

Object recognition refers to a person perceiving an object and processing its physical properties, understanding its use or function, correlating its presence with their previous experiences with the object and making connections between the object and other people or objects. Factors that affect object recognition are difficult to identify conclusively because there are contrasting theories about how people process objects, including some that state that different people recognize objects differently.

## **Object Recognition in Stages Theory**

In one common model, object recognition is grouped into four stages. Stage one involves acknowledging the object's form, depth and color. In stage two, the person groups these attributes similarly and uses them to form a separation between the object and its surroundings. In stage three, the visualization of the object is paired with the person's structural conception of the object in his memory. Stage four involves combining all these components of the object and attaching meaning and recognition to the object. Therefore, the factors impacting object recognition in this model are physical characteristics of the object, the surroundings of the object and the memory, past structural conception, individual make-up and the past experiences and beliefs of the person perceiving the object.

## **Hierarchical Recognition Processing Theories.**

In hierarchical recognition processing theories, people recognize objects either in a bottom-up process, top-down process or both. In the bottom-up hierarchy people sequentially process information about the object using parts of their brain in an order that generates recognition last. They begin with lower-level cortical processors such as the primary visual cortex and go “up” to the inferotemporal cortex (IT) where recognition occurs. Top-down hierarchical recognition processing theories are referred to as a neurological shortcut to recognizing objects. The process is similar except that only partially processed attributes of the object are sent from the cortical processors to the prefrontal (PFC) cortex, which generates tentative interpretations and sends them to the IT. Once this happens, the IT generates richer, more accurate interpretations of the object, which are incorporated into the efforts of the cortical processors.

## **Explanation**

Studies have shown that people with lesions on their PFCs recognize objects more slowly and likely use bottom-up processing only. Other than that, there have been no findings on why some people would use different processes. In these theories, the contributing factors are unknown outside of the health of the brain and individual interpretation.

## **Object Constancy Theories**

Other theories place a high importance on object constancy, which allows people to recognize objects under different viewing conditions. Factors like where the object is in relation to the observer, the lighting conditions and object size, depth and color are relevant to these theories. Some of these theories place a high importance on the object's structural information (viewpoint-invariant theories,) the principal axis of the object (3D model theories,) the geometric components of the object (recognition by components theories), memory of the object from multiple viewpoints and angles (viewpoint-dependent theories) and how objects are classified into groups by the observer (multiple views theories.)

## Key Concepts

- factors object recognition
- impacting object recognition
- factors impacting recognition

## References

- [CiteSeerX: Computational Theories of Object Recognition](http://citeseerx.ist.psu.edu/viewdoc/summary?doi=10.1.1.50.5839) [http://citeseerx.ist.psu.edu/viewdoc/summary?doi=10.1.1.50.5839]
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- [CS: Theories of Object Recognition](http://www.cs.tut.fi/~tabus/eye_book/node20.html) [http://www.cs.tut.fi/~tabus/eye\_book/node20.html]