

The Relationship of Concepts, Memory, and Language in the Cognitive Psychology of Thinking: An Aristotelian–Thomistic Appraisal

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The concept, in conjunction with memory and language, is the foundation of the cognitive psychology of thinking. All related areas of thinking, reasoning, inference, decision-making, problem solving, are manipulations and predications of concepts. This essay examines current theories of concept formation, as grounded in the information processing, computational approach, and considers the philosophical underpinnings of that view as related to concept formation, memory, and language. A philosophical approach, based on the classical realism of Aristotle and Aquinas, is presented as an alternative metaphysics worthy of serious consideration.

Keywords: Aristotle, Aquinas, concept formation, memory, language

Although the psychology of thinking includes a number of processes, such as memory, concept formation, language, induction and inference, deductive reasoning, decision-making, and problem solving, the foundation of thinking is concept formation. All other processes are related to producing concepts, recalling concepts, using concepts, or articulating them in oral or written form. A recent textbook (Minda, 2021) states:

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Concepts provide structure to the mental world. We rely on them to make predictions, to infer features and attributes, and to generally understand the world of objects, things, and events. The study of concepts, categories, and thinking is one that emphasizes how categories are created and learned, how concepts are represented in the mind, and how those concepts are used to make decisions, solve problems and drive the reasoning process. (p. 70)

This description calls for unpacking, particularly regarding the terms: categories, concepts, and learning. Categories, here, refer to “objects, things, or events in the outside world that can be structured into groups” (Minda, 2021, p. 71). These groupings exist outside the mind. Concepts refer to “the mental representation that denotes the category” (Minda, 2021, p. 71). This epistemic description claims that the human thinker receives sensory information from outside the mind and then forms a representation (a concept) that corresponds to objects, things, and events as they exist. Further, this approach points out that the human thinker develops an adequate, if not always perfect, knowledge of the world as it is. Thus, this formulation is consistent with the correspondence theory of knowledge.

Concepts are formed via learning, and the learning process is, largely, associative learning, a broad class of well-known conditioning models (classical conditioning, operant conditioning, and social learning), all of which involve learning something new based on the association of a new stimulus or stimuli with a new or existing response or set of responses. Hence, those things, objects, and events of the outside world are learned as representation-concepts, which are then stored in memory for later use in reasoning, problem solving, and such.

This paper has four goals: (a) to provide a brief presentation of the current theories of concepts advanced by cognitive psychology, (b) to consider the relationship between concept formation, memory, and language, (c) to examine the Aristotelean–Thomistic (A–T) philosophical position, known as classical realism, as related to concept formation, memory, and language, particularly considering areas of overlap and difference with cognitive psychology, and (d) to propose that classical realism provides a better metatheory for the formation of concepts and the relationship of concepts to memory and language.

Current Theoretical Formulations

Cognitive psychology has developed several theories to explain concepts. They are the following: the classical view, the hierarchical model, prototype theory, the exemplar theory, and the theory–theory view.

The classical view. This formulation states that a concept is a set of necessary and sufficient conditions needed to classify members, that all members of the concept have equal standing, and that all members share the same nature. Murphy (2002), along with others, identifies this formulation as Aristotelean, and it has been rejected by cognitive psychology and many philosophers as too rigid.

However, in fact, this view is not Aristotelian (see Spalding and Gagné, 2013, for a detailed discussion), so the A–T approach to concepts has not been ruled out.

The hierarchical model. One of the earliest psychological theories of concepts is the semantic hierarchy (Collins and Quinlan, 1970). This theory posits that concepts are organized according to levels of conceptual origination. At the superordinate level are highly abstract concepts, such as animal, plant, artifacts, which have few, if any, overlapping features. At the basic level, the superordinate levels subdivide into more specific concepts, e.g., animals into cats, dogs, horses, that have high within-concept similarity. At the subordinate level, basic levels subdivide into still abstract but more specific concepts, e.g., dogs into labs, retrievers, poodles, and so on. Research suggests that object identification occurs primarily at the basic level (Rosch et al., 1976).

Prototype theory. This theory claims that categories (the outside world) are represented by abstract concepts (prototypes) that summarize ideal or typical features of the category (Murphy, 2002). An object is classified according to its fit with this prototype. Prototypes can consist of frequently occurring features. Thus, a particular dog is classified as a dog according to its correspondence to the prototypical dog, and this can be graded according to features matching the prototype (maximum for Labs, minimum for Chinese Crested dogs).

