World and representation

The world and the mind

Sept 13,2023

The world and the mind

We often confuse the world with our mental representation of the world itself.

Is this a correct assumption?

Example 1 – the car accident

In two experiments, subjects viewed films of automobile accidents and then answered questions about events occurring in the films.

The question,

"About how fast were the cars going when they smashed into each other?"

elicited higher estimates of speed than questions which used the verbs *collided*, *bumped*, or *hit* in place of ***smashed***.

Example 1 – the car accident (continued)

On a retest one week later, those subjects who received the verb ***smashed*** were more likely to say "***yes***" to the question,

"Did you see any broken glass?",

even though broken glass was not present in the film.

These results are consistent with the view that the questions asked subsequent to an event can cause a reconstruction in one's memory of that event.

Elizabeth F Loftus and John C Palmer. Reconstruction of automobile destruction: An example of the interaction between language and memory. *Journal of verbal learning and verbal behavior*, 13(5):585–589, 1974.

Example 2 – the Asian disease problem

Participants were asked to

”imagine that the U.S. is preparing for the outbreak of an unusual Asian disease, which is expected to kill 600 people.”

Two alternative programs to combat the disease have been proposed.

Example 2 – the Asian disease problem (continued)

The first group of participants was presented with the following choice. In a group of 600 people,

- Program A: ”200 people will be saved”;
- Program B: ”there is a 1/3 probability that 600 people will be saved, and a 2/3 probability that no people will be saved”

72% of the participants preferred program A, 28%, opted for program B.

Example 2 – the Asian disease problem (continued)

The second group of participants was presented with a different choice. In a group of 600 people,

- Program C: ”400 people will die”;
- Program D: ”there is a 1/3 probability that nobody will die, and a 2/3 probability that 600 people will die”

In this decision frame, 78% preferred program D, with the remaining 2% opting for program C.

Example 2 – the Asian disease problem (continued)

Programs A and C are identical, as are programs B and D.

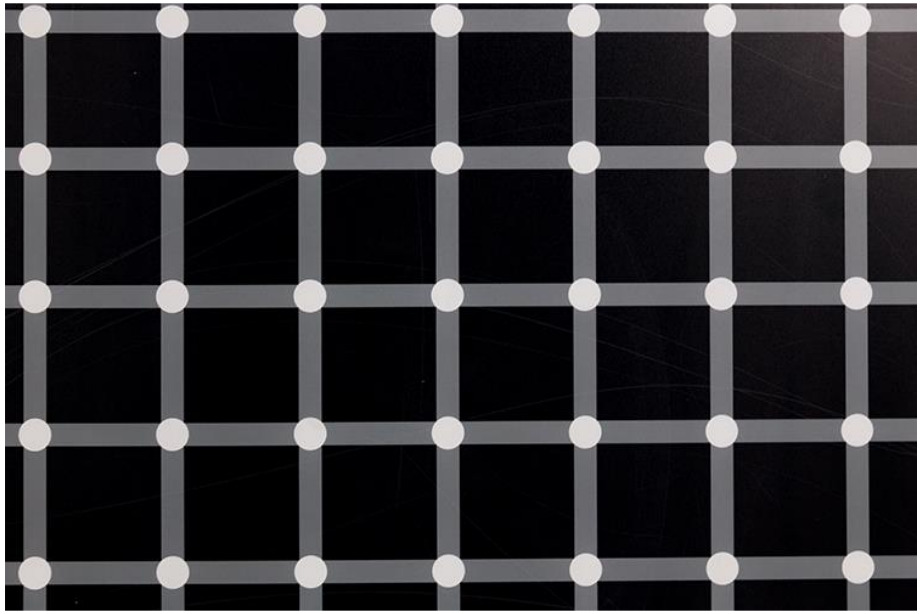
The change in the decision frame between the two groups of participants produced a preference reversal.

When the programs were presented in terms of lives saved, the participants preferred the secure program, A (= C).

When the programs were presented in terms of expected deaths, participants chose the gamble D (= B).

Daniel Kahneman and Amos Tversky. The psychology of preferences. *Scientific American*, 246(1):160–173, 1982.

Optical illusions



The *Herman Grid* [1], which is an optical illusion in which a grid of white dots on a black background appears to create dark spots at the points of intersection. This example demonstrates how our visual perception (and so our senses) can deviate from objective reality.

