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Niwanputri, G.S. orcid.org/0000-0002-4281-9191, Toms, E. orcid.org/0000-0003-0677-689X and Simpson, A. orcid.org/0000-0002-4406-4917 (2023) Untangling cognitive processes underlying knowledge work. In: Gwizdka, J. and Young Rieh, S., (eds.) CHIIR '23: Proceedings of the 2023 Conference on Human Information Interaction and Retrieval. CHIIR '23: ACM SIGIR Conference on Human Information Interaction and Retrieval, 19-23 Mar 2023, Austin, TX, USA. ACM, pp. 401-405. ISBN: 9798400700354.

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Untangling Cognitive Processes Underlying Knowledge Work

A APPENDIX

The coding sheet was prepared based on cognitive processes from Wang's Layered Reference model of The Brain (LRMB) [25] and Bloom's Revised Taxonomy by Anderson and Krathwohl [1]*.

HCP : higher-CP
MCP : meta-CP
SCCP : subconscious-CP
SCP : sensation-CP

CP	Definition	Level
Analogy	Analogy is a higher-CP of the brain at the higher cognitive layer that identifies similarity of the same relations between different domains or systems and/or examines that if two things agree in certain respects then they probably agree in others.	HCP
Analysis	Analysis is a higher-CP of the brain at the higher cognitive layer that divides a physical or abstract object into its constitute parts in order to examine or determine their relationship deductively.	HCP
Application*	Carrying out or using a procedure through executing or implementing.	HCP
Comprehension	Comprehension is a higher-CP of the brain at the higher cognitive layer that searches relations between a given object (O) or attribute (A) and other objects, attributes, and relations (R) in LTM, and establishes a representative OAR model for the object or attribute by connecting it to appropriate clusters of the LTM.	HCP
Creation	Creation is a higher-CP of the brain at the higher cognitive layer that discovers a new relation between objects, attributes, concepts, phenomena, and events, which is original, proven true, and useful.	HCP
Decision making	Decision making is a higher-CP of the brain at the higher cognitive layer by which a preferred option or course of action is chosen from among a set of alternatives on the basis of given criteria.	HCP
Deduction	Deduction is a higher-CP of the brain at the higher cognitive layer by which a specific conclusion necessarily follows from a set of general premises.	HCP
Evaluation*	Making judgments based on criteria and standards through checking and critiquing.	HCP
Explanation	Explanation is a higher-CP of the brain at the higher cognitive layer that assists comprehension or understanding of a given concept by providing related categories, detailed relations, and useful analogies.	HCP
Imagery	Imagery is a higher-CP of the brain at the higher cognitive layer that abstractly sees acquired visual images stored in the brain without any sensory input or establishes a relation between a mental image and the corresponding external entities or events.	HCP
Induction	Induction is a higher-CP of the brain at the higher cognitive layer by which a general conclusion is drawn from a set of specific premises based mainly on experience or experimental evidence.	HCP
Learning	Learning is a higher-CP of the brain at the higher cognitive layer that gains knowledge of something or acquires skills in some action or practice by updating the cognitive models of the brain in LTM.	HCP
Planning	Planning is a higher-CP of the brain at the higher cognitive layer that generates abstract representations of future actions, statuses, or paths to achieving a given goal, based on current information.	HCP
Problem solving	Problem solving is a higher-CP of the brain at the higher cognitive layer that searches a solution for a given problem or finds a path to reach a given goal.	HCP
Quantification	Quantification is a higher-CP of the brain at the higher cognitive layer that measures and specifies the quantity of an object or attribute by using a quantifier such as all, some, most, and none, or by using a more exact rational measurement scale.	HCP
Reasoning	Reasoning is a higher-CP of the brain at the higher cognitive layer that inferences a possible causal conclusion from given premises based on known causal relations between a pair of cause and effect proven true by empirical arguments, theoretical inferences, or statistical predications.	HCP
Recognition	Recognition is a higher-CP of the brain at the higher cognitive layer that identifies an object by relating it to a concept or category or comprehends a concept by known meanings.	HCP

Synthesis	Synthesis is a higher-CP of the brain at the higher cognitive layer that combines objects or concepts into a complex whole inductively.	HCP
Abstraction	Abstraction is a meta-CP of the brain at the meta cognitive layer that establishes an abstract model (or concept) for an entity of external world by eliciting the information of its common and qualitative/quantitative attributes or properties in order to mentally process it.	MCP
Attention	Attention is a meta-CP of the brain at the metacognitive layer that focuses the mind, or the perceptive thinking engine, on one of the objects or threads of thought by selective concentration of consciousness.	MCP
Categorization	Categorization is a meta-CP of the brain at the metacognitive layer that identifies common and equivalent attributes or properties shared among a group of entities or objects and then uses the common attributes or properties to identify this group of entities.	MCP
Concept establishment	Concept establishment is a meta-CP of the brain at the meta cognitive layer that constructs a "to be" relation between an object or its attributes and existing objects/attributes.	MCP
Knowledge Representation	Knowledge representation is a meta-CP of the brain at the metacognitive layer that describes how information can be appropriately encoded and utilized in the cognitive models of the brain.	MCP
Memorisation	Memorization is a meta-CP of the brain at the meta cognitive layer that encodes, stores, and retrieves information in LTM, partially controlled by the subconscious processes of sensation, memory, and perception.	MCP
Searching	Search is a meta-CP of the brain at the metacognitive layer that is based on trial-and-error explorations to find a set of correlated objects, attributes, or relations for a given object or concept; or to find useful solutions for a given problem.	MCP
Action	Action is a set of subconscious CPs of the brain at the subconscious cognitive function layers that executes both bodily (external) and mental (internal) actions via the motor systems of the body or the perceptional engine of the brain.	SCCP
Emotions	Emotions are a set of states or results of perception that interpret the feelings of human beings on external stimuli or events in the categories of pleasant or unpleasant, such as joy/worry, happiness/sadness, safety/fear, and pleasure/angry.	SCCP
Goal setting	Goal setting is a CP of the brain at the perception layer that establishes a desired and valued outcome for a motivation or an action.	SCCP
Memory	Memory is a set of subconscious CPs of the brain at the subconscious cognitive function layers that retains the external or internal cognitive information in various memories of the brain, particularly in LTM.	SCCP
Motivation	Motivation is a CP of the brain at the perception layer that explains the initiation, persistence, and intensity of CPs. Motivation is a modulating and coordinating influence on the direction, vigour, and composition of behaviour. This influence arises from a wide variety of internal, environmental, and social sources and is manifested at many levels of behavioural and neural organizations.	SCCP
Self-consciousness	Self-consciousness is a CP of the brain at the perception layer that maintains a stable mental state of human beings for sensation, perception, occurrent thought, and actions to function properly.	SCCP
Willingness	Willingness is a CP of the brain at the perception layer that is the faculty of conscious, deliberate, and voluntary choices of actions.	SCCP
Audition	Audition is a sensational CP of the brain at the sensation layer that detects and receives aural information from sources of the external world in the forms of intensity, frequency, location, and other attributes and characteristics.	SCP
Vision	Vision is a sensational CP of the brain at the sensation layer that detects and receives visual information from entities of the external world in the forms of images, shapes, sizes, colours, and other attributes or characteristics.	SCP