Exemplar theory. This account claims that categories (outside world) are represented by concepts which are memory traces (exemplars) stored in memory through learning (e.g., Hintzman, 1986). Hence, a memory trace exemplar of each dog encountered is stored, and each new encounter with a dog is compared to those stored exemplar traces. This eliminates the need for abstracted prototypes.

The theory–theory view. This view claims that categories and their concept representations are learned according to pre-existing knowledge about the world (e.g., Murphy and Medin, 1985). Pre-existing knowledge allows humans to grasp correlations and causal connections about features of things and then proceed to develop concepts.

These five theories of concept formation are rival claims; and, as Spalding and Gagné (2013) have pointed out, the final four have approximately equal (though different) empirical support. The common denominator underpinning all but the classical theory is the computational, information processing approach, which has been the primary cognitive psychology approach since the cognitive revolution (Neisser, 1967) and developed in parallel with the development of cognitive science (Stedman, 2021). Pitt (2008) has called this the computational theory of mind and notes that it has split into two camps, classical and connectionist. The classicalists (e.g., Fodor, 2000; Marr, 1982) assert that mental representations are symbolic structures having semantic content (meaning) and are assembled from more primitive representational states. The connectionists (e.g., Rumelhart, 1989; Smolensky, 1989) claim that concepts are tied to brain structure and neural networking. The theories cited above contain elements of both these positions but

perhaps lean more toward the connectionist approach (see Stedman, 2021), at least in the sense that they see the need for their computational underpinnings to be appropriate to a brain-like computing structure.

It should be noted that the classical and connectionist computational theories both depend on learning, as described above, and both claim ties to objects and events in the world. Both regard the mental representation as ultimately brain-based but emphasize somewhat different mechanisms. Classicists adhere more to computer models and architecture; connectionists also do this but emphasize learning in neural networks, as described by Garson and Buckner (2019):

Connectionism is a movement in cognitive science that hopes to explain intellectual abilities using artificial neural networks (also known as “neural networks” or “neural nets”). Neural networks are simplified models of the brain composed of large numbers of units (the analogs of neurons) together with weights that measure the strength of connections between these units. These weights simulate the effect of synapses that link one neuron to another. (p. 1)

As noted, cognitive psychology leans more in the direction of connectionism, but primarily in a kind of implicit sense that the computations that underly cognition must be able to be carried out in a brain-like structure.

Concepts and Memory

The theoretical approaches described above all lean heavily on memory, and at the same time, theories of memory incorporate concepts and conceptual processes. Minda (2021) describes a common theory as “a hypothetical arrangement among lower-level perceptual responses (perception, attention, working memory), structured representations (concepts in memory) and higher-order thought processes (cognitive behavioral outcomes)” [p. 70]. Again, unpacking this statement, we should note that the perceptual responses (or at least the working memory component), the structured representations, and the higher-order thought processes described here are brain-based memory entities. Thagard (2019) describes these representations as “analogous to computer data structures” which are manipulated by computational information processing systems. This is a claim about the metaphysical status of memory and concepts, a claim that is mirrored in all the theoretical approaches described above. As such, it is a materialist (monist) claim as opposed to a dualist claim (more on this point later).

There is no doubt that memory is absolutely necessary for human thought. Hence, the various theoretical entities described by cognitive psychology (encoding, working memory, long term storage and retrieval, combinations of remembered facts with other facts, use of memory in deliberative reasoning, judgement, and problem solving) are brain-based memory processes without which thinking could not occur. Cognitive psychology has also described types of

memory (semantic, episodic, declarative, and intentional) and errors of memory (absent-mindedness, suggestibility, misattribution, blocking, bias, persistence, and transience) which direct or misdirect the course of thinking. In sum, memory and thinking are tightly bound and these learned conceptual representations are stored for recall and assembly as needed in given tasks.

