# DOWNLOAD PDF CONCEPTS AND MECHANISMS OFPERCEPTION

## Chapter 1 : Visual Perception | Simply Psychology

*In lieu of an abstract, here is a brief excerpt of the content. Books cited in a panoramic exposition of the evolution of experimental research over the past 10 years. We witness the major shift from a search for static psychological and social structures to a concern with process and chang.*

Please help improve this section by adding citations to reliable sources. Unsourced material may be challenged and removed. September Learn how and when to remove this template message The book is a collection of revised articles that appeared in precedence, each preceded by an introduction by Hofstadter. They describe the scientific work by him and his collaborators in the s and s. The project started in the late s at Indiana University. There he met and collaborated with Melanie Mitchell , who then became his doctoral student. The book was written during a sabbatical year at the Istituto per la Ricerca Scientifica e Tecnologica in Trento, Italy. An Eternal Golden Braid exploded on the literary scene, earning its author a Pulitzer prize and a monthly column in Scientific American. But in the end, many people believed that these intellectual games yielded no useful model of cognition on which to base future AI research. Now Fluid Concepts and Creative Analogies presents that model, along with the computer programs Hofstadter and his associates have designed to test it. These programs work in stripped-down yet surprisingly rich microdomains. The Architecture of Jumbo D. Prolegomena to Any Future Metacat D. September Learn how and when to remove this template message Chapter 1: When he was 17, he studied the way that triangular and square numbers interleave, and eventually found a recursive relation describing it. In his first course on AI, he set to the students and to himself the task of writing a program that could extrapolate the rule by which a numeric sequence is generated. Instead he devised a simplified version of the problem, called SeekWhence, where sequences are based on very simple basic rules not requiring advanced mathematical knowledge. He argues that pattern recognition , analogy, and fluid working hypotheses are fundamental to understand how humans tackle such problems. The Architecture of Jumbo[ edit ] Jumbo is a program to solve jumbles , word puzzles consisting in five or six scrambled letters that need to be anagrammed to form an English word. The resulting word does not need to be a real one but just to a plausible, that is, to consists of a sequence of letters that is normal in English. The constituent elements of Jumbo are the following: The " cytoplasm ": The name is inspired by the place in a cell where molecular fragments are assembled into proteins. A "temperature" is associated to the present state of the cytoplasm; it determines how probable it is that a destructive codelet is executed. There is a "freezing" temperature at which no destruction can occur anymore: A Study in Cognition and Recognition[ edit ] Numbo is a program by Daniel Defays that tries to solve numerical problems similar to those used in the French game "Le compte est bon". The game consists in combining some numbers called "bricks", using the operations of multiplication, addition, and subtraction, to obtain a given result. The program is modeled on Jumbo and Copycat and uses a permanent network of known mathematical facts, a working memory in the form of a cytoplasm, and a coderack containing codelets to produce free associations of bricks in order to arrive at the result. Some of these AI projects, like the structure mapping engine SME , claimed to model high faculties of the human mind and to be able to understand literary analogies and to rediscover important scientific breakthroughs. In the introduction, Hofstadter warns about the Eliza effect that leads people to attribute understanding to a computer program that only uses a few stock phrases. The authors claim that the input data for such impressive results are already heavily structured in the direction of the intended discovery and only a simple matching task is left to the computer. Their main claim is that it is impossible to model high-level cognition without at the same time modeling low-level perception. While cognition is necessarily based on perception, they argue that it in turn influences perception itself. Therefore, a sound AI project should try to model the two together. In a slogan repeated several times throughout the book: Since human perception is too complex to be modelled by available technology, they favor the restriction of AI projects to limited domains like the one used for the Copycat project. It is a description of the architecture of the Copycat program, developed by Hofstadter and Melanie Mitchell. The field of application of the program is a domain of short alphabetic sequences. A typical puzzle is: If abc were changed to abd, how would you change ijk in the same

way?. The program tries to find an answer using a strategy supposedly similar to the way the human mind tackles the question. Copycat has three major components: The Slipnet, a model of long-term memory in humans. It contains concepts of various degrees of abstraction, from the letter types to the notion of opposite. Concepts are connected with links indicating their similarity. The activation of a node may cause the activation of a neighbor with a probability proportional to the inverse of the length of their link. The lengths of these links are not static; they have a value at the beginning but they may change elastically during computation according to the partial results achieved. The Workspace, a model of short-term memory. Here partial structures are constructed and dismantled. The temporary results may cause the activation of concepts in the slipnet. A temperature measures the satisfaction of the program with the structure obtained at each moment. High temperature means dissatisfaction and leads to the adoption of a different strategy. Low temperature means satisfaction and the continuation of the present strategy. The Coderack, a collection of codelets, that is small fragments of code, that wait to be selected and executed in the workspace. Each has a weight associated to it that determined its probability to be selected for execution. The resulting software displays emergent properties. It works according to a parallel terraced scan that runs several possible processes at the same time. It shows mental fluidity in that concepts may slip into similar ones. It emulates human behavior in tending to find the most obvious solutions most of the time but being more satisfied as witnessed by low temperature by more clever and deep answers that it finds more rarely. Perspectives on Copycat[ edit ] This chapter compares Copycat with other recent at the time work in artificial intelligence. Severe criticism is put on the claim that these tools can solve "real-life" problems. In fact, only the terms used in the example suggest that the input to the programs comes from a concrete situation. Finally a more positive assessment is given to two other projects: Prolegomena to Any Future Metacat[ edit ] This chapter looks at those aspects of human creativity that are not yet modeled by Copycat and lays down a research plan for a future extension of the software. Also important is the ability to learn and to remember the results of the mental activity. The creativity displayed in finding analogies should be applicable at ever higher levels: The resulting program was named Tabletop. The authors present a different and vaster domain to justify the relevance of attacking such a trivial-seeming project. The alternative domain is called Ob-Platte and consists in discovering analogies between geographical locations in different regions or countries. Once again arguments are offered against a brute-force approach, which would work on the small Tabletop domain but would become unfeasible on the larger Ob-Platte domain. Instead a parallel non-deterministic architecture is used, similar to the one adopted by the Copycat project. He argues against a strict adherence to a match between the results of an AI program with the average answer of human test subjects. He gives two reasons for his rejection: In the main article, the architecture of Tabletop is described: Letter Spirit[ edit ] This last chapter is about a more ambitious project that Hofstadter started with student Gary McGraw. The microdomain used is that of grid fonts: The goal is to construct a program that, given only a few or just one letter from the grid font, can generate the whole alphabet in the same style. The difficulty lies in the ambiguity and undefinability of style. The projected program would have a structure very similar to that of Jumble, Numble, Copycat, and Tabletop. Epilogue[ edit ] In the concluding part of the book, Hofstadter analyses some AI projects with a critical eye. The project under scrutiny are the following. AARON , a computer artist that can draw images of people in outdoor settings in a distinctive style reminiscent of that of a human artist; criticism: Although some of the prose generated by the program is quite impressive, due in part to the Eliza effect , the computer does not have any notion of plot or of the meaning of the words it uses. Furthermore, the book is made up of selected texts from thousands produced by the computer over several years. AM , a computer mathematician that generates new mathematical concepts. It managed to produce by itself the notion of prime number and the Goldbach conjecture. As with Racter, the question is how much the programmer filtered the output of the program, keeping only the occasional interesting output. Also, mathematics being a very specialized domain, it is doubtful whether the techniques used can be abstracted to general cognition. Another mathematical program, called Geometry, was celebrated for making an insightful discovery of an original proof that an isosceles triangle has equal base angles. The proof is based on seeing the triangle in two different ways. However, the program generates all possible ways of seeing the triangle, not even knowing that it is the same triangle.

