Knowledge System Research Document 12-1-24

Contents

# Basic Research on Knowledge

* True belief based on justification OR opinions; the game should have both
* Sources of knowledge: perception using senses, introspection to look inside, memory, intuitions, inferences (using knowledge to create new), testimonies
* Two basic types-propositional and non-propositional
* Propositional knowledge use “that” clauses along with addressing the who and why
* Prop knowledge takes the form of mental representations involving concepts, idea, theories, and rules
* Non-propositional knowledge involves either ‘know-how’ meaning possessing some practical ability, skill, or competence
* The other part of non-propositional knowledge is familiarity that results from direct experiential contact
* A category called ‘self-knowledge’ could be considered as well
* Consider common knowledge versus domain knowledge etc
* Explicit vs. tacit knowledge with tacit being easily articulated or explained like other types of knowledge
* Biologically primary knowledge is knowledge that humans have as part of their biological heritage
* Knowledge can have instrumental value but can also not have that and can also even be detrimental. There can also be intrinsic value meaning they don’t have any practical benefits
* Look into the business term ‘knowledge management’ & ‘knowledge representation’
* Influential knowledge base formalisms include logic-based systems, rule-based systems, semantic networks, and frames.
* A central contrast is between a posteriori knowledge, which arises from experience, and a priori knowledge, which is grounded in pure rational reflection. Other classifications include domain-specific knowledge and general knowledge, knowledge of facts, concepts, and principles as well as explicit and implicit knowledge.
* Some theorists also contrast declarative knowledge with conditional knowledge, prescriptive knowledge, structural knowledge, case knowledge, and strategic knowledge.
* Explicit memory versus implicit memory in long term memory
* It is said to be stored as explicit memory and can be learned through rote memorization of isolated, singular, facts. But in many cases, it is advantageous to foster a deeper understanding that integrates the new information into wider structures and connects it to pre-existing knowledge. Sources of declarative knowledge are perception, introspection, memory, reasoning, and testimony.
* Look at KB knowledge base in computer science for how sentences are modeled as this may be essentially want I want for the conversation system
* Declarative knowledge arises in many forms. It is possible to distinguish between them based on the type of content of what is known. For example, empirical knowledge is knowledge of observable facts while conceptual knowledge is an understanding of general categorizations and theories as well as the relations between them.[62][63][64] Other examples are ethical, religious, scientific, mathematical, and logical knowledge as well as self-knowledge.
* Forms of knowledge can be distinguished based on how a knowledge claim is supported by its premises. This classification corresponds to the different forms of logical reasoning, such as deductive and inductive reasoning.[62][67][68] A closely related categorization focuses on the strength of the source of the justification. It distinguishes between probabilistic and apodictic knowledge. The distinction between a priori and a posteriori knowledge, on the other hand, focuses on the type of the source.
* One classification distinguishes between knowledge of facts, concepts, and principles. Knowledge of facts pertains to the association of concrete information, for example, that the red color on a traffic light means stop or that Christopher Columbus sailed in 1492 from Spain to America. Knowledge of concepts applies to more abstract and general ideas that group together many individual phenomena. For example, knowledge of the concept of jogging implies knowing how it differs from walking and running as well as being able to apply this concept to concrete cases. Knowledge of principles is an awareness of general patterns of cause and effect, including rules of thumb. It is a form of understanding how things work and being aware of the explanation of why something happened the way it did. Examples are that if there is lightning then there will be thunder or if a person robs a bank then they may go to jail.[73][74] Similar classifications distinguish between declarative knowledge of persons, events, principles, maxims, and norms.
* A further contrast is between domain-specific and general knowledge. Domain-specific knowledge applies to a narrow subject or a particular task but is useless outside this focus. General knowledge, on the other hand, concerns wide topics or has general applications.
* Declarative knowledge plays a central role in human understanding of the world. It underlies activities such as labeling phenomena, describing them, explaining them, and communicating with others about them.
* According to Ellen Gagné, learning declarative knowledge happens in four steps. In the first step, the learner comes into contact with the material to be learned and apprehends it. Next, they translate this information into propositions. Following that, the learner's memory triggers and activates related propositions. As the last step, new connections are established and inferences are drawn.[104] A similar process is described by John V. Dempsey, who stresses that the new information must be organized, divided, and linked to existing knowledge. He distinguishes between learning that involves recalling information in contrast to learning that only requires being able to recognize patterns.[109] A related theory is defended by Anthony J. Rhem. He holds that the process of learning declarative knowledge involves organizing new information into groups. Next, links between the groups are drawn and the new information is connected to pre-existing knowledge.
* Some theorists, like Robert Gagné and Leslie Briggs, distinguish between types of declarative knowledge learning based on the cognitive processes involved: learning of labels and names, of facts and lists, and of organized discourse. Learning labels and names requires forming a mental connection between two elements. Examples include memorizing foreign vocabulary and learning the capital city of each state. Learning facts involves relationships between concepts, for example, that "Ann Richards was the governor of Texas in 1991". This process is usually easier if the person is not dealing with isolated facts but possesses a network of information into which the new fact is integrated. The case for learning lists is similar since it involves the association of many items. Learning organized discourse encompasses not discrete facts or items but a wider comprehension of the meaning present in an extensive body of information.
* It is similar to reasoning in this regard, which starts from a known fact and arrives at new knowledge by drawing inferences from it.
* Researchers suggested that initial problem solving involves explicitly referring to examples and participants start with pure example-based processing.[15][16] The examples illustrate the solution of a similar problem and the problem solver analogically maps the solution of the example onto a solution for the current problem. People make extensive reference to examples even when they are initially taught the rules and principles.[17] It is believed that when people acquire cognitive skills, first an example is encoded as a declarative structure. When participants are tested on their first problems, they have two possible ways to respond. If the example matches the problem they learned, they can simply retrieve the answer. However, if it does not match, they must analogically extend the example.[16] With repeated practice, general rules develop and the specific example is no longer accessed. In this way, knowledge transitions from a declarative form (encoding of examples) to a procedural form (production rules), which is called the adaptive control of thought—rational (ACT-R) theory.
* The most common understanding in relation to the procedural and conceptual knowledge is of the contrast of knowing how and knowing that.[32] Some see the distinction as a contrast between the tacit knowledge of technology and the explicit knowledge of science.[33] Conceptual knowledge allows us to explain why, hence the distinction of "know how" and "know why".[34] Conceptual knowledge is concerned with relationships among items of knowledge, such that when students can identify these links, it means they have conceptual understanding. Cognitive psychologists also use the term declarative knowledge to contrast it with procedural knowledge, and define it as "knowledge of facts".[35] However, declarative knowledge may be a collection of unrelated facts, whereas conceptual knowledge puts the focus on relationships.[36] Also, declarative knowledge is an inert form of knowledge which contrasted with procedural knowledge as an active form, but conceptual knowledge can be part of an active process. Therefore, it is important to know that conceptual knowledge is not simply factual knowledge but consists of ideas that give some power to thinking about technological activity.
* Now the last answer is getting to it. Now think of this. I want a video game where the player can learn things in their brain (will have its own screens). The learning will take place by acquiring words. I have been racking my brain on how words can be processed to get to things that are actually actions or do something in game.
* So like I could hear about "panning for gold" in the game, but that doesn't mean I can do it. That really just means I am vaguely aware I can mine minerals in stream. It doesn't mean I know anything about mining in general nor do I understand panning for gold to be able to do it. For that I need all kinds of words for like the technique and materials and I have to put them together with other general words and process/methodology words etc.
* Word matching mini-game could be good for synonym game where you are linking related concepts
* Consider fill in the blank sentences like mad-libs
* Logic deduction puzzles where you must link statements to form a conclusion
* Clues or riddles to solve
* Text navigation scavenger hunt
* Need a test for each concept like with true or false statements
* Picking which words are closest out a group, which are not closest
* Crossword puzzles
* Word Association Chains
* Word operator statements
* Keyword extraction
* Semantic Matching-placing the word in it’s proper place
* Picking the word that does not belong from a group