Concepts and Language

Concepts and their relations are expressed in language. Minda (2021) offers this description:

Language is a remarkably complex set of behaviors. At its core, the challenge of understanding language as a cognitive behavior is trying to understand how humans are able to produce language such that an idea or thought can be conveyed through speech sounds that can be perceived by another person and converted back into an idea. Communitive language is essentially a “thought transmission system.” (p. 99)

One important distinction cognitive psychology has made regarding this puzzle, the puzzle of the transmission of meaning, is that of surface vs. deep structure. Surface structure refers to “the words that are used, spoken sounds, phrases, word order, grammar, written letters, etc.” (Minda, 2021, p. 99), that we form and transmit to the other. Deep structure refers to the conceptual meaning conveyed, via the surface structure, to another (i.e., the “thought transmission system” mentioned above).

The variables affecting deep structure have been studied extensively. Language ambiguity interferes often with meaning transmission and has led to two theories regarding how transmission occurs: serial sentence parsing (Frazier and Rayner, 1982) and constraint satisfaction (MacDonald et al., 1994). Both are based on the notion that, as soon as we perceive words, we construct mental representations (concepts as deep structures) about them. Ambiguity is also managed by linguistic inference in which the receiver uses inferential reasoning and their own semantic memory to interpret word transmission. Metaphors and analogies can also increase (or decrease) deep structure understanding and transmission (Lakoff, 1987).

Most cognitively oriented research on language adopts this focus on communication, and approaches the relationship between language and thought as primarily one of translation (as reflected in the quotation from Minda, 2021); that is, that language is a code that can be translated from thoughts or ideas by the speaker and into thoughts or ideas by the hearer, such that thoughts originally held by one person are re-constructed and held by another person. This approach raises many questions when one considers the role of language and concepts in thinking more broadly (see, e.g., the collection of papers on thinking

and language in Bermudez, 2006a). One might reasonably ask many questions, perhaps most fundamentally: Do we think in concepts or in words? Does our language constrain our thinking, or only our ability to express our thinking to someone else? Does our language constrain our concept formation, or is concept formation completely independent of language? It is worth understanding that one's answer to these kinds of questions are deeply impacted by one's theoretical (including metaphysical) approach to concepts, and we will try to identify some of these impacts below.

The "code translation" approach described above is generally linked to an understanding of thinking as requiring a "language of thought." The idea is that assigning a meaning to a sentence (or a word, for that matter) is translating from the language to a language-like system of mental representations. Critically, because thoughts appear to have characteristics such as productivity (new thoughts can be built out of existing thoughts) and compositionality (meanings of complex thoughts seem to be built out of meanings of less complex thoughts), thinking must have language-like ways of combining smaller units of thought, just like languages combine words into phrases into sentences, and so on. Hence, many researchers use the phrase language of thought or the term "mentalese" for this underlying, language-like aspect of thought (see Harman, 2006, and Carruthers, 2006, for descriptions of this relation between language and thinking). And, given this parallelism of structure, assigning meaning to an utterance just is translating that utterance from a natural language to the language of thought.

Although this "code translation" approach is very common, it is not the only way of understanding the relation between thought and language. Harman (2006), for example, makes a case that the language of thought is the natural language known by the thinker (i.e., that people actually think in natural language). Carruthers (2006), however, points out that thinking, in the most general sense, cannot either be or require language, otherwise no animals without language would be able to think, nor would any person who has not learned a language. Assuming that language of thought, unlike a natural language, is completely innate, is one way of avoiding this conclusion (i.e., that thinking cannot be or require language). Carruthers, however, proposes instead that a language-like system would only be required for coordinating the outputs of central cognitive processing modules (and that natural language can fulfill that requirement, with no need for a special language of thought), and Bermudez (2006b) proposes, in a somewhat similar vein, that a language-like system would be needed primarily for thinking about thoughts or sentences or propositions. In short, it is unclear whether natural language or mentalese is the language in which we think, and furthermore, it is unclear to what extent a language or language-like system is required for thinking (or for which kinds of thinking a language-like system is required). Suffice it to say that the relation between language and thought remains a difficult question.

What's Missing in Current Views of Thinking?

At this point, we want to identify, very briefly, the way that cognitive psychology, in general, explains each of these three main components of thinking, and to identify what we see as the missing piece in this view, which we believe can then be provided by re-considering an Aristotelian–Thomistic approach to the same issues.