Hofstadter concludes with some methodological remarks on the Turing Test. In his opinion it is still a good definition and he argues that by interacting with a program, a human may be able to have insight not just on its behaviour but also on its structure. However, he criticises the use that is made of it at present:

## Chapter 2 : What is the process of Perception? | Organizational Behaviour | Tutu'rself

*An athlete's pacing strategy is widely recognised as an essential determinant for performance during individual events. Previous research focussed on the importance of internal bodily state.*

Saul McLeod , published In order to receive information from the environment we are equipped with sense organs e. Each sense organ is part of a sensory system which receives sensory inputs and transmits sensory information to the brain. A particular problem for psychologists is to explain the process by which the physical energy received by sense organs forms the basis of perceptual experience. Sensory inputs are somehow converted into perceptions of desks and computers, flowers and buildings, cars and planes; into sights, sounds, smells, taste and touch experiences. A major theoretical issue on which psychologists are divided is the extent to which perception relies directly on the information present in the stimulus. Psychologists distinguish between two types of processes in perception: Bottom-up processing is also known as data-driven processing, because perception begins with the stimulus itself. Processing is carried out in one direction from the retina to the visual cortex, with each successive stage in the visual pathway carrying out ever more complex analysis of the input. Top-down processing refers to the use of contextual information in pattern recognition. For example, understanding difficult handwriting is easier when reading complete sentences than when reading single and isolated words. This is because the meaning of the surrounding words provide a context to aid understanding. Gregory and Top Down Processing Theory Psychologist Richard Gregory argued that perception is a constructive process which relies on top-down processing. Stimulus information from our environment is frequently ambiguous so to interpret it, we require higher cognitive information either from past experiences or stored knowledge in order to makes inferences about what we perceive. For Gregory perception is a hypothesis, which is based on prior knowledge. In this way we are actively constructing our perception of reality based on our environment and stored information. Therefore, the brain has to guess what a person sees based on past experiences. We actively construct our perception of reality. Richard Gregory proposed that perception involves a lot of hypothesis testing to make sense of the information presented to the sense organs. Our perceptions of the world are hypotheses based on past experiences and stored information. Sensory receptors receive information from the environment, which is then combined with previously stored information about the world which we have built up as a result of experience. The formation of incorrect hypotheses will lead to errors of perception e. Such a mask is generally seen as normal, even when one knows and feels the real mask. An assumption based on past experience. Perceptions can be ambiguous The Necker cube is a good example of this. It becomes unstable and a single physical pattern can produce two perceptions. Gregory argued that this object appears to flip between orientations because the brain develops two equally plausible hypotheses and is unable to decide between them. When the perception changes though there is no change of the sensory input, the change of appearance cannot be due to bottom-up processing. It must be set downwards by the prevailing perceptual hypothesis of what is near and what is far. Perception allows behavior to be generally appropriate to non-sensed object characteristics For example, we respond to certain objects as though they are doors even though we can only see a long narrow rectangle as the door is ajar. What we have seen so far would seem to confirm that indeed we do interpret the information that we receive, in other words, perception is a top down process. In some cases it would seem the answer is yes. For example, look at the figure below: This probably looks like a random arrangement of black shapes. In fact there is a hidden face in there, can you see it? The face is looking straight ahead and is in the top half of the picture in the center. Now can you see it? The figure is strongly lit from the side and has long hair and a beard. Once the face is discovered, very rapid perceptual learning takes place and the ambiguous picture now obviously contains a face each time we look at it. We have learned to perceive the stimulus in a different way. Although in some cases, as in the ambiguous face picture, there is a direct relationship between modifying hypotheses and perception, in other cases this is not so evident. For example, illusions persist even when we have full knowledge of them e. The current hypothesis testing theories cannot explain this lack of a relationship between learning and perception. Relying on individual constructs for making sense of the world makes

