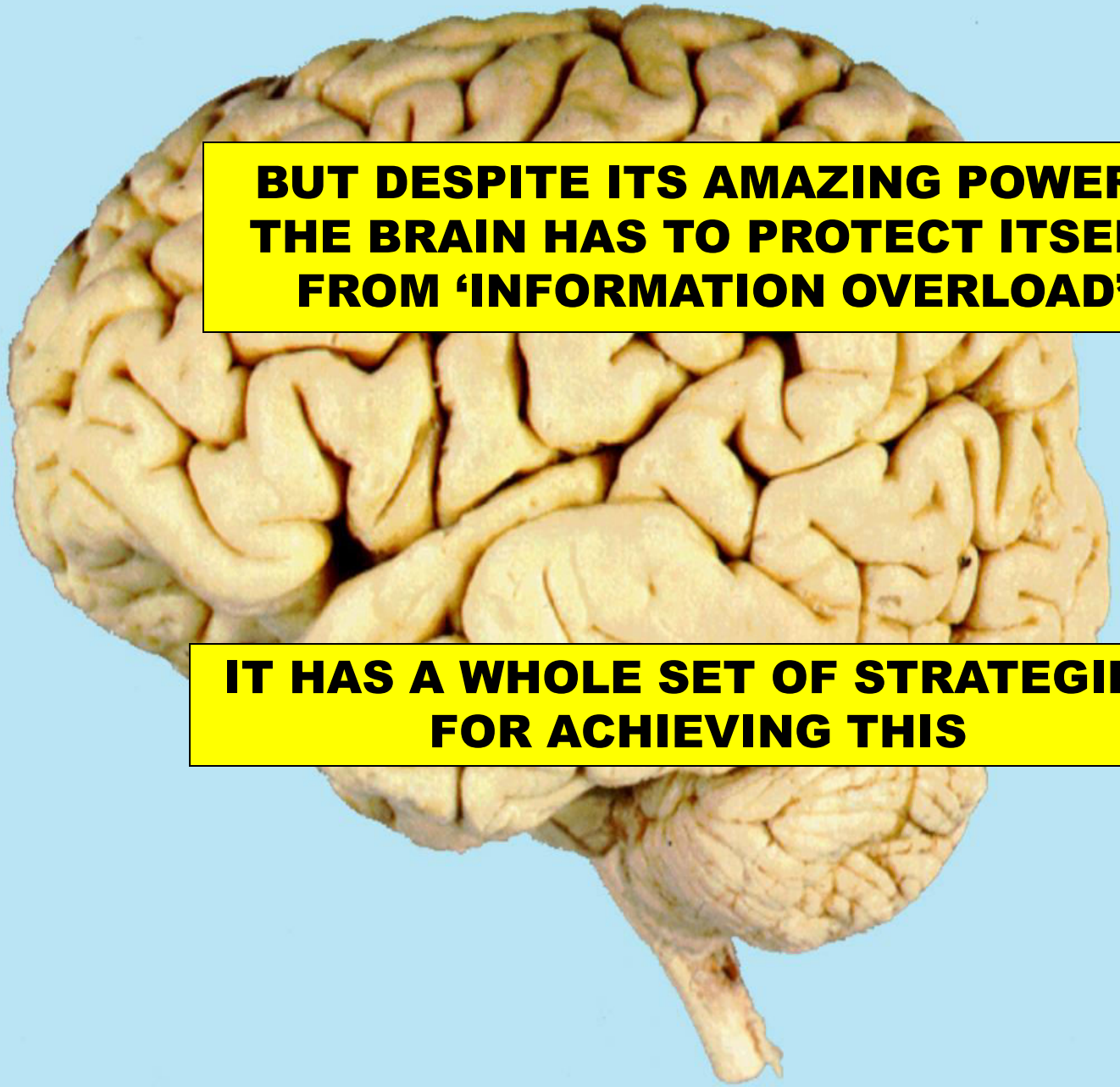












BUT DESPITE ITS AMAZING POWER, THE BRAIN HAS TO PROTECT ITSELF FROM 'INFORMATION OVERLOAD'