Cognitive psychology holds that a concept is a mental representation that, in some way, stands in for all the individual things that fall under that concept. These concepts, then, can be manipulated in order to reason, to make various kinds of judgments, to bring together events in memory, to encode thoughts into language in order to communicate with others. In this sense, concepts are the basis of cognition (although they themselves, of course, come from sensory information taken from individual things and combined). From this rather simple definition of the concept, we immediately see that there are (at least) two major areas of question. First, what exactly do we mean when we say that the representation “in some way, stands in for all the individual things”? Second, what exactly do we mean when we say “things that fall under that concept”? This approach, in general, is largely consistent with the A–T approach, except in the metaphysical approach to concepts (see, e.g., Spalding and Gagné, 2013), and, in particular, the issue of how we get from sensory information about particular things to concepts that represent whole categories, what exactly the concept consists in, and how one then gets back from that concept to particular things. A related issue revolves around “generics,” which are statements that are applied to entire categories of things, even though they actually apply to a relatively small subset of the category (e.g., “birds lay eggs” is true only of adult, female birds, and applies only at certain times; see, e.g., Prasada, Khemlani, Leslie, and Glucksberg, 2013). Although consideration of the metaphysical approaches to concepts might seem highly abstract or “philosophical,” the metaphysical approach does have some consequences for how concepts could be used in the other processes of cognition.

Regarding memory, cognitive psychology (and neuroscience) holds the following. Memory has three general processes; encoding, in which sense data enter the system; storage, both short and long-term; and retrieval, recalling various types of memory to current conscious awareness. The sense data involved in encoding originate in the five external senses but is organized in the brain, first in working memory for short-term use and then some elements are stored in long-term memory and can be retrieved. Short-term memory involves known central nervous system (CNS) structures, such as the hippocampus; however, elements of long-term memory are stored across multiple cortical structures and, during retrieval, are assembled for conscious use. Additionally, earlier stored memories can combine with recent memories and result in new configurations.

Aristotle and later medieval commentators proposed most of these brain-based mechanisms (though, obviously, with less precision about brain locations).

The A–T approach disagrees with cognitive psychology at the metaphysical level. Whereas cognitive psychology holds that the concept is causally explained as physical representation stored in memory, the A–T approach claims a process in which the intellect abstracts universals to form concepts (more detail upcoming).

Cognitive psychology holds, in general, that concepts are translated into and from language for communication, but that thought itself (i.e., thought here defined as the manipulation of concepts without the use of external language) requires language-like properties, as we have discussed above. In this sense, language stands in for memories and for concepts, which themselves stand in for things. As with concepts and memory, cognitive psychology has produced a great deal of excellent research on the empirical factors affecting the use of language, but the more metaphysical concerns about how language and thought relate are less deeply investigated. In particular, what does it mean to translate from thought to language, or from language to thought? How is it that concepts, as understood by cognitive psychology, can play the role they need to play in this picture? How does language, as used in communication and thought, apply to individual things? Again, although the A–T approach agrees with many of the ways in which cognitive psychology looks at language, the metaphysical approach is quite different, and that will have some consequences for how language is, and can be, used.

The common factor underlying these areas of cognitive psychology is that all adopt the computational, information processing approach to one degree or another. As described previously, this claim is that concepts are brain-based representations stored in memory and are “analogous to computer data structures manipulated by computational information processing systems” (Thagard, 2019, p. 3). Further, the claim is that these representations are learned at the most basic levels and gradually build up to complete abstractions. A recent textbook (Goldstein, 2019) presents this process regarding how the term “canary” is learned:

We can illustrate how this network works, how it proposes that knowledge about concepts is organized in the mind, by considering how we would retrieve the properties of canary in the network. We start by entering the network at the concept node for “canary.” At this node, we obtain information that a canary can sing and is yellow. To access more information about “canary,” we move up the link and learn that a canary is a bird and that a bird has wings, can fly, and has feathers. Moving up to another level, we find that a canary is also an animal, which has skin and can move, and finally we reach the level of living things which tells us that it can grow and is living. (p. 257)

Cognitive psychology approaches also hold that semantic meaning is explained by the process as described above. For example, Garson and Buckner (2019) state the following about how clustered brain states could have meaning: “The idea is that similarities and differences between activation patterns along different dimensions of neural activity record semantic information. So, the similarity properties

of neural activations provide intrinsic properties that determine meaning” (p. 14). Representations, presumably derived from external environmental sources and assembled in the brain based on similarity, constitute the computational, information processing theory of meaning.