perception a very individual and chancy process. The constructivist approach stresses the role of knowledge in perception and therefore is against the nativist approach to perceptual development. However, a substantial body of evidence has been accrued favoring the nativist approach, for example: Constructivists like Gregory frequently use the example of size constancy to support their explanations. That is, we correctly perceive the size of an object even though the retinal image of an object shrinks as the object recedes. They propose that sensory evidence from other sources must be available for us to be able to do this. However, in the real world, retinal images are rarely seen in isolation as is possible in the laboratory. There is a rich array of sensory information including other objects, background, the distant horizon and movement. This rich source of sensory information is important to the second approach to explaining perception that we will examine, namely the direct approach to perception as proposed by Gibson. This is crucial because Gregory accepts that misperceptions are the exception rather than the norm. Illusions may be interesting phenomena, but they might not be that informative about the debate. This suggests that perception is necessary for survival â€" without perception we would live in a very dangerous environment. Our ancestors would have needed perception to escape from harmful predators, suggesting perception is evolutionary. James Gibson argues that perception is direct, and not subject to hypotheses testing as Gregory proposed. There is enough information in our environment to make sense of the world in a direct way. There is no need for processing interpretation as the information we receive about size, shape and distance etc. Gibson argued that perception is a bottom-up process, which means that sensory information is analyzed in one direction: Light rays reflect off of surfaces and converge into the cornea of your eye. Because of movement and different intensities of light shining in different directions it is an ever changing source of sensory information. Therefore, if you move, the structure of the optic array changes. According to Gibson, we have the mechanisms to interpret this unstable sensory input, meaning we experience a stable and meaningful view of the world. Changes in the flow of the optic array contain important information about what type of movement is taking place. The flow of the optic array will either move from or towards a particular point. If the flow appears to be coming from the point, it means you are moving towards it. If the optic array is moving towards the point you are moving away from it. Invariant Features the optic array contains invariant information that remains constant as the observer moves. They supply us with crucial information. Two good examples of invariants are texture and linear perspective. Another invariant is the horizon-ratio relation. The ratio above and below the horizon is constant for objects of the same size standing on the same ground. Affordances Are, in short, cues in the environment that aid perception. Important cues in the environment include: The patterns of light that reach the eye from the environment. The grain of texture gets smaller as the object recedes. Gives the impression of surfaces receding into the distance. When an object moves further away from the eye the image gets smaller. Objects with smaller images are seen as more distant. If the image of one object blocks the image of another, the first object is seen as closer. A large number of applications can be applied in terms of his theory e. His theory is reductionist as it seeks to explain perception solely in terms of the environment. There is strong evidence to show that the brain and long term memory can influence perception. However, his theory cannot explain why perceptions are sometimes inaccurate, e. He claimed the illusions used in experimental work constituted extremely artificial perceptual situations unlikely to be encountered in the real world, however this dismissal cannot realistically be applied to all illusions. For example if you stare for some time at a waterfall and then transfer your gaze to a stationary object, the object appears to move in the opposite direction. Bottom-up or Top-down Processing? Neither direct nor constructivist theories of perception seem capable of explaining all perception all of the time. Research by Tulving et al manipulated both the clarity of the stimulus input and the impact of the perceptual context in a word identification task. As clarity of the stimulus through exposure duration and the amount of context increased, so did the likelihood of correct identification. However, as the exposure duration increased, so the impact of context was reduced, suggesting that if stimulus information is high, then the need to use other sources of information is reduced. Science, , The Senses Considered as Perceptual Systems. A Theory of Direct Visual Perception. The Psychology of Knowing. Concepts and Mechanisms of Perception. Infant Behavior and Development, 13 1 , How to reference this article:

## Chapter 3 : Perception - Wikipedia

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Subjective constancy Perceptual constancy is the ability of perceptual systems to recognize the same object from widely varying sensory inputs. A coin looked at face-on makes a circular image on the retina, but when held at angle it makes an elliptical image. Without this correction process, an animal approaching from the distance would appear to gain in size. The brain compensates for this, so the speed of contact does not affect the perceived roughness. Principles of grouping Law of Closure. The human brain tends to perceive complete shapes even if those forms are incomplete. The principles of grouping or Gestalt laws of grouping are a set of principles in psychology , first proposed by Gestalt psychologists to explain how humans naturally perceive objects as organized patterns and objects. Gestalt psychologists argued that these principles exist because the mind has an innate disposition to perceive patterns in the stimulus based on certain rules. These principles are organized into six categories: The principle of proximity states that, all else being equal, perception tends to group stimuli that are close together as part of the same object, and stimuli that are far apart as two separate objects. The principle of similarity states that, all else being equal, perception lends itself to seeing stimuli that physically resemble each other as part of the same object, and stimuli that are different as part of a different object. This allows for people to distinguish between adjacent and overlapping objects based on their visual texture and resemblance. The principle of good continuation makes sense of stimuli that overlap: The principle of common fate groups stimuli together on the basis of their movement. When visual elements are seen moving in the same direction at the same rate, perception associates the movement as part of the same stimulus. This allows people to make out moving objects even when other details, such as color or outline, are obscured. The principle of good form refers to the tendency to group together forms of similar shape, pattern, color , etc. Contrast effect A common finding across many different kinds of perception is that the perceived qualities of an object can be affected by the qualities of context. If one object is extreme on some dimension, then neighboring objects are perceived as further away from that extreme. Perceptual learning With experience, organisms can learn to make finer perceptual distinctions, and learn new kinds of categorization. Wine-tasting, the reading of X-ray images and music appreciation are applications of this process in the human sphere. Specifically, these practices enable perception skills to switch from the external exteroceptive field towards a higher ability to focus on internal signals proprioception. Also, when asked to provide verticality judgments, highly self-transcendent yoga practitioners were significantly less influenced by a misleading visual context. Increasing self-transcendence may enable yoga practitioners to optimize verticality judgment tasks by relying more on internal vestibular and proprioceptive signals coming from their own body, rather than on exteroceptive, visual cues. Set psychology A perceptual set, also called perceptual expectancy or just set is a predisposition to perceive things in a certain way. Subjects who were told to expect words about animals read it as "seal", but others who were expecting boat-related words read it as "sail". They were told that either a number or a letter would flash on the screen to say whether they were going to taste an orange juice drink or an unpleasant-tasting health drink. In fact, an ambiguous figure was flashed on screen, which could either be read as the letter B or the number  When the letters were associated with the pleasant task, subjects were more likely to perceive a letter B, and when letters were associated with the unpleasant task they tended to perceive a number  People who are primed to think of someone as "warm" are more likely to perceive a variety of positive characteristics in them, than if the word "warm" is replaced by "cold". For example, people with an aggressive personality are quicker to correctly identify aggressive words or situations. It starts with very broad constraints and expectations for the state of the world, and as expectations are met, it makes more detailed predictions errors lead to new predictions, or learning processes. Clark says this research has various implications; not only can there be no completely "unbiased, unfiltered" perception, but this means that there is a great deal of feedback between perception and expectation perceptual