IT HAS A WHOLE SET OF STRATEGIES FOR ACHIEVING THIS



ATTENTION

Generally, we attend more to visual input

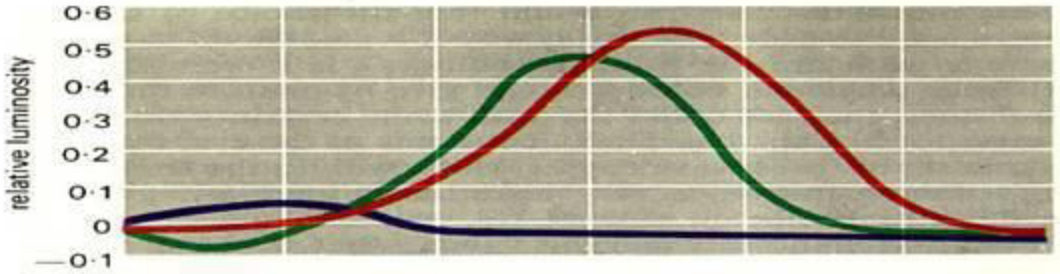
SEE SMELL

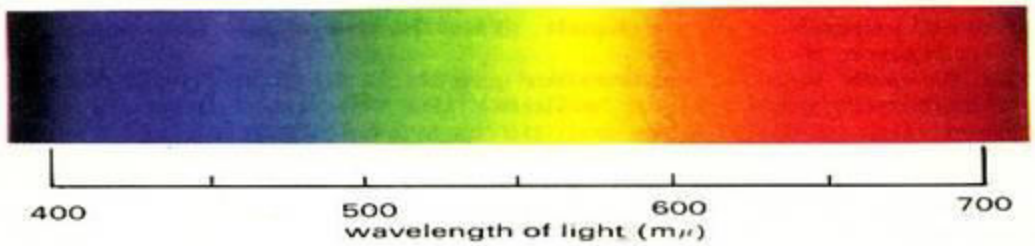


SENSORY ADAPTATION

Brain attenuates input to protect itself from information overload

SMELL TASTE





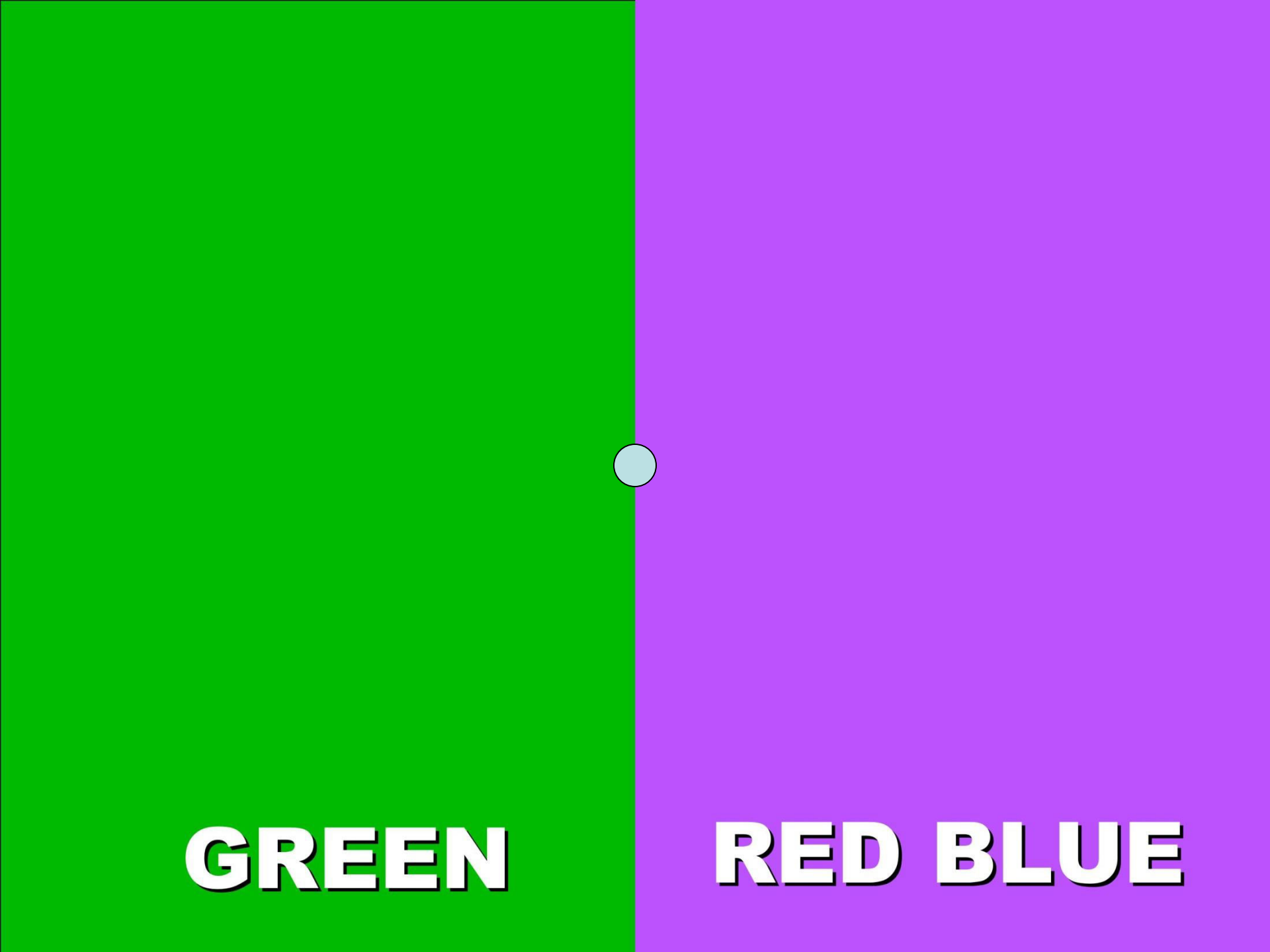
SHORT **MEDIUM** **LONG**

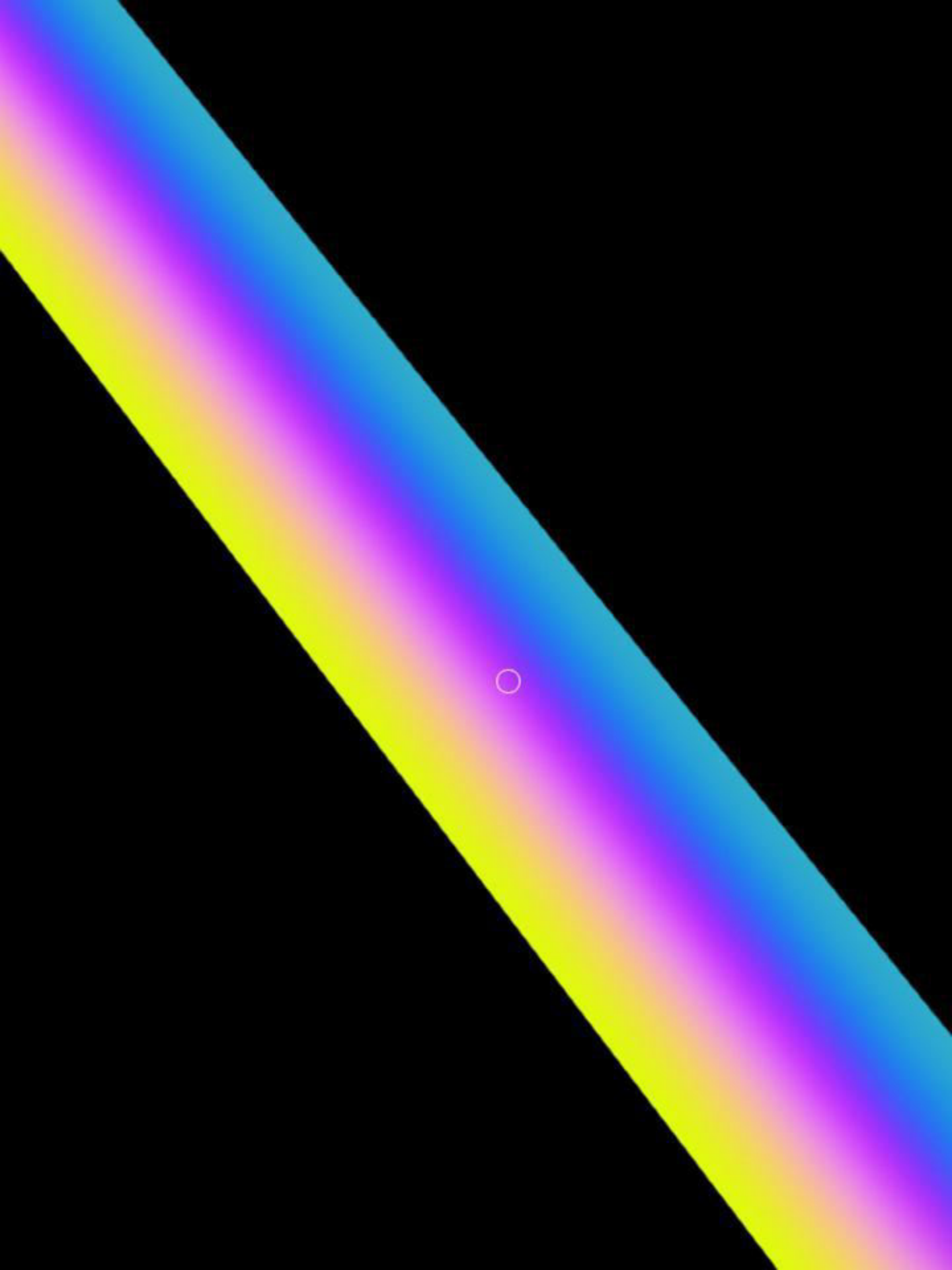
BLUE **GREEN** **RED**

WHITE

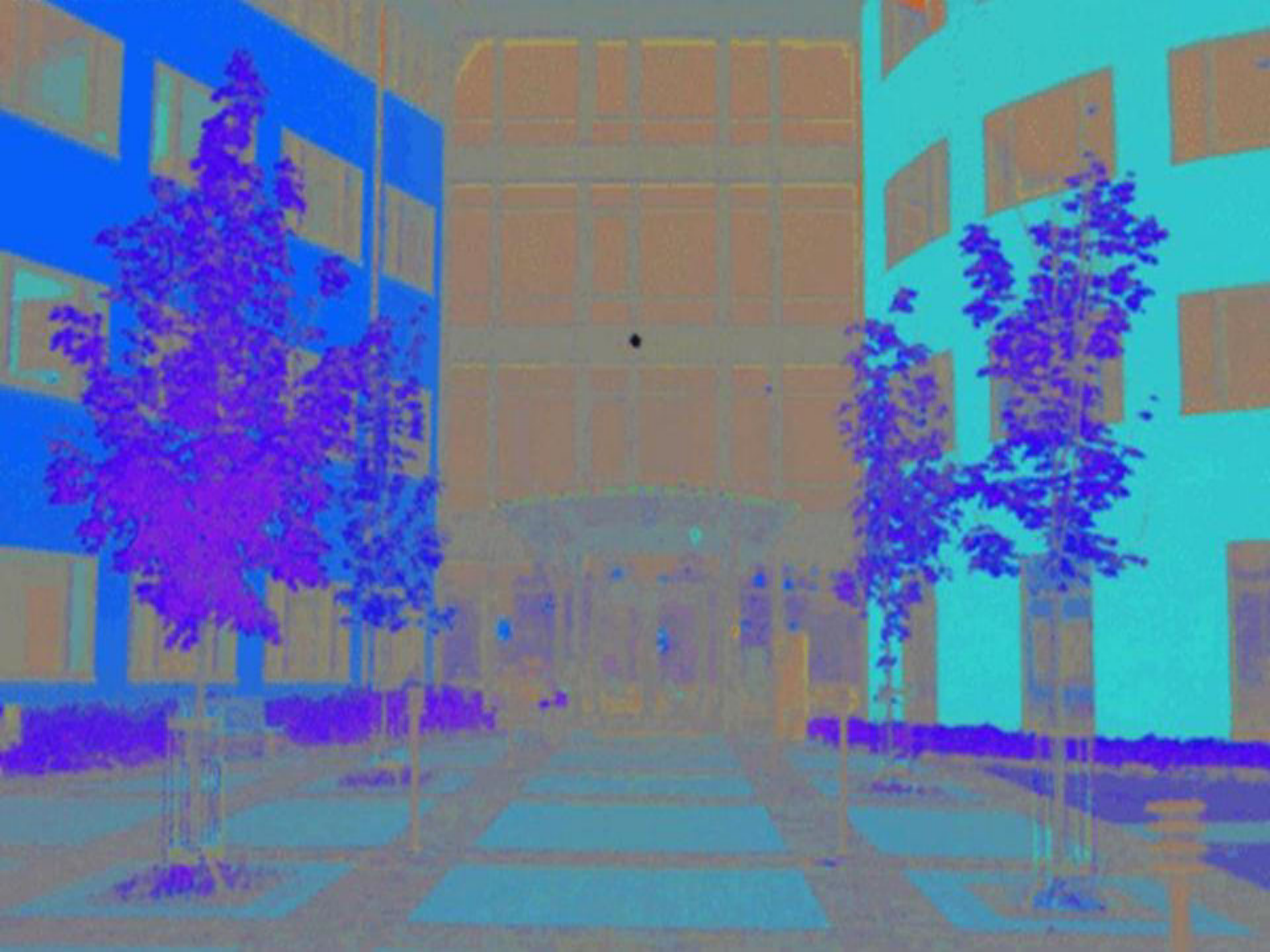
RED

BLUE GREEN


GREEN
RED BLUE







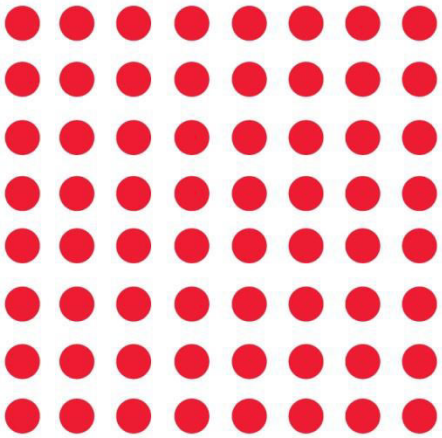


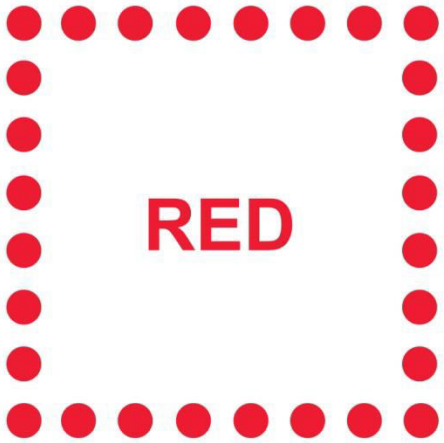


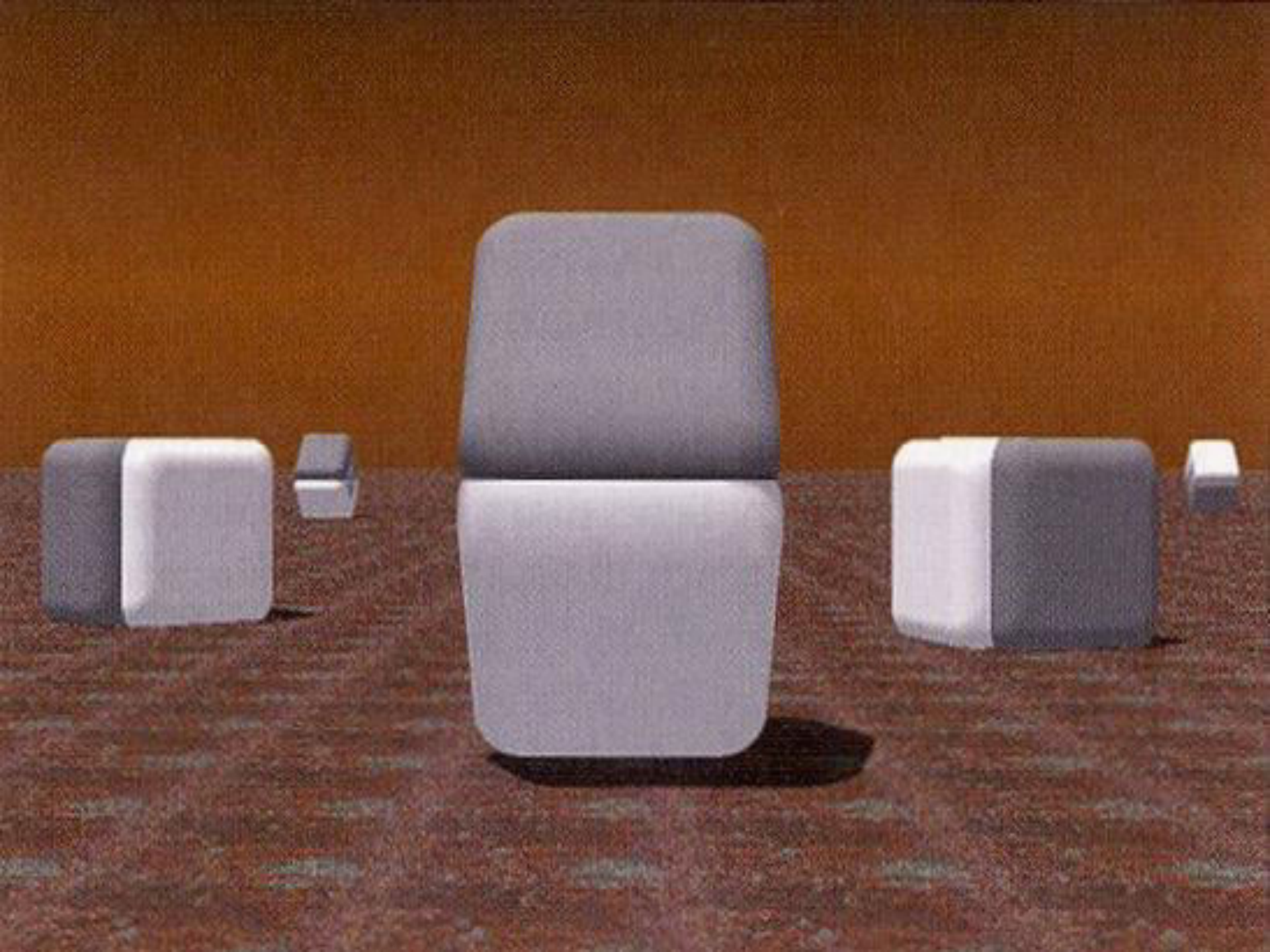
DATA REDUCTION

Senses transmit minimal data to the master program in the brain for it to form a percept

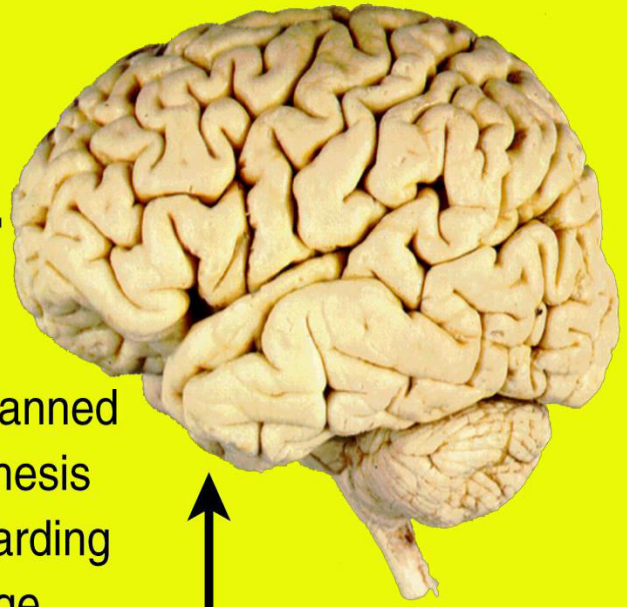





RED



PERCEPT
IN
CONSCIOUSNESS



Features scanned
and hypothesis
formed regarding
the image

**The brain decides
what we perceive**

Features of image
extracted and
transmitted to cortex

OBJECT

STIMULUS



Image formed
on the retina

EYE

RECEPTOR

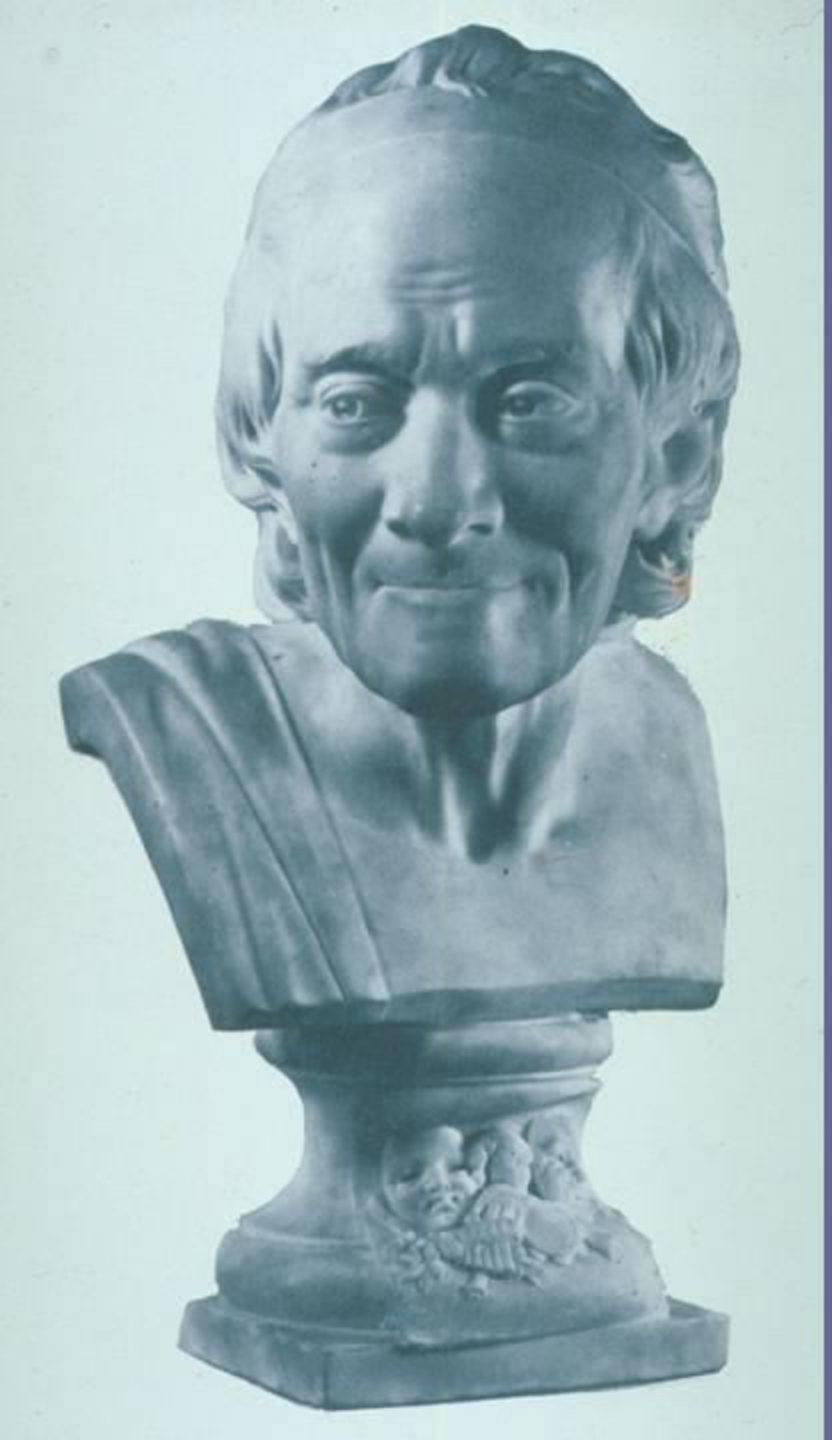


THE MASTER PROGRAM IN THE BRAIN MAKES A DECISION ABOUT WHAT IS PERCEIVED

We know it makes a decision because it can change the decision
If it can change the decision, it must have been making the decision







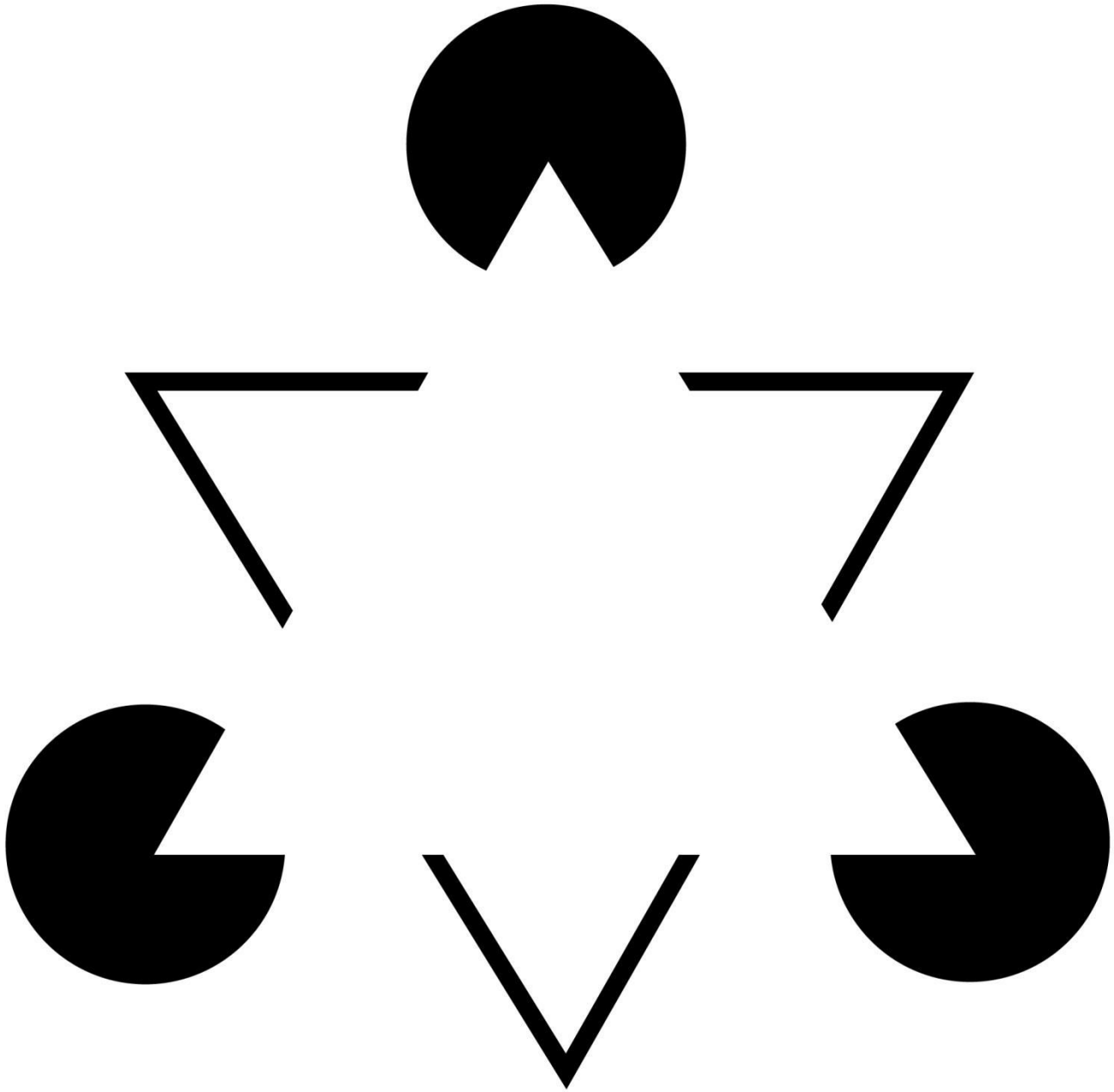
Francois-Marie
VOLTAIRE
1694-1778





ILLUSIONS

Master program in brain makes a decision about what should be perceived. Sometimes it does not correspond to reality