This approach to casual explanation has been challenged both by empirical data and, theoretically, by philosophers of mind. There have been challenges regarding the similarity between the computational approach and the actual biological central nervous system, such as the assertion by Shimansky (2009) that there is little neuroscience evidence to support important computational learning rules (see Stedman, 2021, for more detail). Philosophers of mind challenge the computational, information processing approach regarding semantics (meaning) and consciousness. The issues regarding meaning and consciousness involve explaining how something entirely material, such as computers and the brain, can produce meaning and be conscious. A number of philosophers of mind challenge all or parts of this claim (e.g., Chalmers, 1996; Dreyfus, 1992; Feser, 2005; Madden, 2013; Robinson, 2008; Searle, 1984, 2014; for some challenges from a slightly more psychological perspective see, e.g., Spalding et al., 2014, 2017, 2019; Stedman, 2021; Stedman, Spalding, and Cagné, 2016). Madden (2013) provides a thorough review of the major approaches to the philosophy of mind, including functionalism (the philosophy of mind underlying a computational, information processing psychology). In fact, he is quite appreciative of the strengths of functionalism, as noted in the following quote:

Functionalism is a powerful theory. It seems to provide an account of psychological states without even a hint of anything left to be explained by supposed nonphysical states, while at the same time allowing for mental causation without raising problems of mind body interaction. . . . It is, whatever its vices, a very good idea. (p. 131)

However, despite this enthusiasm, he argues that functionalism’s problems with intentionality and meaning rule it out as a general solution for philosophy of mind. Instead, he argues that the Aristotelian–Thomistic approach can offer a better solution.

Many modern and postmodern philosophies contend that there are fundamental problems intrinsic to any “traditional” approach to these issues (i.e., meaning, belief, etc.), in particular problems with any representationalism in which concepts are “in the head” and in which those concepts are the objects of thinking. The “linguistic turn” in philosophy is, to a large extent, about these (and other) problems in the so-called “traditional” philosophies. O’Callaghan (2003), however, provides an extremely detailed explanation of how the Thomist development of Aristotle’s ideas avoids these problems, and indeed how these Thomist developments are very different from and, at least arguably more Aristotelian than the “traditional” philosophies attacked in the linguistic turn. In particular,

O'Callaghan identifies three theses of "traditional" representationalist philosophies that attract the criticisms: the third thing thesis, the introspectability thesis, and the internalist thesis. A concept is a "third thing" that intervenes between minds and things in the world; such concepts are, in some way, introspectable, such that the mind grasps the concept in order to understand the things in the world; and finally, the nature of those concepts has no necessary connection to anything outside the person who has them. Although it should be clear that these theses are inherent in the functionalist, computationalist, information processing approaches that we described earlier, O'Callaghan (2003) shows that none of these theses are true of the A-T approach, and that this in turn means that the A-T approach provides a relatively unexplored intellectual space within modern thinking on these issues. We turn now to explicating the A-T approach in itself, and then will return to some of the issues that have arisen in our discussion of the psychology of thinking.

The A-T Approach

The General Theoretical Principles

The Aristotelian-Thomistic approach is based on Aristotle's formulation of the hylomorphic theory. As pointed out by Shields (2020), Aristotle's psychology is an extension of his general metaphysical position, hylomorphism, which postulates an understanding of reality by means of the four causes: efficient, material, formal, and final. The efficient cause is the agency generating a particular thing. The material cause is that from which something is generated. The formal cause is the structure the matter becomes, that which specifies what it is. The final cause is the purpose or end of the object, its function. A classic example of the four causes is Aristotle's commentary on sculpting a statue. The efficient cause is the sculptor and his sculpting; the material cause is the block of marble; the formal cause is the image to be sculpted, e.g., a statue of Hermes which specifies the "what it is" of the statue; and the final cause is the purpose, to create and exhibit art. Aristotle also used the concept of final cause at the intentional or mental level to describe the agent's plan for the work and purpose of the work.

The concepts of act and potency are also major metaphysical principles of the A-T approach and go hand in hand with the casual principles presented above. A dictionary definition first: act is the intrinsic principle, which confers a definite perfection on a being, hence, a form. Potency is the capacity to be acted on or changed; the capacity to receive (a form), to be acted on, to be modified. An example may help clarify these concepts. Even today, we say that an athlete seems to have the potential to be great but her potential needs to be perfected through hard and extensive training. Thus, the potential of the athlete is actuated as positive change caused by the training.