experiences often shape our beliefs, but those perceptions were based on existing beliefs [40]. Indeed, predictive coding provides an account where this type of feedback assists in stabilizing our inference-making process about the physical world, such as with perceptual constancy examples. Theories[ edit ] Perception as direct perception[ edit ] Cognitive theories of perception assume there is a poverty of stimulus. This with reference to perception is the claim that sensations are, by themselves, unable to provide a unique description of the world. A different type of theory is the perceptual ecology approach of James J. His theory "assumes the existence of stable, unbounded, and permanent stimulus-information in the ambient optic array. And it supposes that the visual system can explore and detect this information. The theory is information-based, not sensation-based. Animate actions require both perception and motion, and perception and movement can be described as "two sides of the same coin, the coin is action". Gibson works from the assumption that singular entities, which he calls "invariants", already exist in the real world and that all that the perception process does is to home in upon them. A view known as constructivism held by such philosophers as Ernst von Glasersfeld regards the continual adjustment of perception and action to the external input as precisely what constitutes the "entity", which is therefore far from being invariant. The invariant does not and need not represent an actuality, and Glasersfeld describes it as extremely unlikely that what is desired or feared by an organism will never suffer change as time goes on. This social constructionist theory thus allows for a needful evolutionary adjustment. Evolutionary psychology EP and perception[ edit ] Many philosophers, such as Jerry Fodor, write that the purpose of perception is knowledge, but evolutionary psychologists hold that its primary purpose is to guide action. Theories of perception[ edit ].

## Chapter 4 : Fluid Concepts and Creative Analogies - Wikipedia

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This is an open-access article distributed under the terms of the Creative Commons Attribution Non Commercial License , which permits use, distribution, and reproduction in other forums, provided the original authors and source are credited. This article has been cited by other articles in PMC. Abstract Perception and cognition are highly interrelated. Given the influence that these systems exert on one another, it is important to explain how perceptual representations and cognitive representations interact. In this paper, I analyze the similarities between visual perceptual representations and cognitive representations in terms of their structural properties and content. Specifically, I argue that the spatial structure underlying visual object representation displays systematicity â€" a property that is considered to be characteristic of propositional cognitive representations. Furthermore, I argue that if systematicity is taken to be a criterion to distinguish between conceptual and non-conceptual representations, then visual representations, that display systematicity, might count as an early type of conceptual representations. Showing these analogies between visual perception and cognition is an important step toward understanding the interface between the two systems. The ideas here presented might also set the stage for new empirical studies that directly compare binding and other relational operations in visual perception and higher cognition. Perceptual information guides our decisions and actions, and shapes our beliefs. At the same time our knowledge influences the way we perceive the world Brewer and Lambert,  To the extent that perception and cognition seem to share information, it seems there is no sharp division between the realm of cognitive abilities and that of perceptual abilities. An example is visual perception. Visual processing is composed of different stages Marr,  Roughly, at early stages of the visual system, processes like segregation of figure from background, border detection, and the detection of basic features e. This information reaches intermediate stages, where it is combined into a temporary representation of an object. At later stages, the temporary object representation is matched with previous object shapes stored in long-term visual memory to achieve visual object identification and recognition. While early visual processes are largely automatic and independent of cognitive factors, late visual stages are more influenced by our knowledge Raftopoulos, this issue. Examples of cognitive influence on how we perceive the world â€" that modulates late vision â€" are visual search and attention Treisman,  Knowing the color or shape of an object helps a person to quickly identify that particular object in a cluttered visual scene Wolfe and Horowitz,  Phenomena like visual search highlight the fact that visual perception at later stages depends on both sensory and cognitive factors. Late vision is at what philosophers call the personal level: This is apparently not the case for early visual stages, which occur at a subpersonal level, without a person being aware of the information being processed at that stage. Intermediate stages, on the other hand, are probably accessible at a personal level. The degree of representational awareness occurring at this stage is commonly identified with phenomenal consciousness Lamme, ; Raftopoulos and Mueller,  It is a matter of debate to what extent intermediate stages of visual processing are influenced by our knowledge i. Some authors argue that those stages are purely visual Raftopoulos and Mueller, and that the transition between pure perception to cognition occurs only at later visual stages, when temporary object representations are matched for recognition and identification. In this paper, I will not propose an argument for whether early and intermediate stages of visual perception are cognitively penetrable. However, I would like to stress that some of the common properties between visual perception and cognition that I will consider already occur at intermediate stages, thus, casting doubt on the claim that mid-level vision is purely perceptual. Cognitive information influences perceptual processes, but, at the same time, cognitive processes depend on perceptual information Goldstone and Barsalou,  Recent work in philosophy brought new vigor to the hypothesis originally proposed by British Empiricists that cognition is inherently perceptual Prinz,  Such theoretical proposals are supported by empirical findings from psychology. Work on concept acquisition shows that functions e. The basic hypothesis is that a concept is represented by means of a simulation at the sensory level of an experience of