BEWARE OF SUGGESTION EFFECTS





ORANGE JUICE



MASKING THE COLOR OF ORANGE JUICE SAMPLES

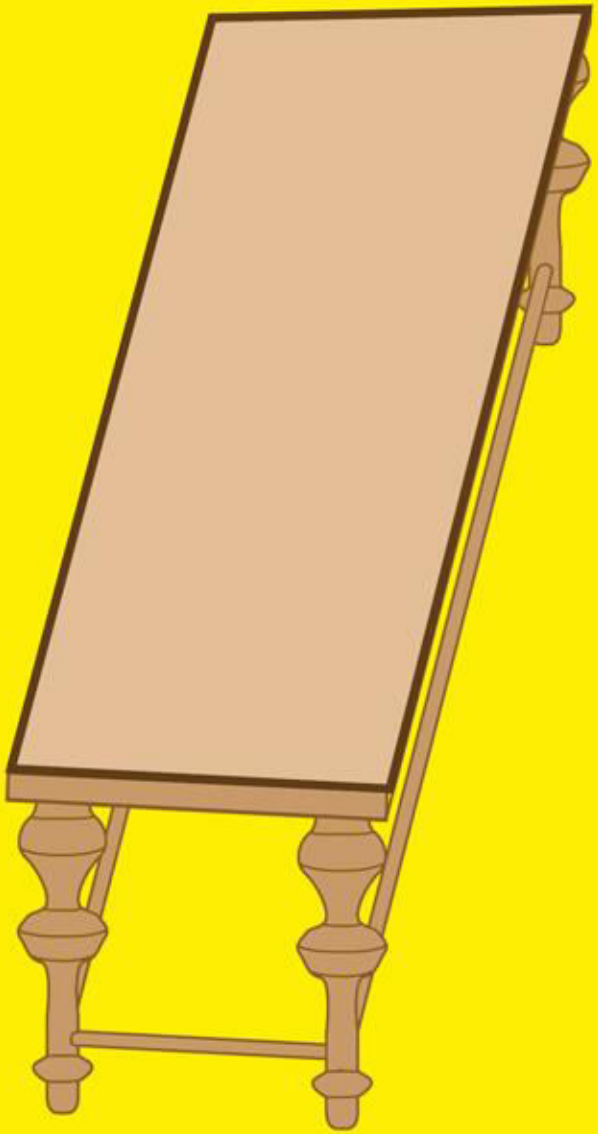


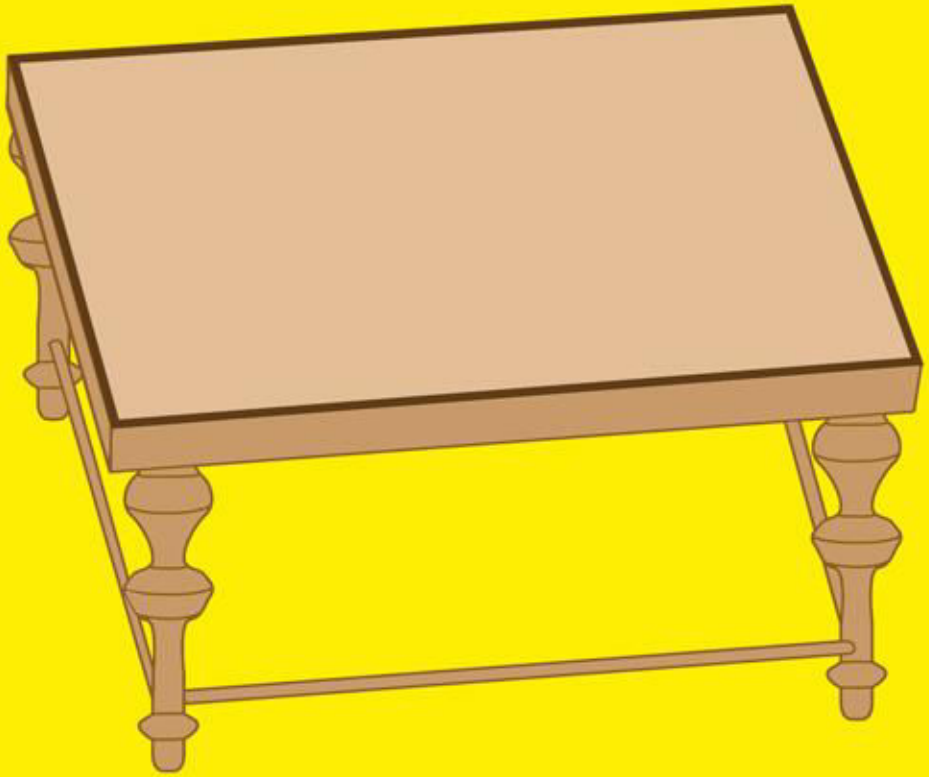


ILLUSIONS

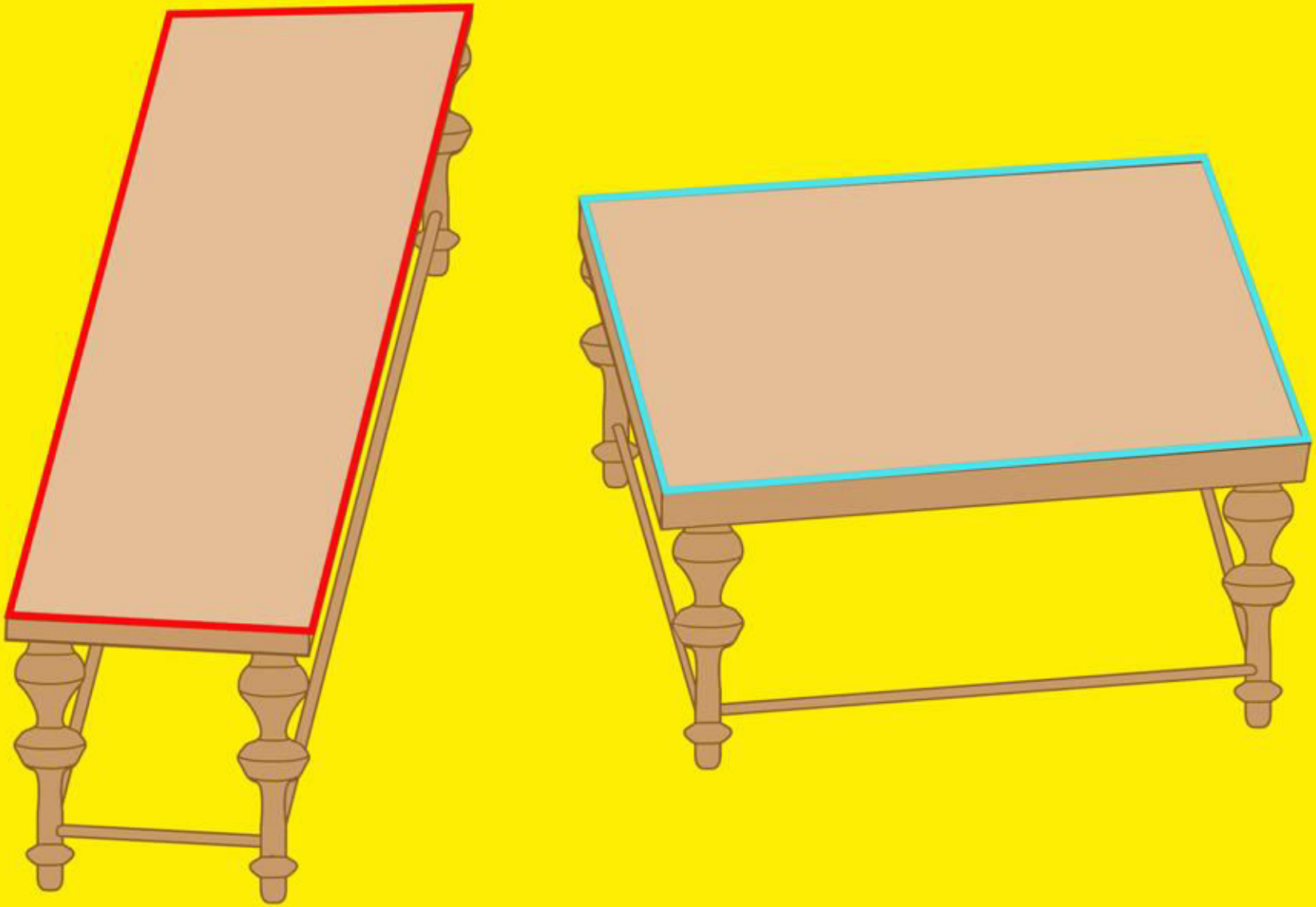
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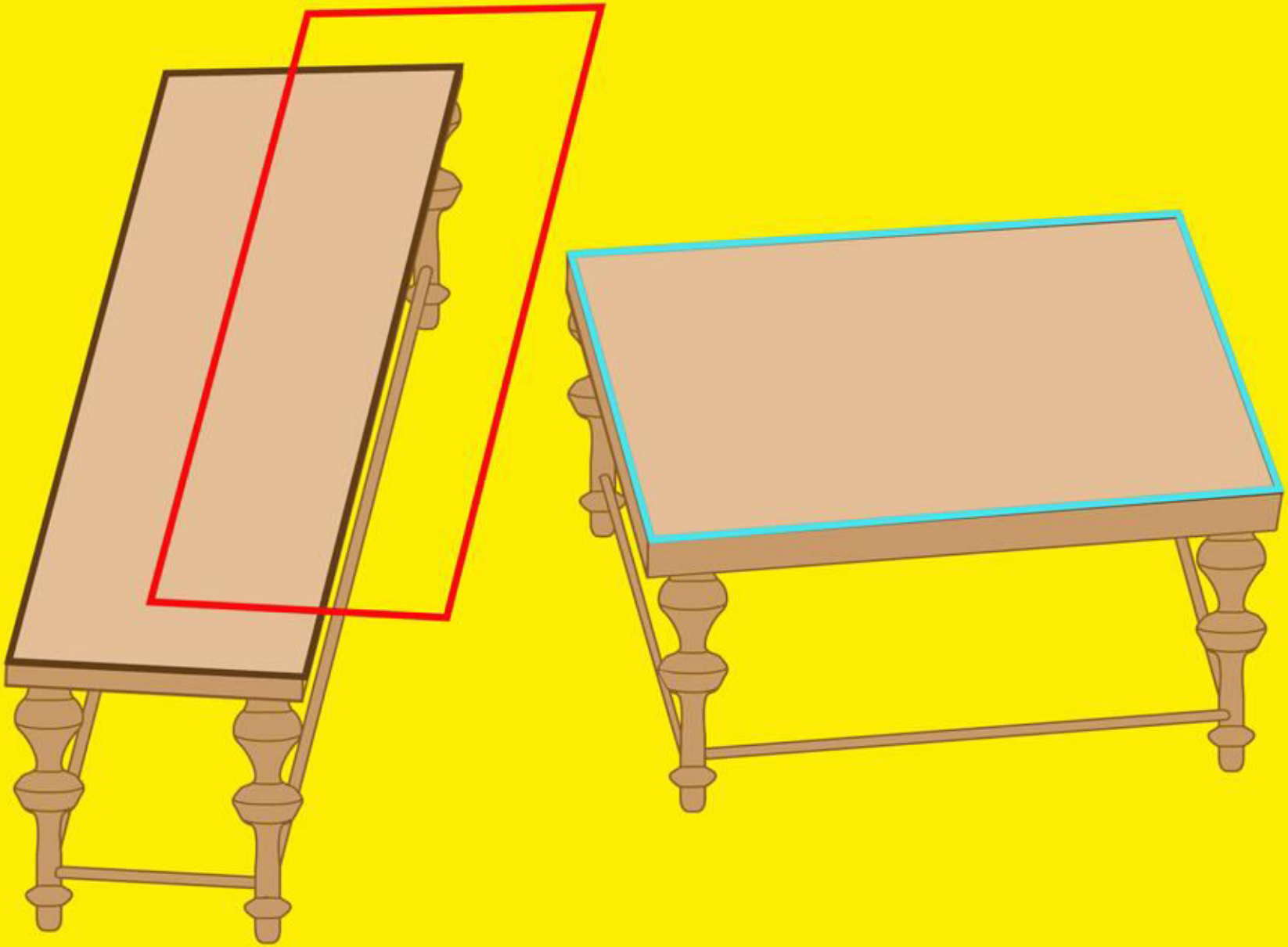
Shepard's tabletops