Another principle of the A–T theory is the distinction between substantial and accidental forms. Substantial form is essential to the thing and accidental form is a quality of (inhering in) the substantial form but not essential to it. In the statue example, its substantial form would be that of a statue or a depiction of someone or something. Accidental forms are such qualities as color, height, type of material, and such. It is important to point out that the A–T approach does posit a moderate form of dualism; however, this is not the full substance dualism of Descartes. Unlike with Descartes, the human being is fundamentally unified in the A–T account, which asserts that humans are one substance only but possess faculties or powers, including the intellect and will, along with the sensory powers.

The Internal Senses

Aristotle's analysis of human behavior, without the benefit of psychological studies, imaging, or detailed neuroscience, led him to postulate "internal senses" involved in processing external sense input: the common sense, and the imagination (memory). Later medieval philosophers, Averroes, Avicenna, and Aquinas, reformulated Aristotle to include four internal senses: the common sense, which receives and arranges all sense data; the imagination that combines and reassembles images; the estimative faculty, which gauges the dangerousness or desirableness of the sensed object; and the memory, which retains the sensory level images or representations for later use. Shields (2020) points out that the A–T analysis of the internal senses flows from the hylomorphic theory and the Aristotelean theory of change from potency to act.

As noted above, the common sense receives and arranges all input from the senses. Aristotle and later thinkers located the common sense, as a biological entity, in the central nervous system (CNS) and determined its functions to be (a) integration of the external senses; (b) discrimination between the separate senses according to its proper object, meaning visual to visual stimuli, auditory to sound stimuli, etc.; (c) unifying those separate sensations into a single sensory perception; and (d) modification of currently sensed objects by "sense memory" based on past experience with the object. In modern cognitive science and psychology, this is known as perceptual binding and there is a vast psychological and neuroscience literature devoted to explaining the mechanisms involved.

The imagination receives the perceptually bound sensation and performs other operations, including (a) retaining and recalling sensation organized by perceptual binding; (b) in humans, producing the ability to combine percepts never directly sensed to be imagined (a unicorn); and (c) most importantly, generating the phantasm. The phantasm is a sensory image or representation that is the product of perceptual binding and combinations of previous sensory perceptions. Learning and recall enrich the phantasm, which becomes more complex over

time and experience. Nevertheless, it should be noted that, in the A–T approach, the phantasm is at the sensory level as opposed to the intellectual level.

Aristotle recognized that both humans and animals have memory, which stores phantasms but is not simply a static storehouse. Spalding et al. (2019) describe A–T memory as follows:

It is important to remember that memory works in concert with all the other internal sense powers such that any phantasm might be stored, whether it is the more or less direct production of an external sensed object, or a combination of other sensory information from the common sense, or whether it is a phantasm (created by the common sense) of an imaginary thing. (p. 40)

At the levels of the external and internal senses, as noted in previous considerations (Stedman, 2021; Spalding et al., 2019), the A–T approach and the computational, information processing approach overlap to a high degree. The vast psychological and neuroscience literature can be interpreted as fleshing out details unavailable to Aristotle and later commentators. At the level of philosophical analysis, the A–T approach is also compatible with the computational approach, particularly in terms of analysis of efficient causal mechanisms.

Abstraction and Judgement

In everyday language, humans speak of concepts or ideas. Such words are so common that we hardly give them notice. Aristotle, however, sought to explain the nature of knowledge by illuminating how human beings are unique in their power to form concepts. Aristotle's treatment of concept formation is somewhat elliptical and undeveloped. Thomas Aquinas in the thirteenth century was able to explain more fully Aristotle's philosophy of knowledge.