that to which the concept truly applies. For example, to represent the concept APPLE 1 , perceptual systems for vision, action, and touch partially produce the experience of a particular apple. Though it seems to be common ground that cognitive and perceptual representations influence each other, they are not taken to be the same kind of representations. Neurophysiological studies distinguish different functional areas for sensory and cognitive systems. Those areas process specific inputs and specialize in different kinds of information processes Zeki, ; Felleman and Van Essen,  And distinct sensory areas can be treated as separate modules Barrett, that deal with their specific representational primitives. From a philosophical point of view, visual perception and cognition process information by means of representations that differ in both their structure and content Heck, ; Fodor,  One of the main characteristics of cognitive states, paradigmatically of thoughts, is that they have a propositional combinatorial structure that satisfies the requirement of the Generality Constraint Evans,  The Generality Constraint describes the pervasive ability of humans to entertain certain thoughts that they have never had before on the basis of having entertained the components of these new thoughts in other preceding situations. For example, from the fact that a person can think that the sky is blue and the car is gray, she can also think that the sky is gray and the car is blue, even if she has never had this thought before. The new thought depends on her conceptual ability to combine already acquired concepts in different ways. This regularity of human thinking is explained by appealing to the fact that thoughts are mental representations with a sentential combinatorial structure Fodor,  Thoughts are built up by combining primitive constituents according to propositional rules. The constituent structure of thought is such that whenever a complex representation is tokened its constituents are simultaneously tokened. Failure to represent car or grayness leads to failure to represent that the car is gray. The appeal to the constituent structure of cognitive representations allows us to explain a further property of these representations: Systematicity, similar to the Generality Constraint, describes the human ability to entertain semantically related thoughts. For example, the ability to entertain a certain thought about cars is connected to the ability to entertain certain other thoughts about cars: Systematic recombinations are necessary to satisfy the Generality Constraint but not sufficient. According to the Generality Constraint, once a thinker can entertain a thought, elements of this thought could be in principle indefinitely recombined with every other appropriate concept that a person possesses. This requirement is not part of systematicity, since it leaves open whether it is in principle possible that a finite type of systematicity exists Fodor and Pylyshyn,  For what concerns the analysis of the structure of visual representations, I will mostly focus on whether those representations implement a systematic structure of constituents. Acceptance of the Generality Constraint, or the weaker systematicity requirement, also affects how we characterize the content of cognitive and perceptual representations. Philosophers distinguish between two types of content: Typical cases of mental states with conceptual content are cognitive mental states, like thought, belief, desire, and so on: Perception, both personal and subpersonal, is considered a paradigmatic example of states with non-conceptual content. In other words, to have the thought that an apple is red, one has to possess the concepts involved in that thought, but to have a perceptual experience characteristic of seeing a red apple one does not need to possess the concepts involved in the specification. It has been argued that perceptual representations, specifically visual representations, do not satisfy the requirement of systematicity, and, hence, unlike cognitive representations, do not have conceptual content Heck,  The argument is based on the idea that visual representations have a pictorial nature. Pictorial theories equate visual representations to images or maps. Like images or maps, visual representations are spatially characterized: Furthermore, like images or maps, visual representations have a holistic character. Unlike cognitive representations, there is no unique structured propositional representation that determines the content of a visual representation. There are many distinct possible decompositions of the same image, such that it is impossible to both identify which are its constituent parts and disentangle the role of these parts in the building up of the pictorial representation. Thus, visual representations, like maps, seemingly lack the syntactic structure of constituents typical of cognitive representations. The lack of a constituent structure entails that visual representations are not systematic. Satisfying systematicity is a necessary condition on satisfying the Generality Constraint. For the reasons above, visual representations do not seem to satisfy systematicity, and hence the Generality Constraint. Therefore, they have a content of a different kind than the content of cognitive representations: This is both an

empirical and theoretical question. From the philosophical point of view, finding out the relationship between perception and cognition will be of benefit to explain phenomena as different as concept formation and acquisition, belief justification, and demonstrative thinking, each of which partly depends on perceptual information. In this paper, I will focus on commonalities between visual perception and cognition that might help explain the communication between those systems. In the first part, I will show that the spatial recombination underlying visual object recognition satisfies the requirement of systematicity. The analysis will take into account the so-called Feature Integration Theory Treisman and Gelade, ; a model that explains visual object representation by considering the spatial nature of visual representations. Although Feature Integration Theory characterizes visual representations as spatially organized, it differs from pictorial theories of visual representations, since it does not commit to the view that visual representations are holistic. In fact, visual representations can be seen as states of the visual system that can be neuronally specified, such that each part of an object representation can be spelled out by considering the different neuronal activations Treisman and Gelade, ; Goldstone and Barsalou,  Each neuronal activation roughly corresponds to a part, or primitive constituent, of the representation. Thus, one can decompose an object representation into its primitive constituents and analyze whether a systematic structure of constituents is displayed by visual spatial recombinations Tacca,  In the second part, I will argue against the claim that visual representations have non-conceptual content. Based on the analysis in the first part of the paper, I will propose that, if one takes systematicity to be a necessary requirement for having conceptual content, visual representations might be an early type of conceptual representations. I conclude that understanding the link between perception and cognition requires considering whether they satisfy common requirements in terms of structure and content. These similarities might be at the basis of the translation of perceptual representations into cognitive representation and elucidate the mechanism of their interaction. Primitive Visual Features and the Binding Problem Recombination in cognitive processes depends on operations on primitive constituents. A primitive constituent is an entity that corresponds to the smallest meaningful representation carrying relevant information for the processing of more complex representations. Different theories posit different types of primitive constituents Smolensky, ; Fodor,  However, there is agreement that the primitive mental representations involved in thought and other cognitive processes, like belief and desire, are concepts. According to an atomistic perspective, concepts cannot be further decomposed into more primitive elements and as such they are the building blocks of thoughts Fodor,  However, others have argued that concepts can be further decomposed into their perceptual components e. Those elementary constituents are taken to be symbolic perceptual representations stored at late perceptual stages that become part of cognitive recombinations. Therefore, they share with cognitive representations systematicity, compositionality, and productivity Barsalou,  In the following, I will show that intermediate visual representations that contribute to object perception but are not yet stored at late visual stages also display systematicity. The hypothesis that concepts have a structure of constituents that involves perceptual representations is based on anatomical, physiological, and psychophysical evidence for the existence of distinct representations for primitive visual features. Neurobiological Zeki, ; Livingstone and Hubel, ; Felleman and Van Essen, and psychophysical studies Treisman and Gelade, report the existence in visual areas of so-called feature maps. Feature maps code for specific object features, like color, motion, and orientation. They are also topographically organized; namely, they represent a specific feature and the specific location in which the feature occurs in the visual field. Thus, any visual object we perceive is first decomposed into its primitive components and only later those components are recombined into a coherent object representation.