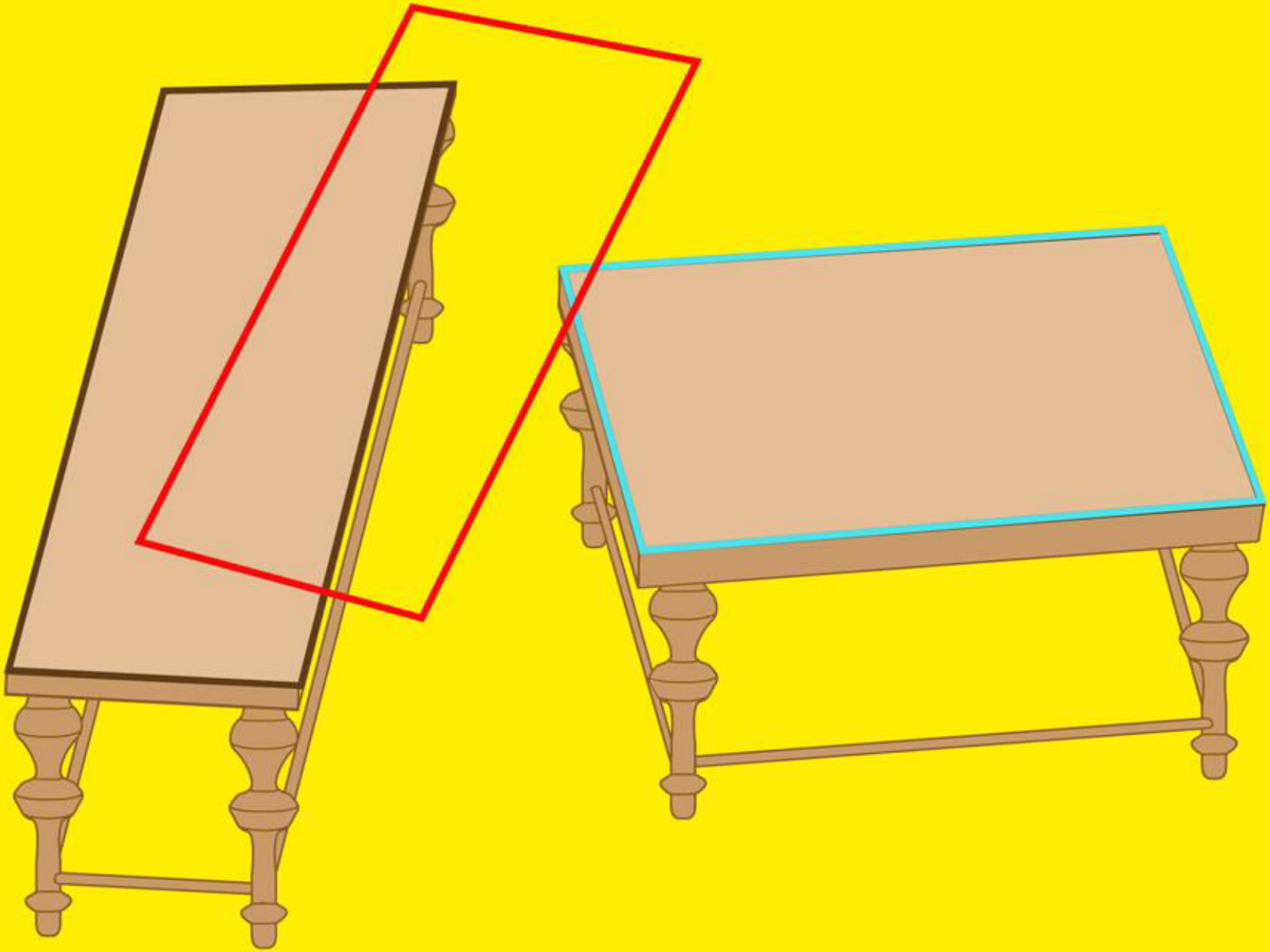


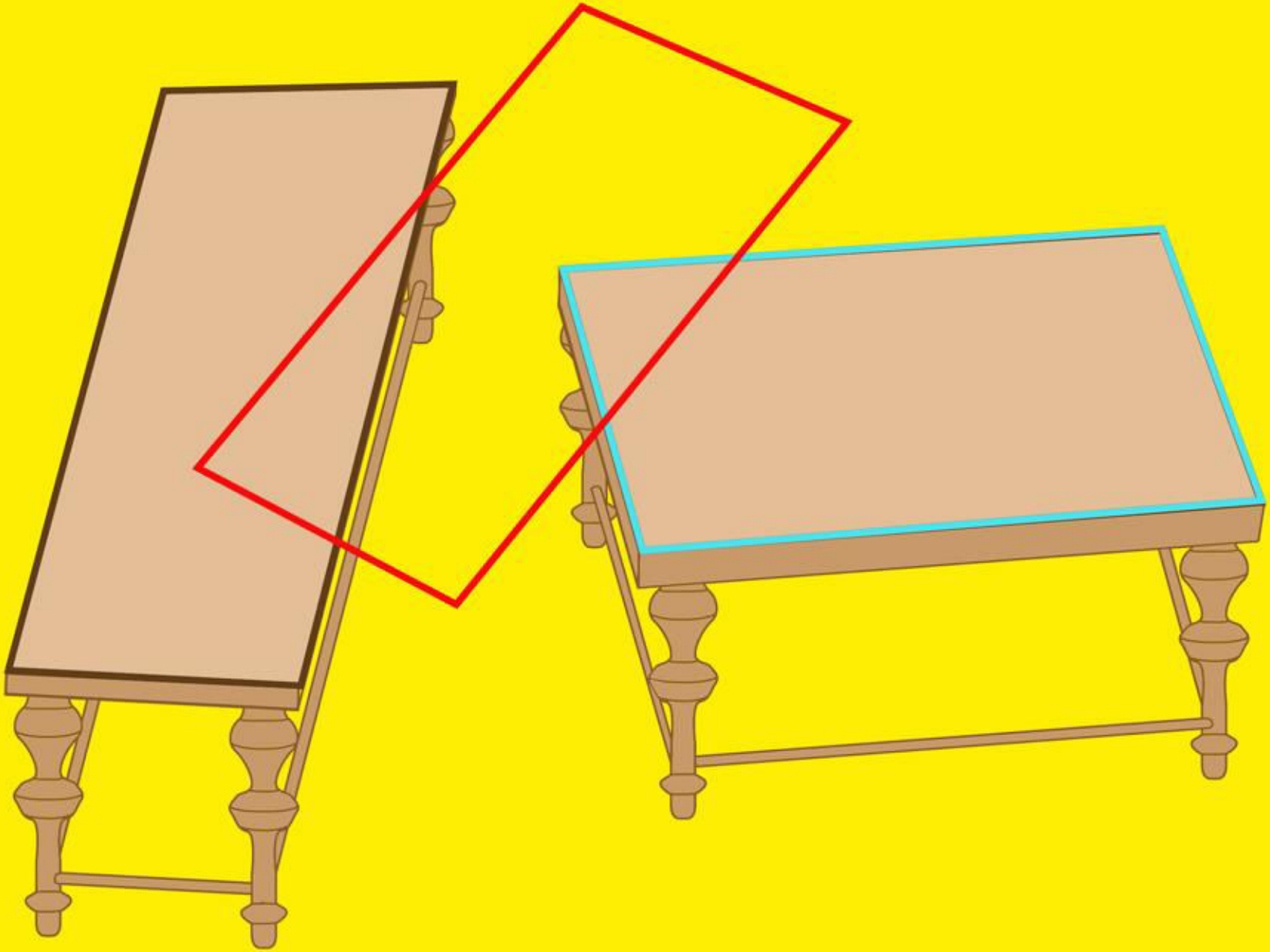


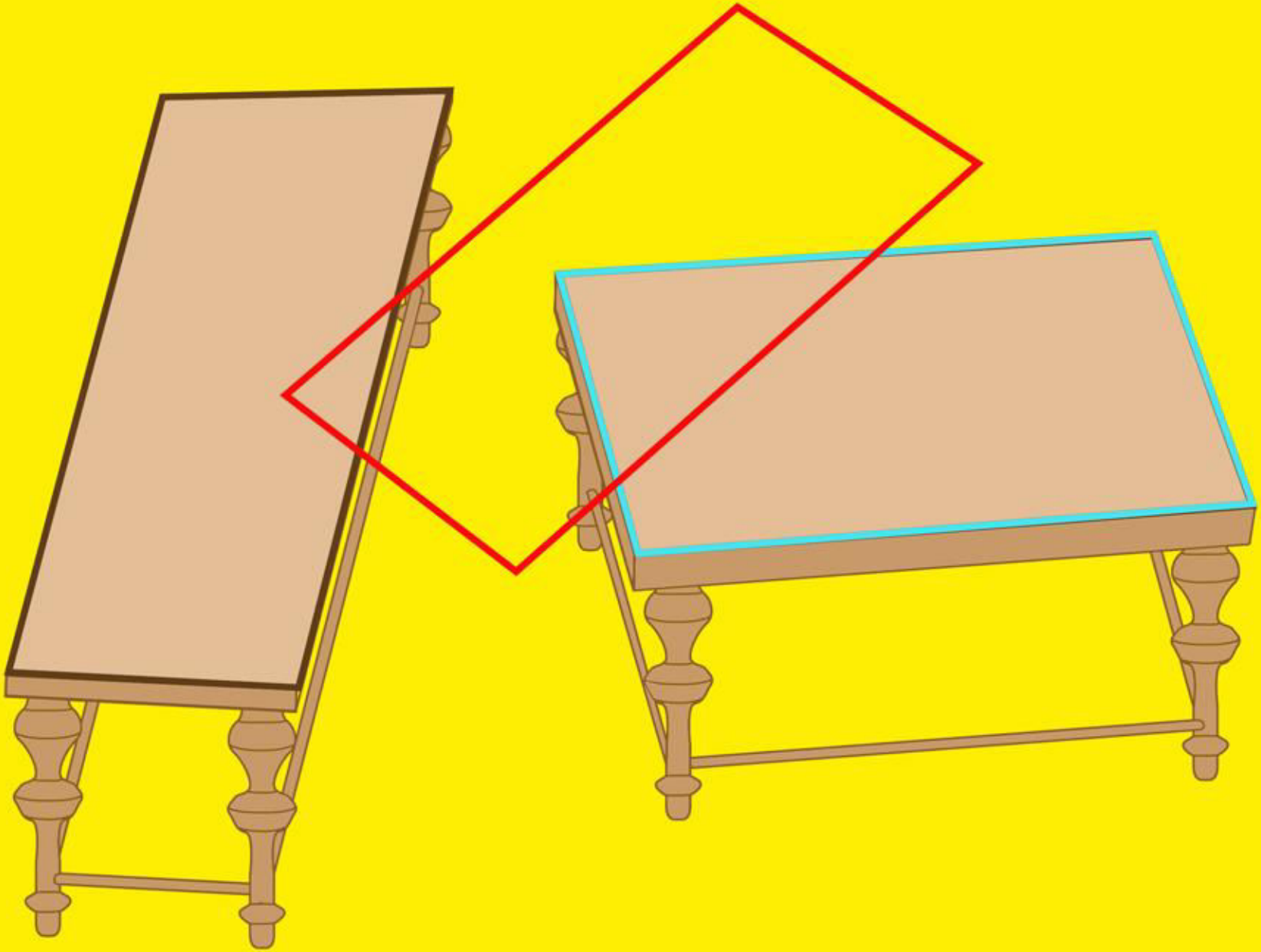
depth perspective

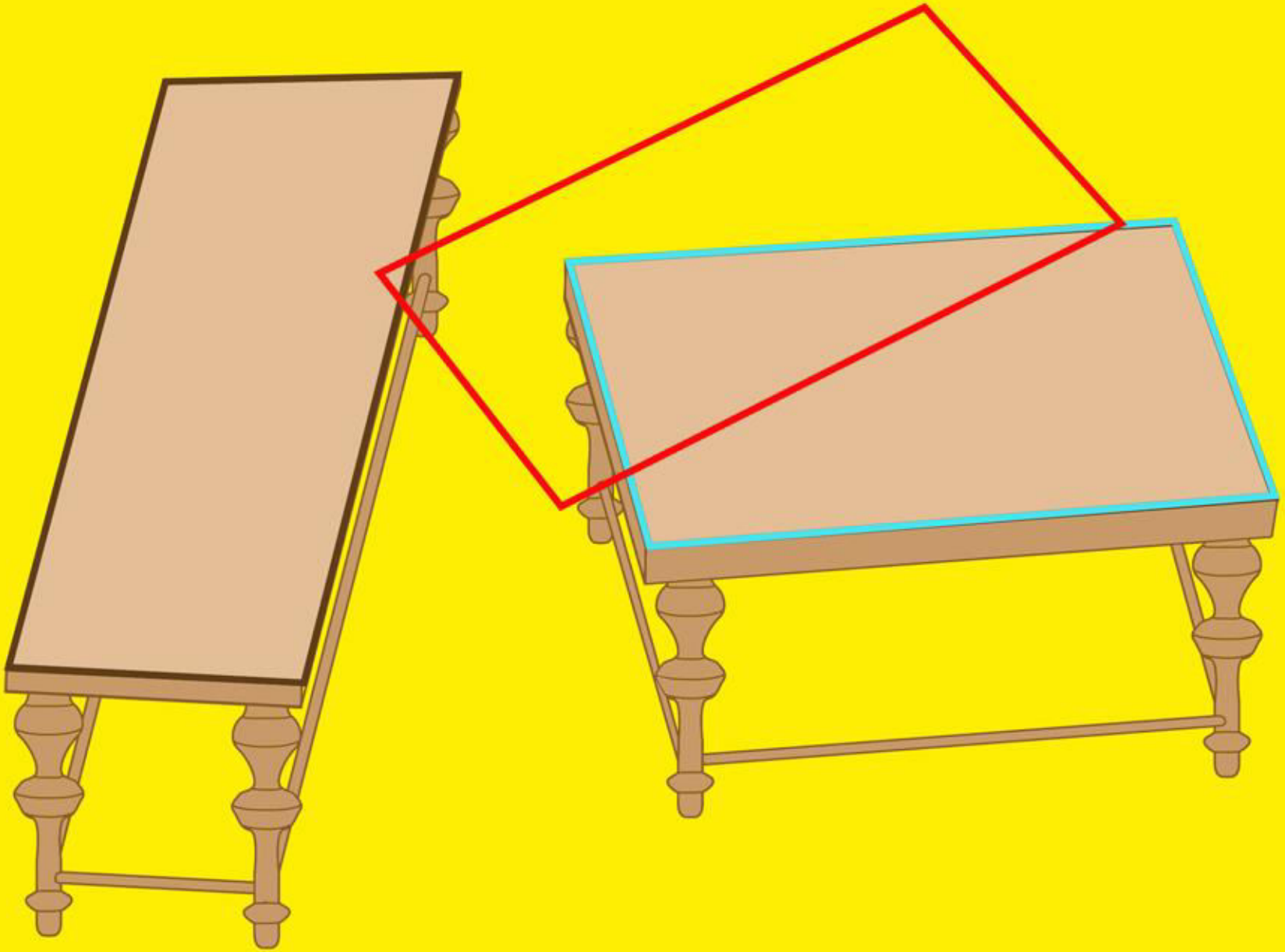


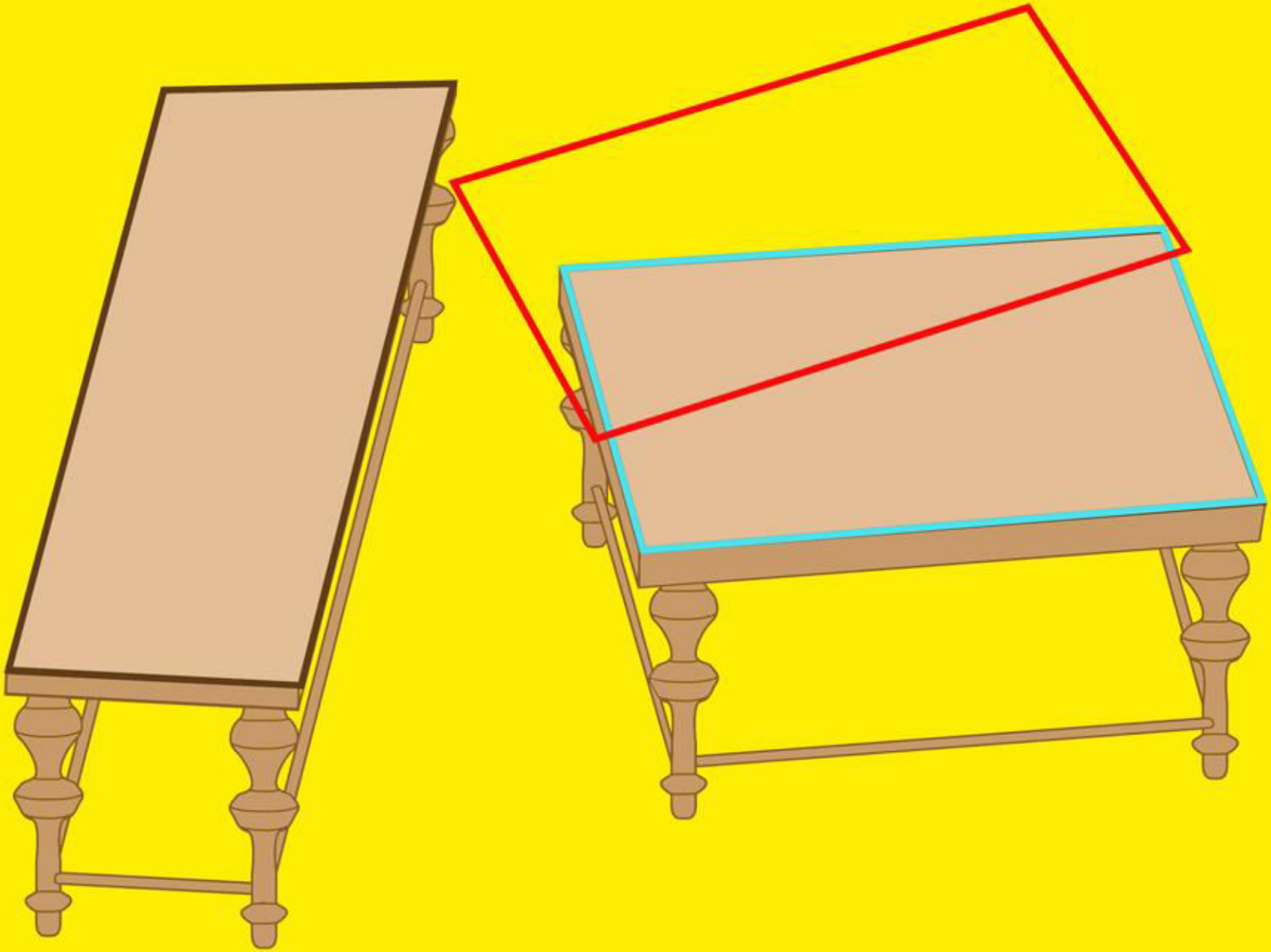


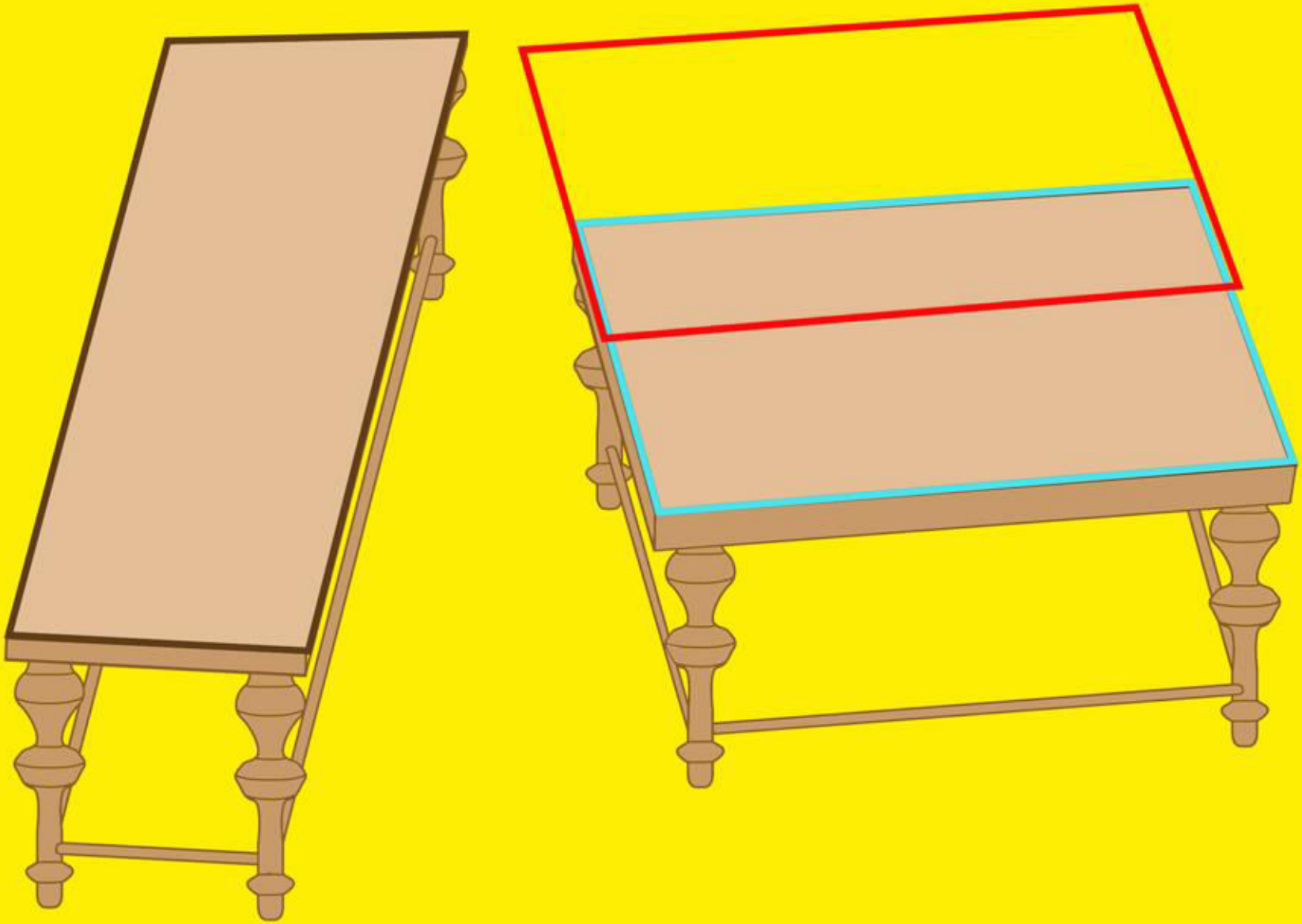


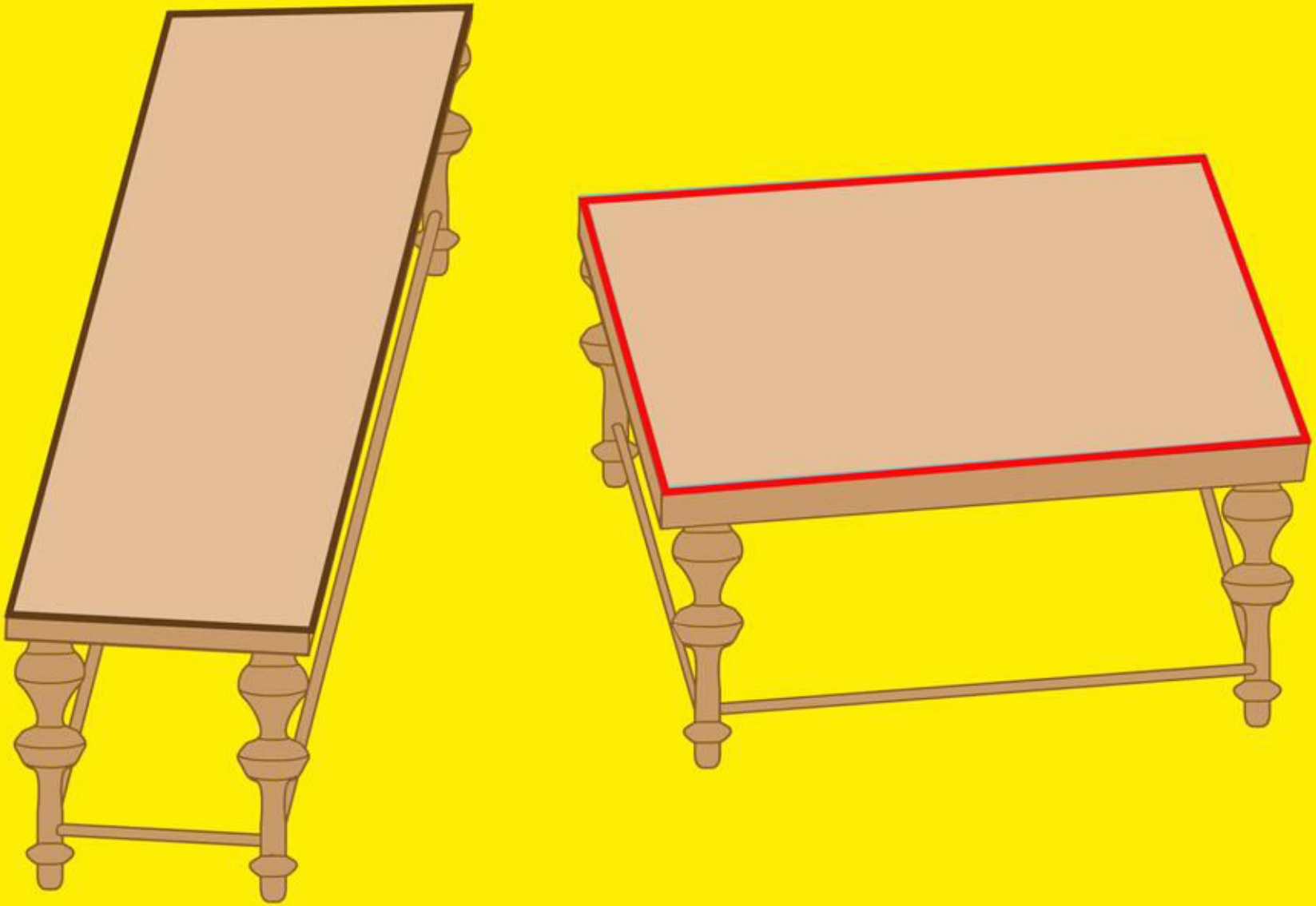


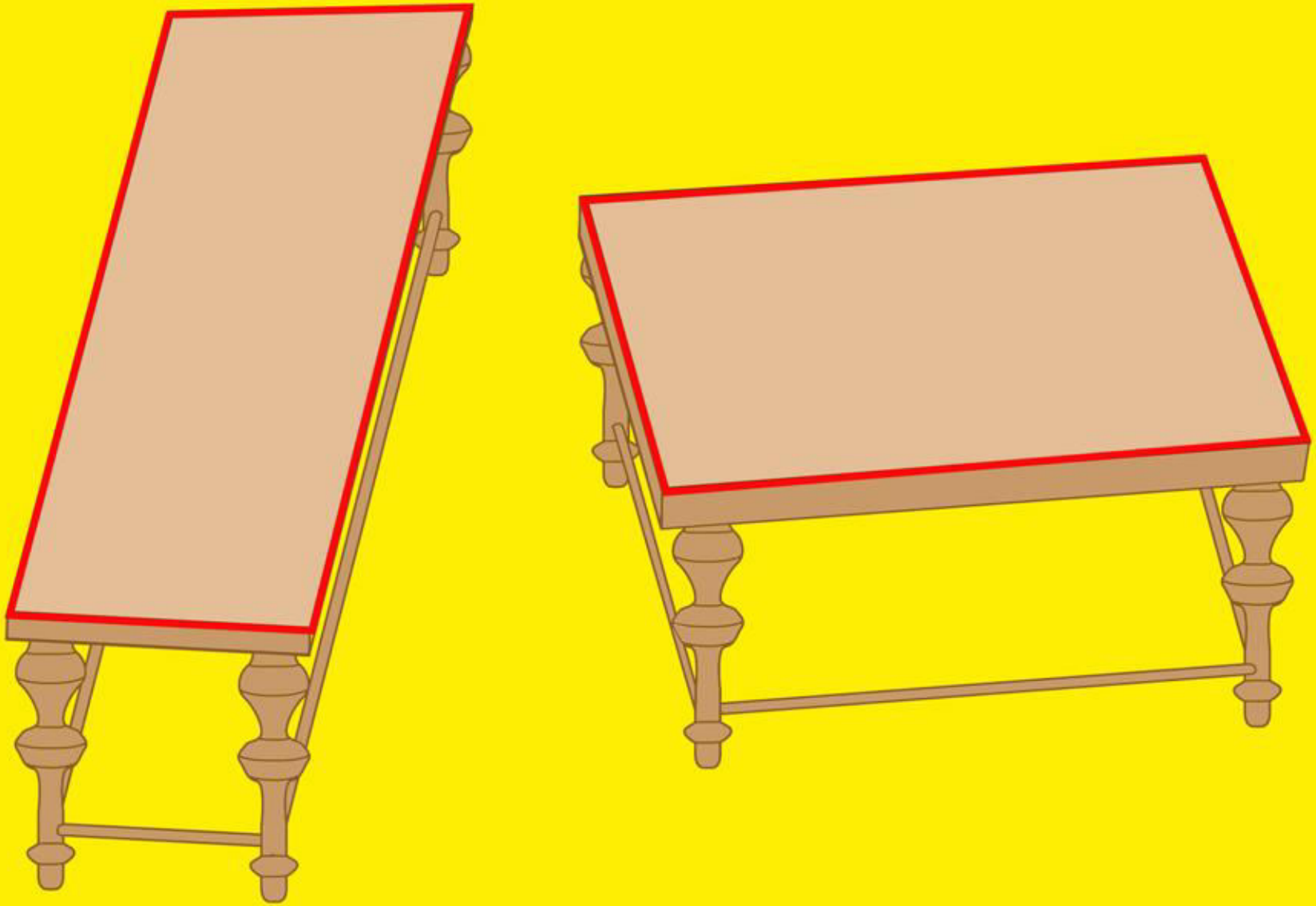