Aquinas' starting point is a reflection on the fact that human knowers have insight. In human experience there is often an intuition into something's inner meaning. This is possible because the world is intelligible; it consists of things with knowable natures. But while Aquinas, following Aristotle, is a sense realist, holding that all knowledge originates in sense awareness of external things, he insists that sense knowledge alone is not able to grasp that something is intelligible. For such insight, another faculty is required: namely, the intellect. The word intellect comes from the Latin word *intelligere* which combines two words, *intus* (within) and *legere* (to read). The senses alone are not able "to read" the intelligible content of a sense object. However, by means of the intellect, the intelligibility of a sense object can be known. How does the commerce between the intellect and the sensible thing result in knowledge that transcends the merely sensible? To answer that question, Aquinas seeks (1) to identify the special powers of the intellect, (2) to explain the formation of ideas (how intelligible content outside our cognition

comes to exist in our cognition), and (3) to solve the problem of universals (how a unitary idea can apply to many instances). This threefold endeavor is always set against the background that there is nothing in the intellect that is not first in the senses (see Aristotle, *Metaphysics* 492b31–430a2; Aquinas, *On Truth*, q. 2a.).

Aquinas asserts a *moderate realism*, according to which universals do not exist as universals in the external world. However, there is a causal foundation for universals in the senses so that they can exist in the human intellect. This causal foundation is in the natures or formal characteristics of physical substances. The human intellect can extract the intelligible content manifest in a sense object, de-materialize it, and assimilate it into the intellect. Using Aristotle's language of potentiality and actuality, one can say that universals (ideas, concepts) exist *potentially* in the external world but only *actually* as they have come to inform the intellect. By this explanation, Aquinas rejects Plato's extreme realism but concedes that universals exist in the mind. By this adjustment, his account of universals is a realism — but a moderate one.

The ability of the intellect to transcend the limitations of the senses means that the intellect knows material things but not materially. This outcome is possible because the intellect dematerializes a sensible substance so as to apprehend its form, the principle which determines what something is. This conviction that there are formal principles (intelligibilities) in the natural world is a fundamental teaching in Aquinas called hylomorphism (discussed in the preceding paragraphs), which signifies that physical substances (the proper objects of sense knowledge) are a composite of matter and form. This doctrine is not an arbitrary theory; it is grounded in the common-sense observation that the universe makes sense, meaning that physical things contain intellectual content. While form never exists without matter, the intellect is aware of it independently of its material conditions. The intellect concentrates its awareness on what something is, while remaining indifferent to the material conditions with which the form is associated. This process, known as abstraction (from the Latin *ab*, meaning from, and *trahere*, to draw) requires a special power. Aquinas finds this power in Aristotle's teaching about the *active intellect*. This principle focuses exclusively on the form of the material thing and makes it part of one's own cognition. The active intellect draws out the intelligible content from the sensible thing. Another way of saying this is that the form always *really* exists in this particular under particular conditions, but the activity of the active intellect abstracts it from its particular existence and gives it cognitive existence as a universal. Accordingly, as mentioned above, the universal, *qua* universal, exists only *potentially* in the particular thing but *actually* in the intellect. The universal as universal does not exist in the external world, but since all knowledge originates in sense experience, the universal has its foundation in our sensory acquaintance with physical things. The form which exists in the thing is a potential universal that becomes actual by the abstractive agency of the active intellect.

As an example of universal concept formation, consider the term “animal.” This term signifies a concept that differs sharply from physical, sense particulars in an evident way. No physical existent possesses the attributes dog, horse, hawk, lungfish, beetle, snail, and lizard. No particular happens to be all of these things at once. No physical thing really has the traits that make both a lizard and a hawk, for example. But our concept of animal is under no such restriction. In precisely the same sense, our concept of animal applies to all living things capable of locomotion and sense knowledge. Moreover, we can think of the meaning of this concept without any regard for its instances at all.

These general notions philosophers call universals, since they express natures common to a multitude of particulars. There are degrees of separateness implicit in the way the mind considers universals as they relate to particulars. When people say “Socrates is a man” and “Napoleon is a man,” they are applying the concept man that expresses the natures of each of the men named. Thomists refer to this kind of abstraction as “total abstraction.” It focuses on what makes the particular a distinct nature but in a way that, in order to apply to that particular, does not negate or exclude its differences. The differences are not explicit, but they remain implicit in the attribution of the universal to this or that particular. Socrates is different from Napoleon, but the point of the attribution is that each is a man. There is another type of abstraction that is more precise. This type of abstraction Thomistic philosophers sometimes call “precise abstraction,” so called because it explicitly excludes particular differences. Total abstraction retains the differences implicitly. An example of precise abstraction is in the formation of the concept “humanity.” The difference becomes evident when one considers that a precise universal cannot be predicated of a subject in the way a nature abstracted non-precisely can. One cannot say “Socrates is humanity” in the way one can say “Socrates is a man.” And yet both terms, “humanity” and “man” apply to Socrates.