**Step 1: Short Term Memory**

-Text accumulates in short term memory  
-Words can be selected  
-Words are

Types of items: facts, topics, subjects, schemas, mental models, concepts, principles, applications

Identify the Subject

Place Subject into Hierarchy

Break Down Subject Into Components

Find Analogies or Examples Related to Subject

1. Each character has their own set of **knowledge.** A character’s knowledge is stored in a **knowledge base** in their **brain.**
2. There are two basic formats of knowledge: individual words/hyphenated compound words called **keywords** AND sentence templates called **semantic blueprints (SBs).**
3. Players can acquire both keywords and semantic blueprints through interaction with the environment and through **thinking.** Thinking is a process where the player can use different processes to combine keywords and SBs to gain more understanding of **concepts**.
4. Concepts have elements, organized into a **conceptual framework**, that can be acquired by meeting requirements at each level of development along a continuum.
5. The elements of the conceptual framework include: **glossary, topics, facts, procedures, relationships, answers, definitions, principles.**
6. The character acquires words of various types allowing them to build their conceptual frameworks. Concepts build on each other leading to more and more sophisticated concepts.
7. The purpose of building concepts is to allow the player to access game functionality including ALL game actions, dialogue possibilities, and their overall ability to interact with the environment as in real life.

1 Declarative Knowledge

1.1 Facts

1.2 Concepts

1.3 Principles

1.3.1 Cause & Effect

1.3.2 Patterns

1.4 People

1.5 Events

1.6 Self-Knowledge

1.7 End

2 Procedural Knowledge

3 Tacit Knowledge

4

5

6 End