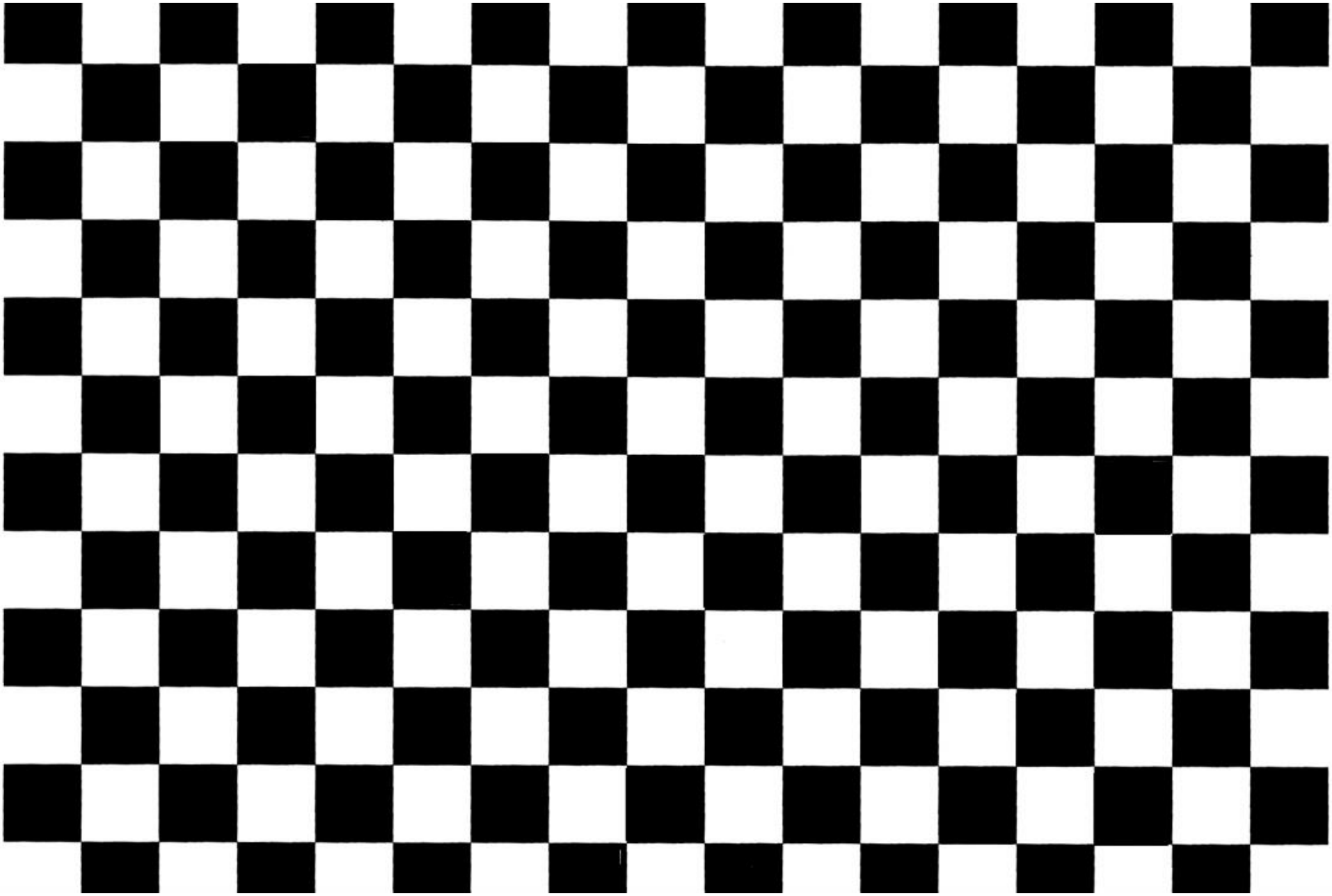




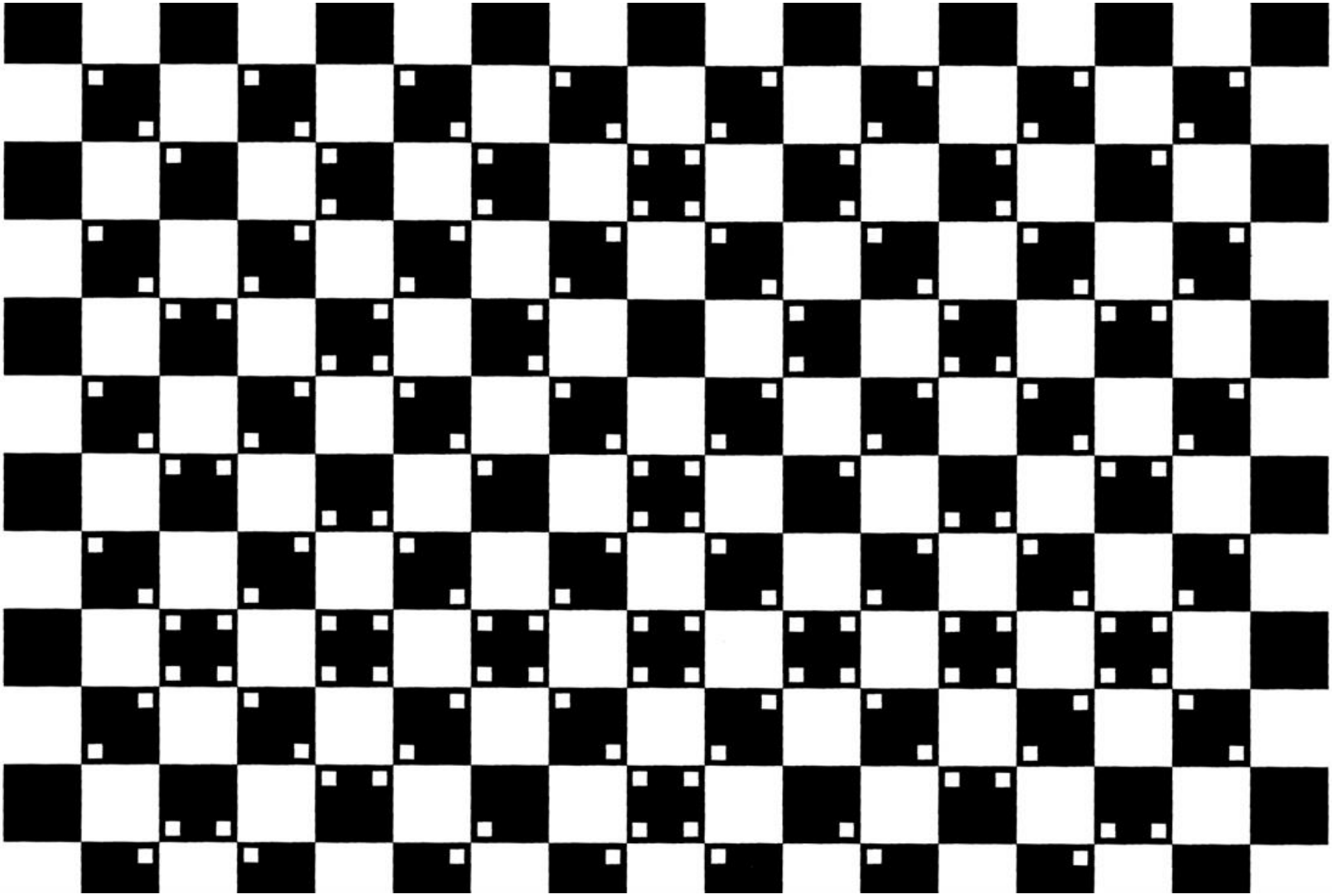




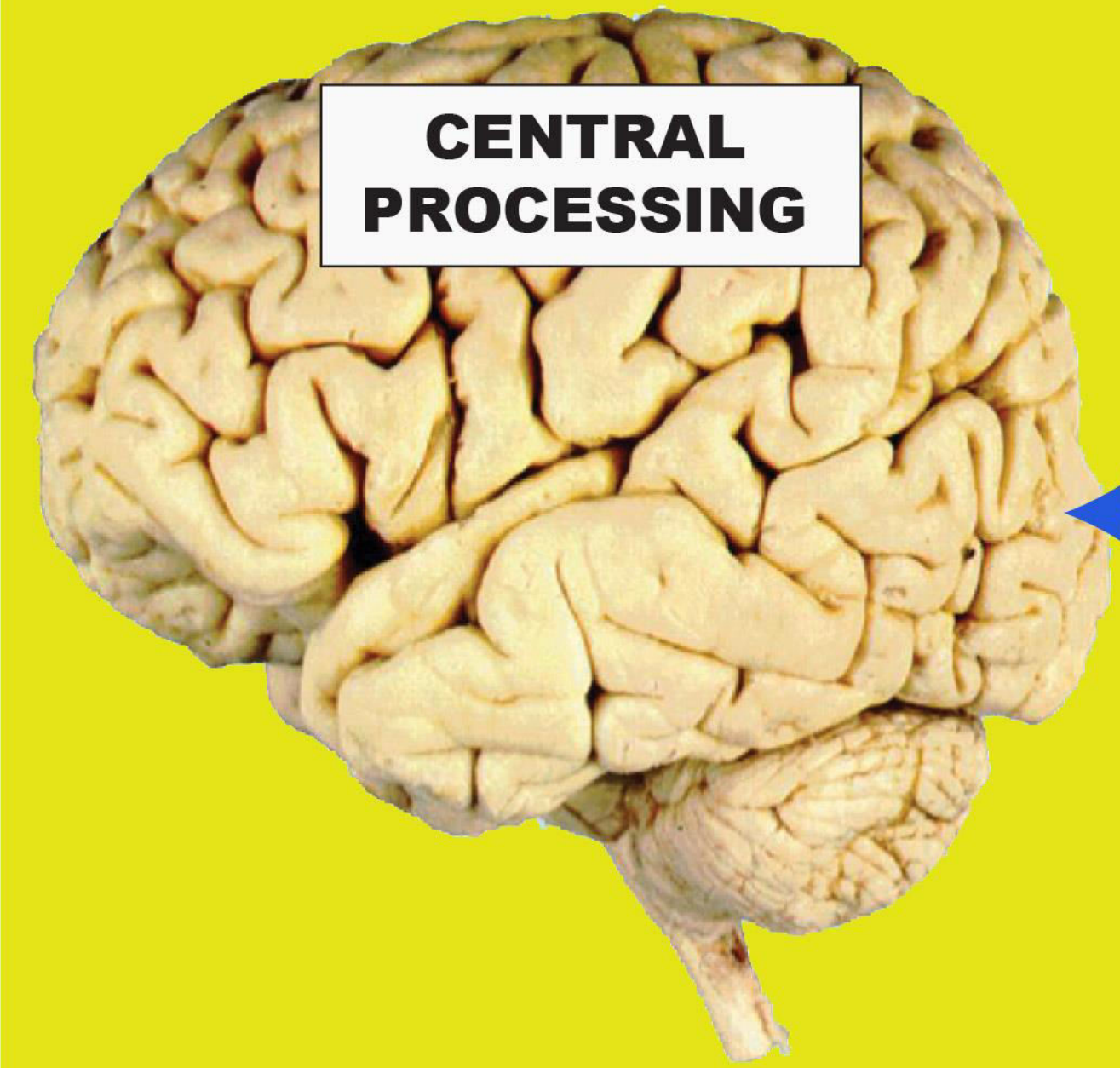
KITAOKA'S WAVES



KITAOKA'S WAVES



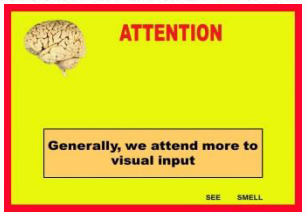
AVOIDING COGNITIVE OVERLOAD



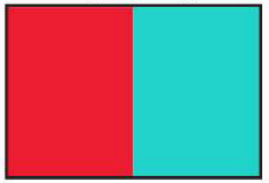
CENTRAL PROCESSING

SENSORY INPUT

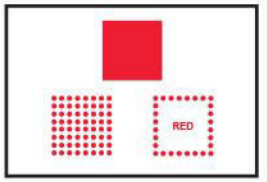