## Chapter 5 : Professor Richard Gregory on-line

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References to Papers appearing in collected papers Concepts and Mechanisms of Perception , London: Duckworth are referred to as: The Psychology of Seeing l Princeton University Press; Oxford: Edited with Sir Ernst Gombrich. A History of Explanations of Psychology and Physics l Weidenfeld and Nicolson; USA: Macmillan Scientific Book Club choice. Italian, La Mente nella, Scienze, Mondadori l Edited with Pauline Marstrand. Update in progress, Vol 2 of Vision and Visual Dysfuction. OUP 13 - Mirrors in Mind First published in Concepts and Mechanisms of Perception, Duckworth. Humphrey ed Psychology through Experiment, London. Motor Skills 18, B Brown and L Houssiades "Illusory perception as a constancy phenomenon. J, and Gregory, R. Royal Inst,itution Discourse] 40, , The role of retinal stimulation and of eye movements. New Horizons in Psychology. Psychol 18, 1, Brit Interplanetary Soc, 21, Contemporary Problems In Perception, London l The Neuropsychology of Spatially Orientated Behaviour. Illusion in Nature and Art. A projection technique and observations. Handbook of Perception 9. Royal Society B, , , Attention and Performance IX. Heard l "Colour contrast without luminance contrast. Colour vision deficiencies VIII, ed. Heard "Some Phenomena and Implications of Isoluminance. Mackay Rays shimmer due to accommodation changes. B, , National Physical Laboratory, Symposium No. Mechanization of Thought Processes, Vol 2, H. Current Problems in Animal Behaviour, Methuen. Biological Prototypes and Synthetic Systems, Vol. Principles and Practice of Bionics. Lighting Research and Technology, 3, 4, Arts, , , Machine Intelligence 7, 21, Proceedings of the Royal Institution, London. New Society, 12 December Fisher eds Perception and Representation. Interdisciplinary Science Reviews, 9, 1, p. Proceedings of International Congress on M. M Coxeter, et al. Cogito, 1, 3, British Association for the Advancement of Science, l Reprinted l Interdisciplinary Science Reviews, 12, 3, Matters of Intelligence, ed. RSA, , , Cantor Lecture, Royal Society. Evolution of the Eye and Visual System Eds. Vol 2 of Vision and Visual Dysfunction. L "Hypothesis and illusion: Explorations in perception and science. Royal Institution of London. Special Issue , Conversations with Japanese Scientists. Edited with Andrew M. Nature, , p. Trends in Cognitive Sciences, 1, 5, In From Brains to Consciousness: Essays on the New Sciences of the Mind. Toward a Science of Consciousness: Interdisciplinary Science Reviews, 24, No. From Truths of Bartlett to Illusions of Vision. The Rise and Fall of the Exploratory. Bartlett, Culture and Cognition. Brain Research , Elsevier B. Where do prior probabilities come from? A World Beyond Human Experience. The Meaning of Asymmetry. The Machinery of the Mind. Times Higher Education Supplement 18th June. Preliminaries to a Science of the Mind. Nature, , , Restoration of atmospherically degraded images, U. Colour vision deficiencies VIII. An Introduction to the Bristol Exploratory. Interactive Science and Technology Centres, ed. Leonardo, 23, 4 p. L "Exploring Science Hands-on. Problem or Crisis ed. In Press Shaking Hands with the Universe: Journal of Museum Management and Curatorship.

## Chapter 6 : Interactions Between Perception and Concepts | PCL

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Perception is a process consisting of several sub processes. We can take an input â€”throughput output approach to understand the dynamics of the perceptual process. This approach emphasizes that there is input which is processed and gives output. The stimuli in the environment-objects, events, or people-can be considered as the perceptual inputs. The actual transformation of these inputs through the perceptual mechanism of selection, organization, and interpretation can be treated as the throughputs, and the resultant opinions, feelings, attitudes etc. This simplified process of perception in fig: Figure is a simplified version of perceptual process. It does not present the whole factors which go in input-throughout output process of perception. These are existence of stimuli, perceptual mechanism, and perceptual outputs. Perceptual outputs along with other determinants of human behavior affect and shape behavior. Let us we how perceptual process works in terms of its three basic elements. Stimuli may be in the form of objects, events, or people. Thus everything in the setting where events occur, or which contributes to the occurrence of events, can be termed as perceptual input. When the perceiver interacts with a stimulus, sensation takes place which, we have seen earlier starts perceptual process. Perceptual mechanism involves three elements- selection of stimuli, organization of stimuli, and interpretation of stimuli. After receiving the stimuli from the environment, some are selected for further processing while others are screened out because it is possible for a person to selected all stimuli which he sees in the environment. There are two types of factors which affect selection of stimuli. These are external and related to stimuli and internal related to the perceiver. These external and internal factors are of several types. We shall discuss these factors and their impact on the selection of stimuli in the subsequent section of this chapter dealing with perceptual selectivity. After the stimuli are received, these are organized in some form in order to make sense out of that. The various forms of organizing stimuli are figure-ground perceptual grouping, simplification, and closer. The perceptual inputs that have been organized will have to be interpreted by the perceiver so that he can sense and extract some meaning of what is going on in the situation. People interpret the meaning of what they have selectively perceived and organized in terms of their own assumptions of people, things and situation. In such a process, there are chances of misinterpretation. Interpretation of stimuli is affected by characteristics of stimuli, situations under which perception takes place, and characteristics of the perceiver. These factors also affect the total perceptual process. Based on perceptual mechanism which ends with interpretation of stimuli, perceptual outputs emerge. These outputs may be in the form of covert actions development of attitudes, opinions, beliefs, impression about the stimuli under consideration. These outputs along with other factors affecting human behavior may result in overt behavior. For overt behavior to occur, perception is not the sole decider though it is important. For example, when a person sees an advertisement of a product, he may perceive that the product is good. This perception, however, may not be enough for the person to buy the product overt behavior.