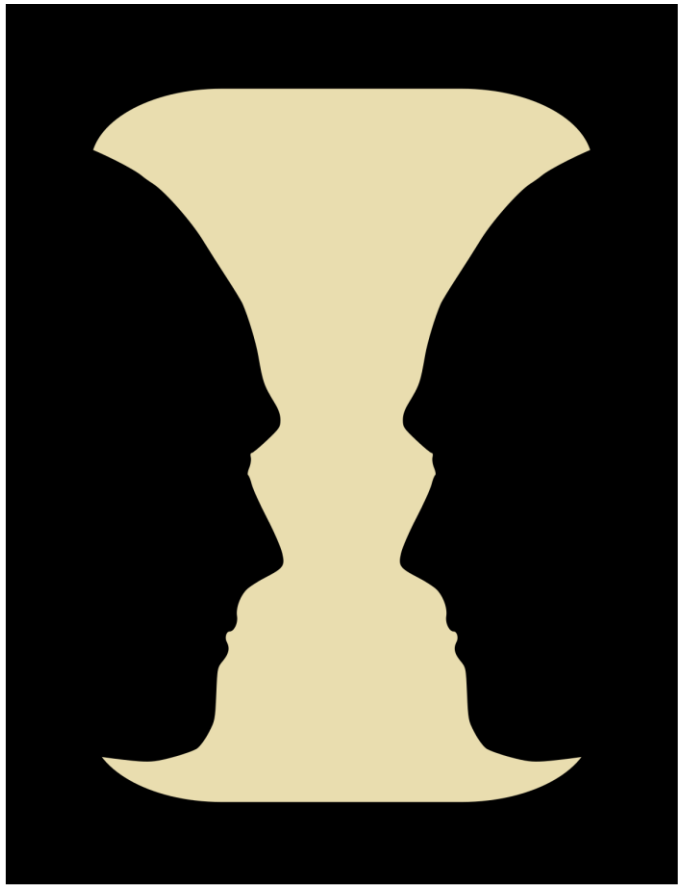
Optical illusions

Pareidolia is the tendency for perception to impose a meaningful linterpretation on a nebulous stimulus, usually visual, so that one sees an object, pattern, or meaning where there is none. For example, we tend to see faces everywhere,even in the surface of the Moon..

Optical illusions

Viewers can see either a young woman looking away or an old woman in profile, depending on how they interpret the drawing's lines. The illusion plays on our ability to switch between different perspectives.

Optical illusions



This is a classic example of figure-ground perception. Viewers can either see a vase in the center or two faces in profile facing each other. The brain can switch between either interpretation but cannot see both at the same time.

Mind Fallacies

A **fallacy** is reasoning that is logically invalid, or that undermines the logical validity of an argument

Fallacies can be classified depending on their structure (formal fallacies) or on their content (informal fallacies).

A **formal fallacy**, also called a deductive fallacy or logical fallacy [2], represents a type of reasoning that loses validity due to a flaw in its logical structure. In other words, it is a deductive argument that is invalid.

Informal fallacies, the larger group, may then be subdivided into categories such as improper presumption, faulty generalization, and error in assigning causation and relevance, among others.

Mind Fallacies - examples

Example 1.10 (Cognitive Bias) Cognitive biases are informal fallacies. They represent systematic patterns of deviation from the norm and rationality in the evaluation process. The Asian disease example, see above, is an instance of cognitive bias.

Example 1.11 (Misconceptions) Misconceptions are informal fallacies. A common misconception is a perspective or data that is often considered to be true but is actually false. Usually, such misunderstandings stem from entrenched traditions (such as gossipy tales), stereotypes, superstitions, fallacies, misinterpretations of science, or the spread of pseudoscience.

Example 1.13 (Paradoxes) Paradoxes are examples of formal fallacies. Paradoxes are situations or statements that seem contradictory or contraintuitive, often challenging our normal thinking and expectations. They are intellectual puzzles that can cause confusion and amazement as they violate our common understanding of logic or the laws of reality.

Mind Fallacies - examples

Example 1.12 (Cognitive Distortion) Cognitive distortions are an informal fallacy.

- overgeneralization, which draws overly broad conclusions from a single negative event;
- mental filtering, which focuses attention only on the negative aspects of a situation;
- over-labeling, which assigns negative labels to oneself or others based on mistakes or failures;
- dichotomous thinking, which considers only extremes without acknowledging nuance;
- emotional reasoning makes one believe that one's feelings reflect objective reality;
- personalization leads one to interpret events as being directly related to oneself;
- Negative prediction involves predicting the worst without concrete evidence;
- Catastrophism makes one imagine the worst as the only possibility, ignoring alternatives, while sample selection draws general conclusions from a limited set of data or experiences.

So What?

Logic is a crucial tool for avoiding fallacious reasoning.

Formalizing thinking through logic provides us with a structured framework for evaluating arguments and drawing conclusions.

The systematic approach of logic helps us recognize and foil fallacious reasoning.

Learning to identify the premises, inferences and conclusions in an argument enables us to detect logical errors or inconsistencies.

This is key in Computer Science and even more in Artificial Intelligence.

Logic

- At the beginning it looks obvious
- However, in a few lectures it will become obscure
- … with no hope to recover, without starting from page 1

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