Selective attention



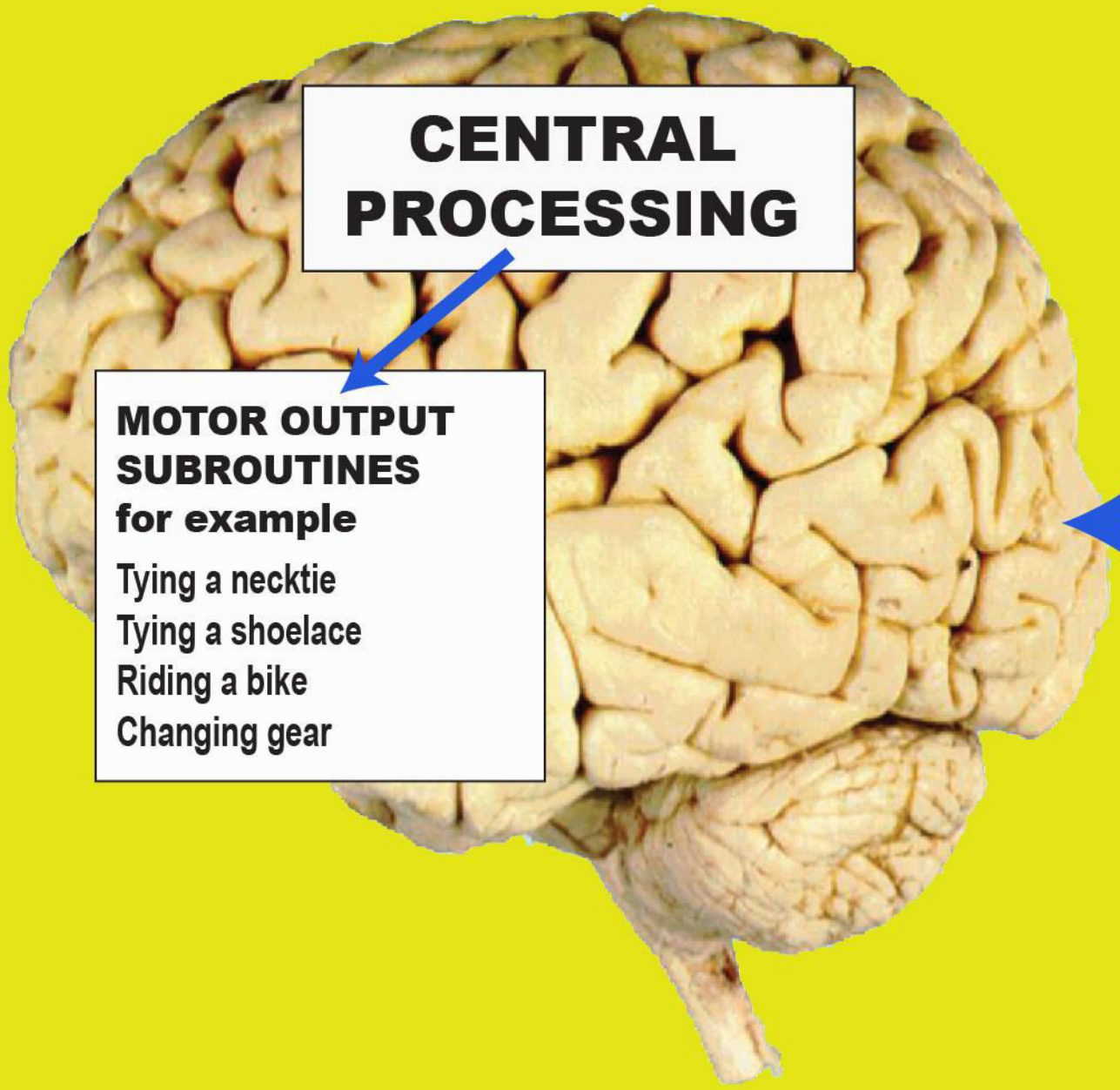
Sensory adaptation



Data reduction by recoding



AVOIDING COGNITIVE OVERLOAD



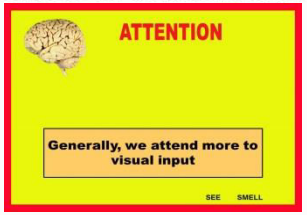
CENTRAL PROCESSING

MOTOR OUTPUT SUBROUTINES for example

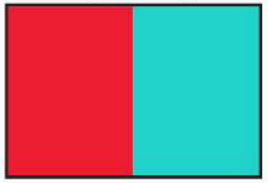
Tying a necktie
Tying a shoelace
Riding a bike
Changing gear