## Chapter 7 : Commonalities between Perception and Cognition

*Interactions Between Perception and Concepts One of our research goals is to expand our understanding of perception, cognition, and their interactions. Traditionally, work in human perception has been disconnected from research on more sophisticated cognitive functioning.*

Meaning, Definition, Nature and Importance Article shared by: Read this article to learn about the meaning, nature and importance of perception. Meaning and Definition of Perception: This input of meaningful information results in decisions and actions. The study of these perpetual processes shows that their functioning is affected by three classes of variablesâ€"the objects or events being perceived, the environment in which perception occurs and the individual doing the perceiving. But what is seen is influenced by the perceiver, the object and its environment. The meaning of perception emphasises all these three points. Perception has been explained by Ajit Singh as follows: In other words, sensation involves detecting the presence of a stimulus whereas perception involves understanding what the stimulus means. For example, when we see something, the visual stimulus is the light energy reflected from the external world and the eye becomes the sensor. This visual image of the external thing becomes perception when it is interpreted in the visual cortex of the brain. Thus, visual perception refers to interpreting the image of the external world projected on the retina of the eye and constructing a model of the three dimensional world. It correlates, integrates and comprehends diverse sensations and information from many organs of the body by means of which a person identifies things and objects, the sensations refer to. Perception is determined by both physiological and psychological characteristics of the human being whereas sensation is conceived with only the physiological features. Perception is a subjective process, therefore, different people may perceive the same environment differently based on what particular aspects of the situation they choose to selectively absorb, how they organize this information and the manner in which they interpret it to obtain a grasp of the situation. It is because what we hear is not what is really said, but what we perceive as being said. When we buy something, it is not because it is the best, but because we take it to be the best. Thus, it is because of perception, we can find out why one individual finds a job satisfying while another one may not be satisfied with it. One person may be viewing the facts in one way which may be different from the facts as seen by another viewer. Like the mirrors at an amusement park, they distort the world in relation to their tensions. This problem is made more complicated by the fact that different people perceive the same situation differently. In order to deal with the subordinates effectively, the managers must understand their perceptions properly. Thus, for understanding the human behaviour, it is very important to understand their perception, that is, how they perceive the different situations. The world as it is perceived is the world that is important for understanding the human behaviour.

## Chapter 8 : Concepts and mechanisms of perception / R. L. Gregory | National Library of Australia

*new Honda Concepts for at Toky Motor Show first photos.*

Stages Involved in Perception Process Article shared by: This article throws light on the three important stages involved in perception process, i. A number of stimuli are constantly confronting people in the form of information, objects, events, people etc. These serve as the inputs of the perceptual process. A few of the stimuli affecting the senses are the noise of the air coolers, the sound of other people talking and moving, outside noises from the vehicular traffic or a street repair shop or a loud speaker playing somewhere plus the impact of the total environmental situation. Some stimuli do not affect the senses of a person consciously, a process called subliminal perception. When a person receives information, he tries to process it through the following sub processes of selection, organisation and interpretation. Many things are taking place in the environment simultaneously. However, one cannot pay equal attention to all these things, thus the need of perceptual selectivity. Perceptual selectivity refers to the tendency to select certain objects from the environment for attention. The objects which are selected are those which are relevant and appropriate for an individual or those which are consistent with our existing beliefs, values and needs. For this, we need to screen or filter out most of them so that we may deal with the important or relevant ones. The following factors govern the selection of stimuli: The bigger the size of the stimulus, the higher is the probability that it is perceived. Size always attracts the attention, because it establishes dominance. The size may be the height or weight of an individual, sign board of a shop, or the space devoted to an advertisement in the newspaper. A very tall person will always stand out in the crowd on the other hand; a very short person will also attract attention. A full page advertisement will always catch attention as compared to a few lines in the classified section. Intensity attracts to increase the selective perception. A few examples of intensity are yelling or whispering, very bright colours, very bright or very dim lights. Intensity will also include behavioural intensity. The repetition principle states that a repeated external stimulus is more attention drawing than a single one. Because of this principle, supervisors make it a point to give the necessary directions again and again to the workers. Similarly, the same advertisement or different advertisement but for the same product shown, again and again on the TV will have more attention as compared to an advertisement which is shown once a day. High status people ran exerts greater influence on the perception of the employees than the low status people. There will always be different reactions to the orders given by the foreman, the supervisor or the production manager. An object which contrasts with the surrounding environment is more likely to be noticed than the object which blends in the environment. For example, the Exit signs in the cinema halls which have red lettering on a black background are attention drawing or a warning sign in a factory, such as Danger, written in black against a red or yellow background will be easily noticeable. In a room if there are twenty men and one woman, the woman will be noticed first because of the contrast. The principle of motion states that a moving object receives more attention than an object which is standing still. A moving car among the parked cars catches our attention faster. A flashing neon-sign is more easily noticed. This principle states that either a novel or a familiar external situation can serve as an attention getter. New objects in the familiar settings or familiar objects in new settings will draw the attention of the perceiver. A familiar face on a crowded railway platform will immediately catch attention. Because of this principle, the managers change the workers jobs from time to time, because it will increase the attention they give to their jobs. By nature we mean, whether the object is visual or auditory and whether it involves pictures, people or animals. It is well known that pictures attract more attention than words. Video attracts more attention than still pictures. A picture with human beings attracts more attention than a picture with animals. The internal factors relate to the perceiver. Perceiving people is very important for a manager, because behaviour occurs as a result of behaviour. Following are the internal factors which affect perception: Although interrelated with other internal factors learning may play the single biggest role in developing perceptual set. A perceptual set is basically what a person expects from the stimuli on the basis of his learning and experience relative to same or similar stimuli. This perceptual set is also known as cognitive awareness by which the mind organizes information