SENSORY INPUT

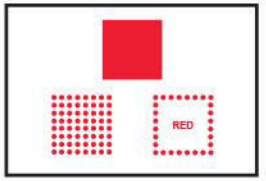
Selective attention



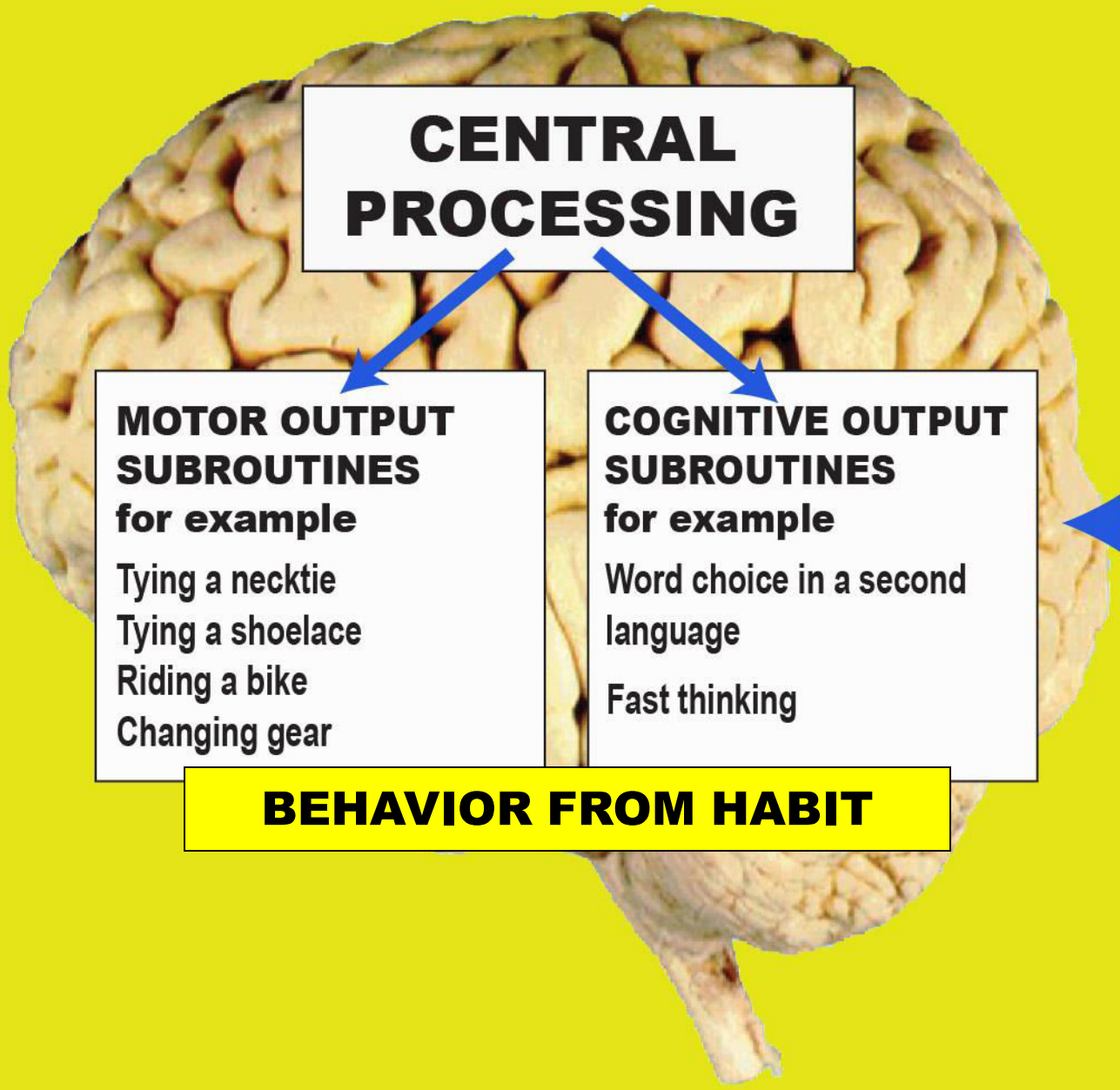
Sensory adaptation



Data reduction by recoding



AVOIDING COGNITIVE OVERLOAD



CENTRAL PROCESSING

MOTOR OUTPUT SUBROUTINES for example

Tying a necktie
Tying a shoelace
Riding a bike
Changing gear

COGNITIVE OUTPUT SUBROUTINES for example

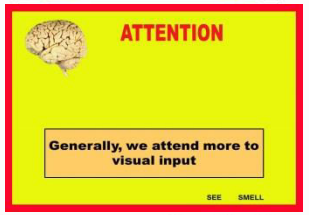
Word choice in a second language

Fast thinking

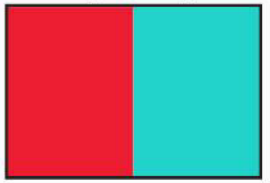
BEHAVIOR FROM HABIT

SENSORY INPUT

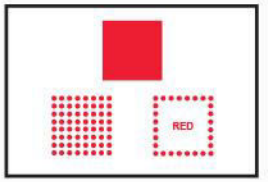
Selective attention

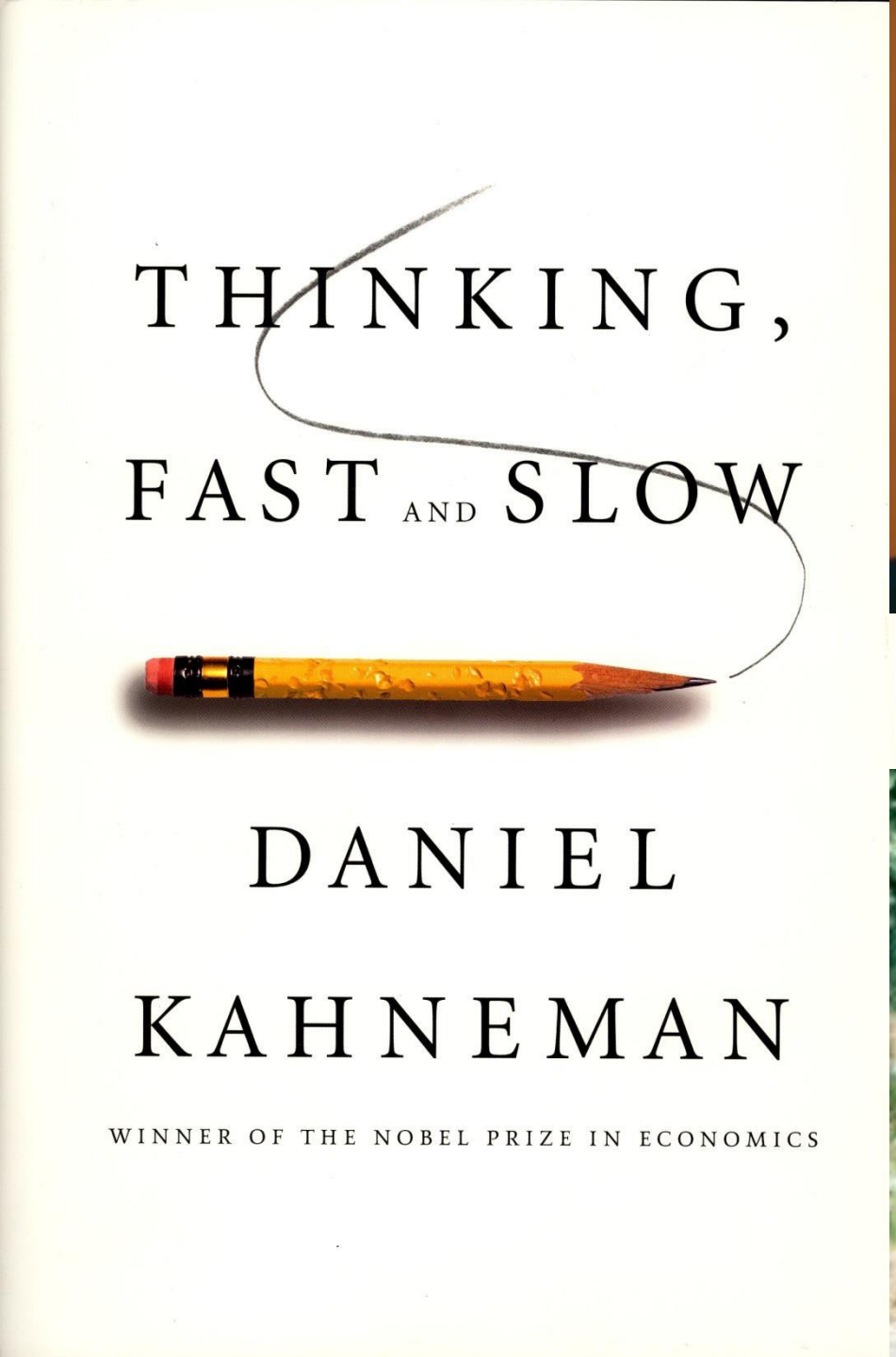


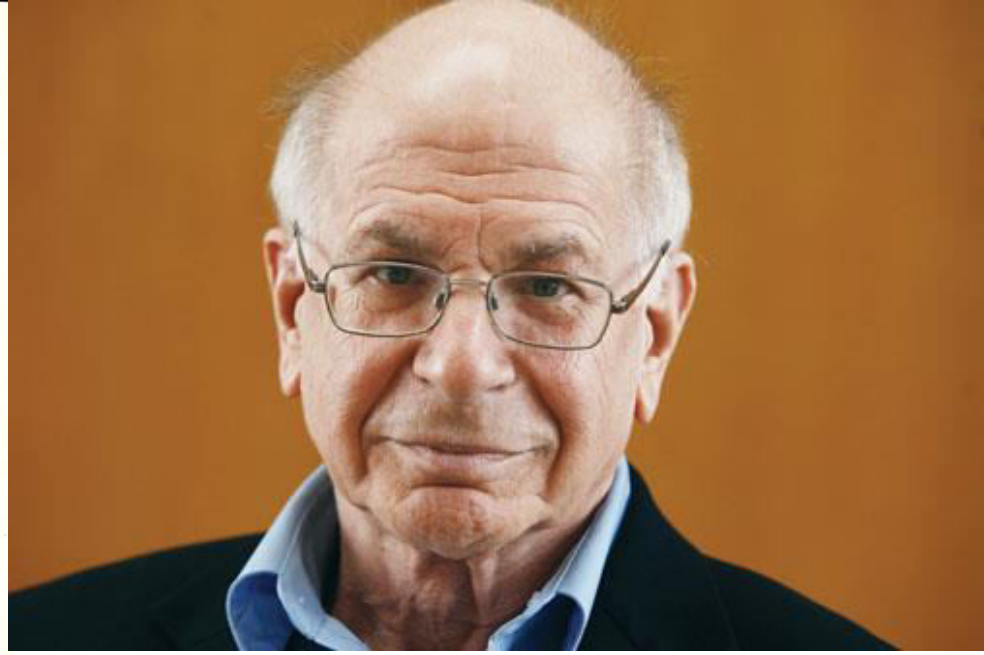
Sensory adaptation



Data reduction by recoding







Daniel Kahneman



Amos Tversky

IQ and GENERAL KNOWLEDGE ANSWERS

4..A farmer has 17 sheep and all but 9 die. How many are left ?

8: 17 – 9 = 8

5..It takes 5 machines 5 minutes to make 5 Christmas puddings
How long does it take a 100 of the same machines to make 100 Christmas puddings

100 minutes?

6..In the lake is a patch of lily pads. Every day the patch doubles in size.
It takes 48 days for the patch to cover the whole lake.
How long does it take to cover half the lake?

24 days

IQ and GENERAL KNOWLEDGE ANSWERS

4..A farmer has 17 sheep and all but 9 die. How many are left ?

FAST 8: 17 – 9 = 8

SLOW 9: All but nine die, so nine are left.

5..It takes 5 machines 5 minutes to make 5 Christmas puddings
How long does it take a 100 of the same machines to make 100 Christmas puddings

100 minutes ? 5 minutes?

6..In the lake is a patch of lily pads. Every day the patch doubles in size.
It takes 48 days for the patch to cover the whole lake.
How long does it take to cover half the lake?

24 days 47 days

FAST THINKING: sub-routine



Fast – instant reaction: working on auto pilot
Automatic – responding while not thinking it through
Frequent – something that judge is used to doing
Stereotypic - respond to stereotypic situation not the actual one

Not paying proper attention.

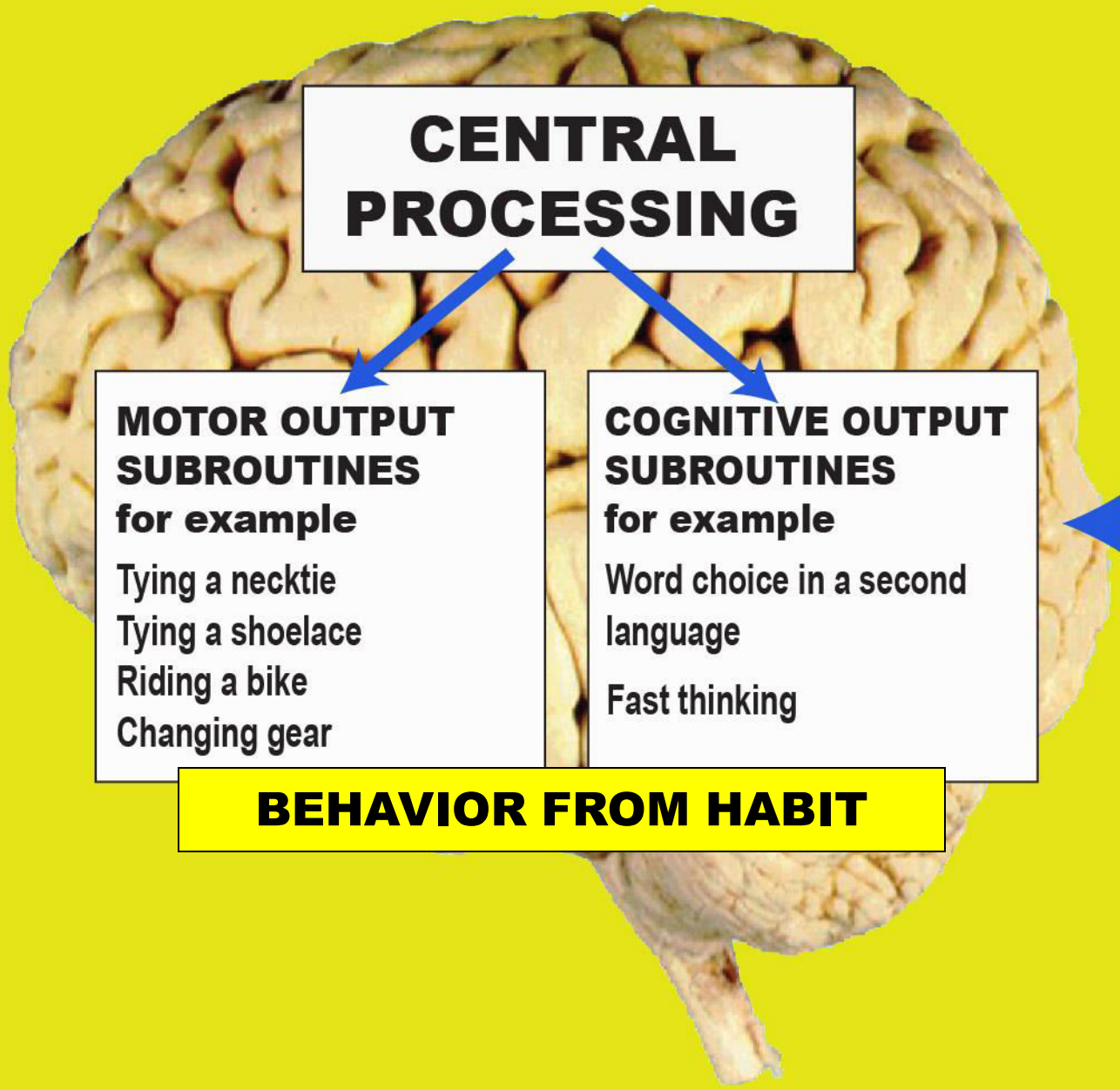
SLOW THINKING: central processing

Slow – careful consideration
Conscious - Logical. Needs more effort
Infrequent
Calculating, logical, avoids stereotypes

Paying proper attention.



AVOIDING COGNITIVE OVERLOAD



CENTRAL PROCESSING

MOTOR OUTPUT SUBROUTINES for example

Tying a necktie
Tying a shoelace
Riding a bike
Changing gear

COGNITIVE OUTPUT SUBROUTINES for example

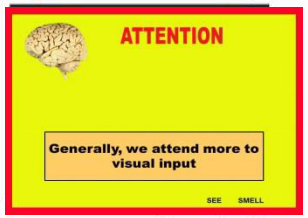
Word choice in a second language

Fast thinking

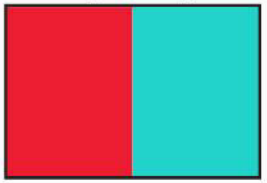
BEHAVIOR FROM HABIT

SENSORY INPUT

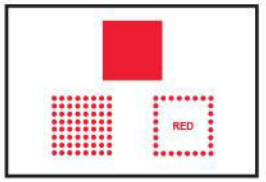
Selective attention



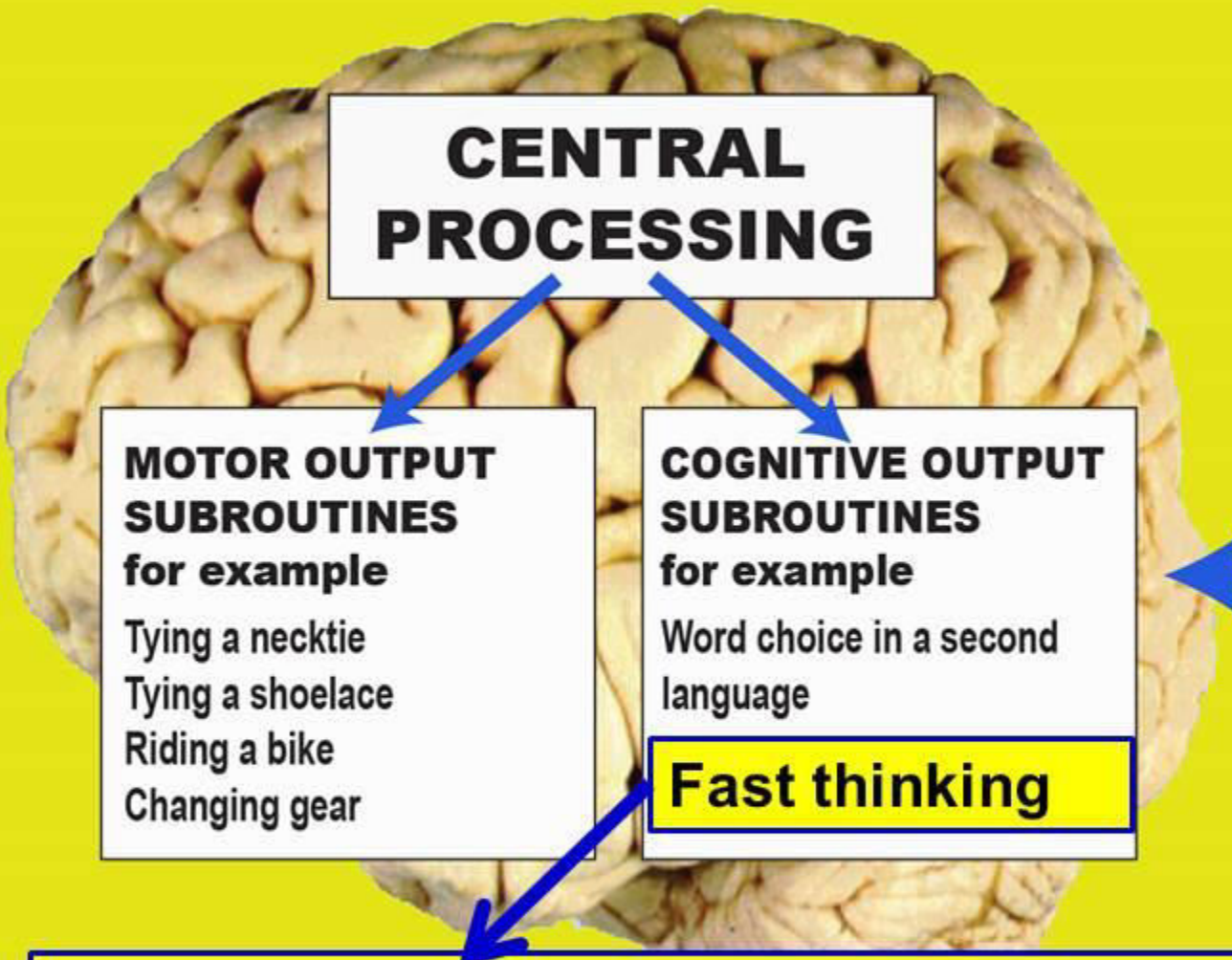
Sensory adaptation



Data reduction by recoding



AVOIDING COGNITIVE OVERLOAD



CENTRAL PROCESSING

MOTOR OUTPUT SUBROUTINES for example

Tying a necktie
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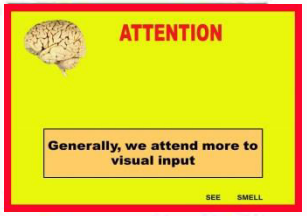
COGNITIVE OUTPUT SUBROUTINES for example

Word choice in a second language

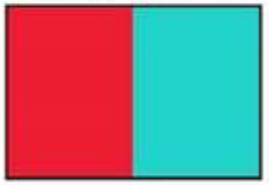
Fast thinking

SENSORY INPUT

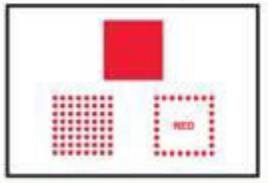
Selective attention



Sensory adaptation

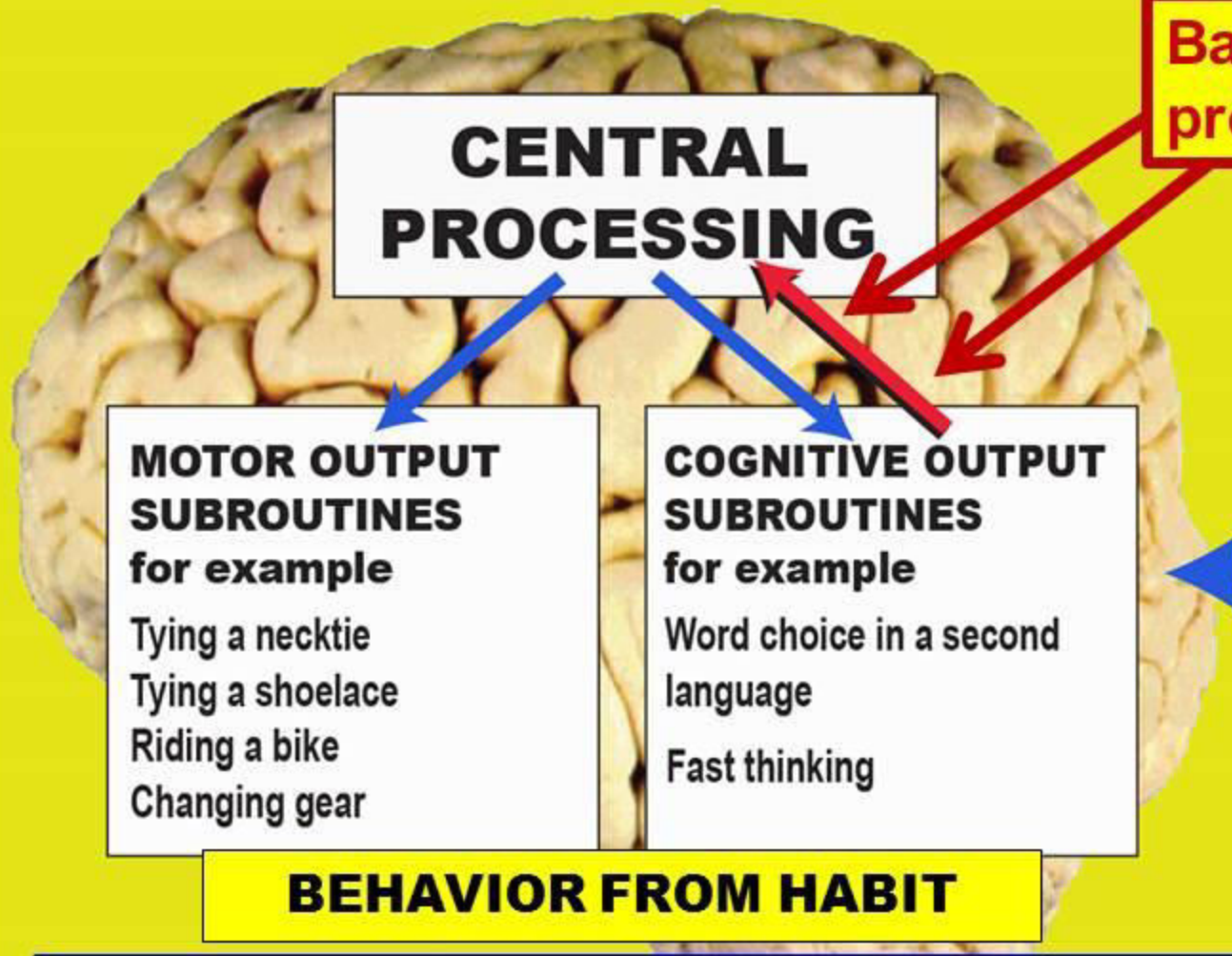


Data reduction by recoding



PREFERENCE TEST. Switches on binary-choice subroutine. Acting on 'auto-pilot'. The source of response bias.

AVOIDING COGNITIVE OVERLOAD



CENTRAL PROCESSING

Back to Central processing

MOTOR OUTPUT SUBROUTINES for example

Tying a necktie
Tying a shoelace
Riding a bike
Changing gear

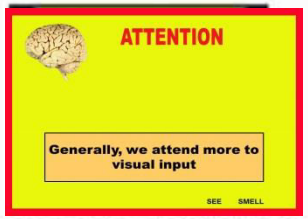
COGNITIVE OUTPUT SUBROUTINES for example

Word choice in a second language

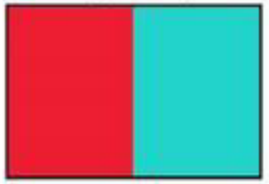
Fast thinking

SENSORY INPUT

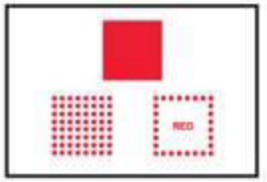
Selective attention



Sensory adaptation



Data reduction by recoding



BEHAVIOR FROM HABIT

PREFERENCE TEST. Back to CENTRAL PROCESSING Binary-choice subroutine. inoperative. Response bias inoperative



DISRUPTIVE PROTOCOLS
Make the preference test unlike a regular paired preference test, to disrupt the binary-choice subroutine with its operative response bias.

Without the binary-choice subroutine, the decision returns to central processing and now proper attention is paid to the sensory input from the products, in the placebo and target pairs.

TRIADIC PREFERENCE TEST

DISRUPTION



You are going to perform a preference test.
You will taste three stimuli to see whether you like them or not.

You might like them all about the same. ✓

You might like them all to a diferent degree. ✗

You might like two the same and one more. ✓

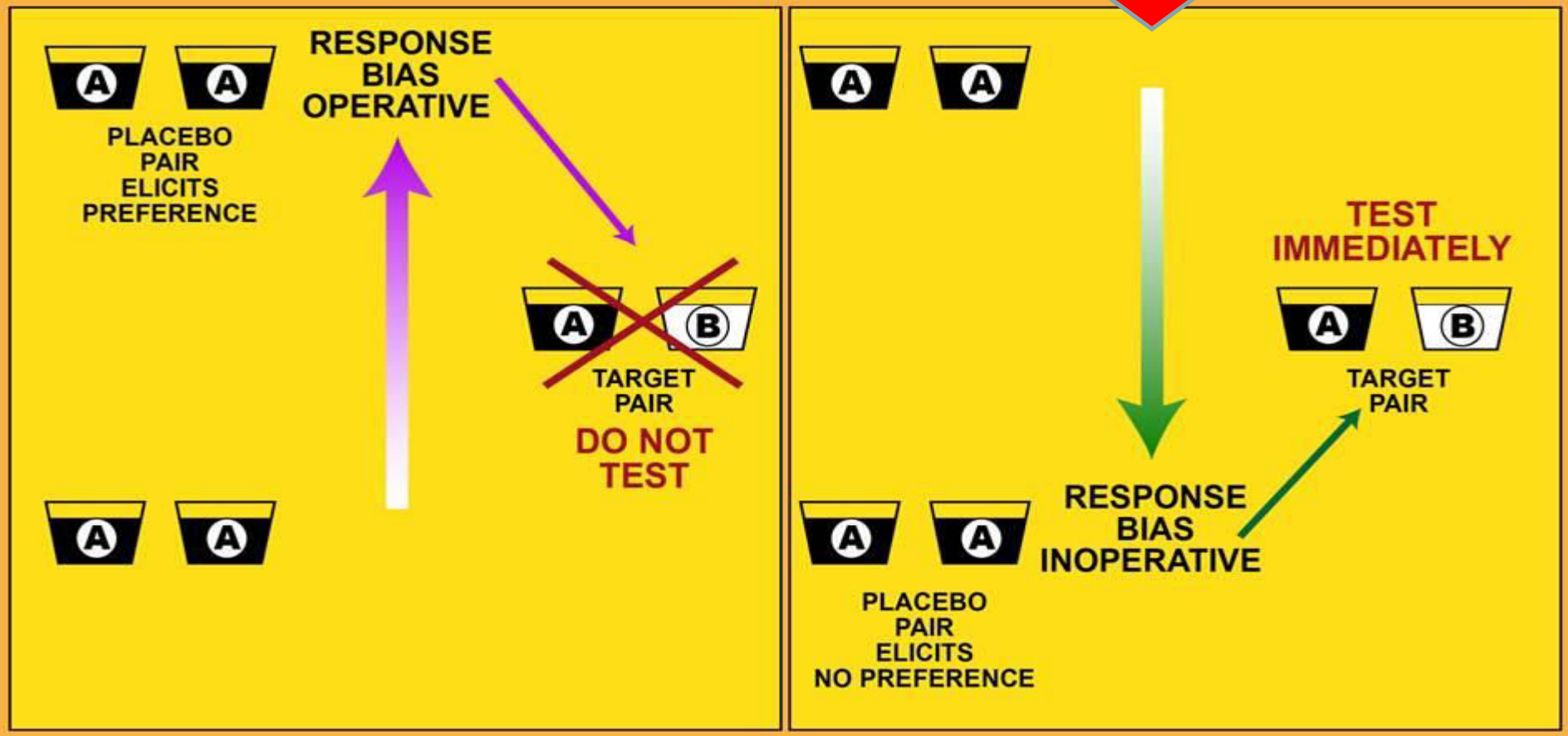
You might like two the same and one less. ✓

76.5 - 94% pass the screening

Change of environment, makes the test no longer appear like a paired preference test.

Binary response subroutine, with its built-in response bias, fails to engage.

Response bias is INOPERATIVE



TRIADIC PREFERENCE TEST

Eduardo Calderon, Alondra Rivera-Quintero, Yixun Xia

Various experiments, including:
one using Pomegranate vs Cranberry Juice cocktail.
N=200 related samples design.
Primers used before test, half time C, half P

TRIADIC VS REGULAR
HOW MANY PASS SCREENING

CCP or PPC vs **CC or PP**
92% **34%**



Calderon et al. FQP 2015, 39, 8-15

REVERSE HIDDEN DEMAND CHARACTERISTICS

DISRUPTION



PLACEBO PAIR

You might like one more than the other or you might like them just about the same.

I know you'll like them just about the same; everybody does.

IF JUDGE HAS A PREFERENCE: How great was the difference?

Very small:

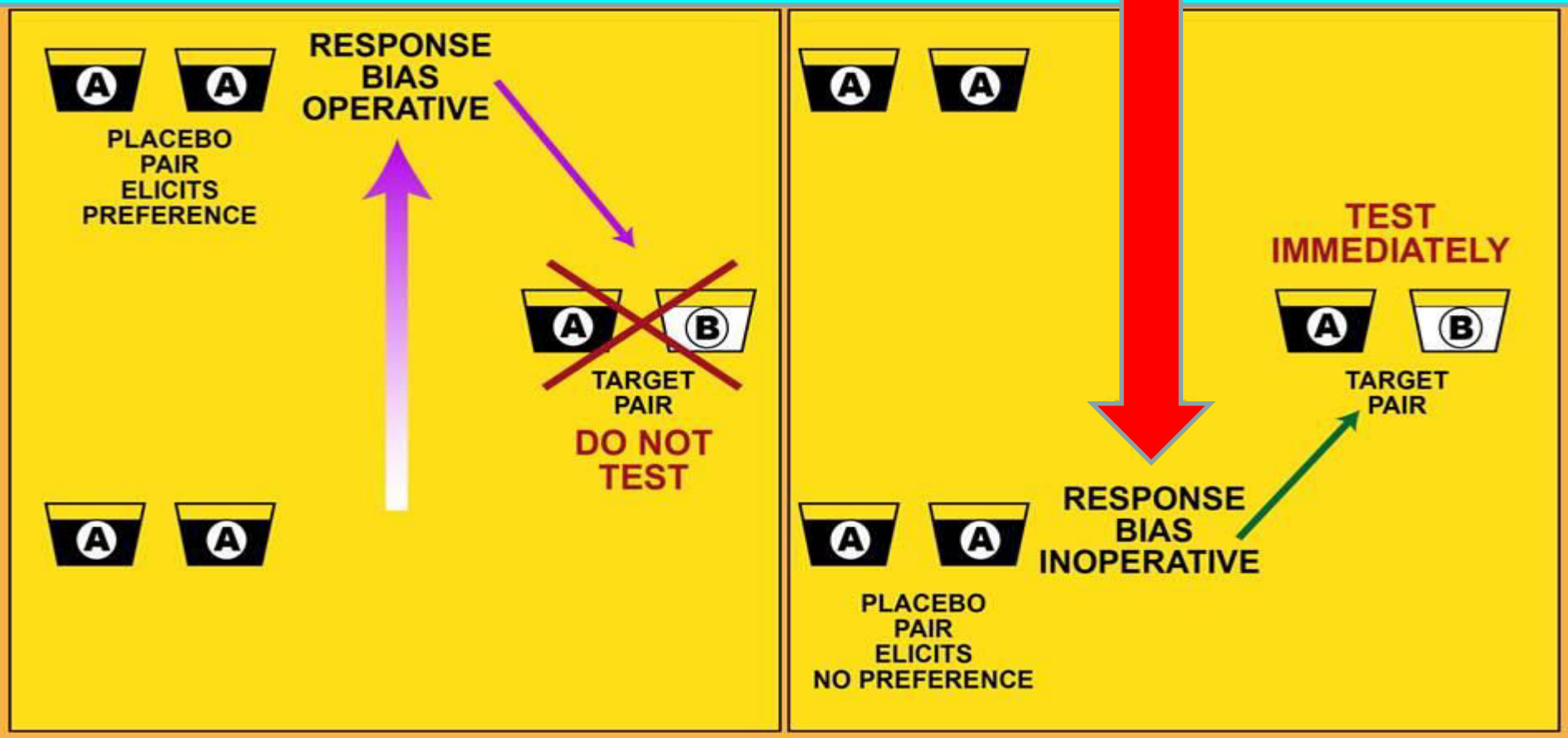
So you like them just about the same?

Yes. ✓ *No.* ✗ 80-90%

TEST PAIR

Same thing **original vs sour cream and onion**

The instructions strongly suggest that the consumer should have no preference with the placebo pair; namely that the binary choice subroutine, with its built in response bias, should not be operative. Response bias is rendered INOPERATIVE



PAIRED PREFERENCE TEST WITH REVERSED HIDDEN DEMAND CHARACTERISTICS

Yixun Xia, Eduardo Calderon,
Alondra Rivera-Quintero

Various experiments, including:
one using Pomegranate vs Cranberry Juice cocktail.
N=200 related samples design.

NEW vs REGULAR

HOW MANY PASS SCREENING

88% vs 44%



Xia et al. JSS 2014, 29, 149-158



Eduardo Calderón
Alondra Rivera-Quintero

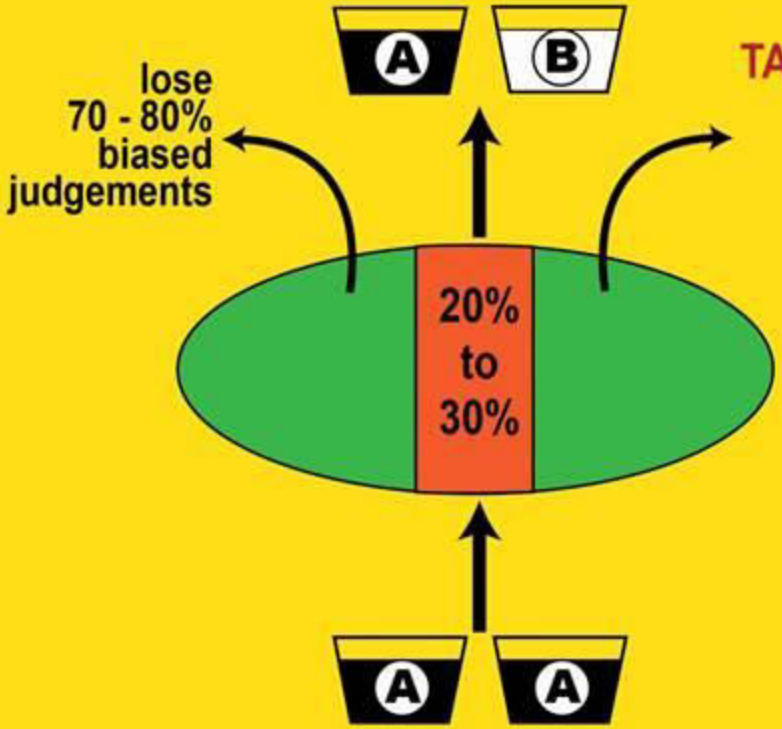
Calderon *et al.*
Food Qual. Pref. 2015, 39, 8-15

Yixun Xia (Sunshine)

Xia *et al.*
J. Sensory Stud. 2014, 29, 149-158.



Unacceptable preference protocol



PLACEBO PAIR

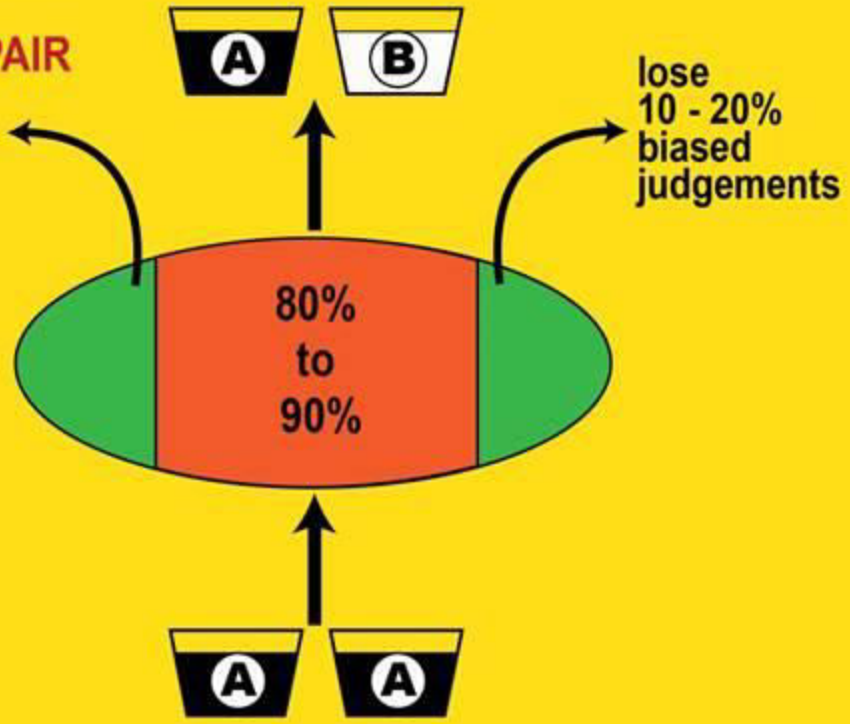
20- 30% No Preferences

Binary choice subroutine engaged and provides preference responses

RESPONSE BIAS OPERATIVE

TARGET PAIR

Acceptable preference protocol



PLACEBO PAIR

80- 90% No Preferences

Preference responses produced by central processing

RESPONSE BIAS INOPERATIVE