and forms images and compares them with previous exposures to similar stimuli. A number of illustrations have been used by psychologists to demonstrate the impact of learning on perception. Some are as explained below: Take the following figure for example: According to this experiment, if a person is first shown a clear and un-ambiguous picture of a young woman as in fig. However, if the person is shown the clear picture of an old woman first and then the ambiguous picture, he will perceive the ambiguous picture as that of an old woman. It is because of the cognitive awareness as the mind organizes information and forms images and compares them with previous exposure to Fig. From the above illustration it is clear that our perceptions and interpretations of such illustrations would depend upon our previous exposure to such situations earlier. Besides the learning aspects of the perceptual set, motivation also has a vital impact on perceptual selectivity. For example, a person who has a relatively high need for power, affiliation or achievement will be more attentive to the relevant situational variables. For example, when such a person walks into the lunch room, he may go to the table where several of his co-workers are sitting, rather than a table which is empty or on which just one person is sitting. Another example is that a hungry person will be more sensitive to the smell or sight of food than a non-hungry person. In one experiment people who were kept hungry for some time were shown some pictures and were asked to describe what they saw in them. Most of the reported more food items in such perceptions. Closely related to learning and motivation is the personality of the perceiving person. For example, the older senior executives often complain about the inability of the new young manager to take tough decisions concerning terminating or reassigning people and paying attention to details and paper work. Different perceptions in young and old are due to their age differences. Further, the generation gap witnessed in recent years definitely contributes to different perceptions. In addition to the above two problems another problem is about the woman in the work place. Women are still not reaching the top levels of organisations. At least part of this problem can be attributed to perceptual barriers such as the established managerial hierarchy is not able to see perceive that qualified woman should be promoted into top level positions. Of course, there are individual differences in all age categories but the above examples show that how personalities, values and even age may affect the way people perceive the world around them. After having selectively absorbed the data from the range of stimuli we are exposed to at any given time, we then try to organize the perceptual inputs in such a manner that would facilitate us to extract meaning out of what we perceive. While selection is a subjective process, organizing is a cognitive process. How we organize the stimuli is primarily based on the following principles: Figure-Ground principle is generally considered to be the most basic form of perceptual organisation. This principle simply implies that the perceived object or person or event stands out distinct from its back ground and occupies the cognitive space of the individual. For example, as you read this page, you see white as the background and black as the letters or words to be read. You do not try to understand what the white spaces amidst the black letters could mean. Likewise, in the organisational setting, some people are more noticed or stand out than others. For example, an individual in the organisation might try to focus his entire attention on his immediate supervisor, trying to be in his good books, completely ignoring his colleagues and how they feel about his behaviour. According to this principle, thus, the perceiver tends to organize only the information which stands out in the environment which seems to be significant to the individual. Grouping is the tendency to curb individual stimuli into meaningful patterns. For instance, if we perceive objects or people with similar characteristics, we tend to group them together and this organizing mechanism helps us to deal with information in an efficient way rather than getting bogged down and confused with so many details. This tendency of grouping is very basic in nature and largely seems to be inborn. Some of the factors underlying his grouping are: The principle of similarity states that the greater the similarity of the stimuli, the greater the tendency to perceive them as a common group. The principle of similarity is exemplified when objects of similar shape, size or colour tend to be grouped together. For example, if all visitors to a plant are required to wear white hats while the supervisors wear blue hats, the workers can identify all the white hats as the group of visitors. Another example is our general tendency to perceive minority and women employees as a single group. The principle of proximity or nearness states that a group of stimuli that are close together will be perceived as a whole pattern of parts belonging together. For example, several people working on a machine will be considered as a single group so that if the productivity

on that particular machine is low, then the entire group will be considered responsible even though, only some people in the group may be inefficient. The following figure demonstrates the proximity principle. The ten squares in the figure are seen as pairs of two, three, four or five depending on their nearness to each other: The principle of closure relates to the tendencies of the people to perceive objects as a whole, even when some parts of the object are missing. For example, in the following figure the sections of the figures are not complete, but being familiar with the shapes we tend to close the gaps and perceive it as a whole: Speaking from the point of view of an organisation, if a manager perceives a worker, on the whole, a hard worker, sincere, honest, then even, if he behaves in a contradictory way sometimes which is a kind of a gap , the manager will tend to ignore it, because it does not fit in with the overall impression, that he has about the worker. Continuity is closely related to closure. But there is a difference. Closure supplies missing stimuli, whereas the continuity principle says that a person will tend to perceive continuous lines of pattern. The continuity may lead to inflexible or non creative thinking on the part of the organisational participants. Only the obvious patterns or relationships will be perceived. Because of this type of perception, the inflexible managers may require that employers follow a set and step by step routine leaving no ground for implementation of out of line innovative ideas. Constancy is one of the more sophisticated forms of perceptual organisation.

## Chapter 9 : Stages Involved in Perception Process

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This distinction is echoed by philosophers who differentiate sense data from cognitive inferences about sense data. Even when we strive for disembodied, symbolic abstraction, our cognitive processes retain their connection to perception. Perceptual Learning Much of our current research argues for an influence of concept learning on our perceptual abilities. Certainly in many domains, experts radiologists, wine tasters, chicken sorters, chess masters, and fishers seem to have developed specialized perceptual tools for analyzing the stimuli in their domain of expertise. We are interested in describing mechanisms of perceptual learning, and implementing these mechanisms in neural network models. One mechanism of perceptual change is selective attention, according to which perceptual dimensions that are relevant for an important categorization become sensitized. One general experimental method that my laboratory has often used to explore selective attention is to first have people learn a categorization for a substantial length of time anywhere from half an hour to 20 hours , and then give them a perceptually based test to see whether this initial category learning task has altered their later performance. Goldstone found that dimensions relevant during the initial categorization phase become sensitized for a subsequent task in which subjects respond as to whether two stimuli are physically identical or not. Two other seemingly contradictory mechanisms of perceptual learning are dimensionalization and unitization. Natural ways of perceiving an object can be abandoned if less natural ways involve parts that have been useful for categorization. This incongruity can be transformed into a commonality at a more abstract level. Unitization and differentiation are both processes that build appropriate sized representations for the tasks at hand Goldstone,  A final mechanism of perceptual learning is feature creation â€”- the development of functionally novel perceptual organizations. Perception may not be stable, but its departures from stability may facilitate rather than hamper its ability to support cognition. Rather than creating concepts by composing together a fixed set of primitive elements, it appears that novel elements can be created if they are needed for concept learning and if they obey certain psychophysical constraints. Our laboratory has built neural network models of the perceptual flexibility that we have observed in the laboratory. The system cannot view the world directly, but rather must view the world filtered through its detectors. Our detectors are built to be flexibly tuned to the stimuli and tasks confronting the system. More recent work has shown how a neural network, when given a set of input patterns, can create a set of building blocks that, when combined together, are able to reconstruct the input patterns Goldstone,  Conceptual Learning There are two very different ideas about what concepts are like in cognitive science. Linguists and artificial intelligence researchers often stress the interrelations between concepts â€” concepts are defined in terms of their connections to other concepts in a system. We have developed a neural network model that incorporates both isolated and interrelated aspects of concepts, and are currently empirically testing this model.