Aquinas borrows from Aristotle another principle to express how sense experience gives a representation of itself to the knower so that the active intellect can access its intellectual contents. This representation Aristotle calls the *phantasm*. The phantasm is a complex sensible image which the active intellect can illuminate, rendering it intelligible. The active intellect liberates the information implicit in the phantasm from its material conditions. The intellect knows the material thing but knows it *immaterially*. In keeping with his application of Aristotle’s principles of actuality and potentiality, Aquinas observes that, if the formation of universals requires an active intellect, their reception in the knower requires a *passive intellect*. This intelligible form, which Aquinas refers to as the intelligible species, or idea, originates from the active intellect’s illumination of the sensible experience (phantasm), which elevates the experience to the intellectual level. For Aquinas, the intelligible species derives from the phantasm but exists as intelligible only in the passive intellect. We should perhaps note here that A–T terms like phantasm, agent intellect, passive intellect, and others may sound strange to

psychologist readers. However, these are constructs proposed by Aristotle and Aquinas to explain observed behavior. As such, they are parallel to the hypothetical constructs used by psychologists for the same purpose.

For Aquinas, ways of understanding include *simple apprehension* (abstraction, concept formation, or grasp of the universal), *judgment* (the relationship of concepts so as to attribute predicates of subjects), and *reasoning* (the derivation of knowledge from knowledge already possessed). Judgments are affirmative, when something is said to belong to something else, or negative, when something is said to be disassociated from something else. The full A–T approach says that judgment is formed as concepts are combined or divided from each other. Judgment is significant because it takes the mind beyond simple insight, awareness of this or that concept, to an awareness of how concepts relate to one another. But this relationship is more than merely a logical one. The judgment through the receptivity of the passive intellect has unity with the form that generates the knowing act, a form that is at once outside the mind (in a real, mind-independent existent) and inside the mind (in a cognitional mode of being). In this way, Aquinas concurs with Aristotle's famous declaration that in knowledge the knower and the known are one. Truth emerges as the knower recognizes his own awareness that his mind is in conformity with what it knows. Truth is not a thing but a relation of identity, resulting from the fact that the intellect is aware of its own formal identity with its object. Because intellection dematerializes its object, the intellect is an immaterial faculty. One consequence of this is that the knower can be reflexively aware of itself. The intellect is present to itself, and thus is aware of its own act of awareness. Truth is a judgment about how the knower is in relationship with its object. "Wherefore," Aquinas says, "the intellect knows the truth accordingly as it reflects upon itself" (*On Truth*, q. 1, art. 9). Since truth is a judgment, judging can also be defined as the understanding of understanding, for through judgment the intellect understands its own understanding.

Knowledge involves the entire knower. This is a crucial point concerning Aristotle's and Thomas' sense realism. Knowledge relies on the senses because the person is an organic unity. The unitary knower exercises different powers. But this is not to suggest that as the knower engages one power, the other powers are not involved. True, the nature of certain subject matter requires the focus of a particular power. But this must not obscure that one and the same person always knows through the integrated action of his or her multiple powers. Hence, it is not just the intellect that knows metaphysics, for example. Nor is it the case that when one hears, it is only the ears that operate; it is the whole person who hears, exercising as an organic unity the power of the auditory. When someone listens to a concert, it is not just the discrete auditory power that has the experience. It is the whole person who hears the concert.

Language

A theory of language should be to explain how two or more people can discuss a common object. The intersubjectivity and objectivity of language is crucial for a philosophical explanation of language, including how language can be expressive of truth or falsity. As the Aristotelean philosopher Mortimer Adler (1976) puts it, the philosopher's task is to explain how meaningless notations or utterances can convey meaning, the awareness of which makes a language. The idea that language simultaneously exists as meaningless units and meaningful elements is known in linguistics and psychology of language as duality of patterning (Hockett, 1960).

What is required to confer meaning on notations so that they become signs called "words"? To answer this question, one needs to examine the nature of signs. A sign is that which refers to something other than itself. We are familiar with signs that occur commonly in nature: for example, a dark cloud is a sign of rain; smoke, a sign of fire. These examples are signs of cause-effect relations, what Adler calls "signal-signs": signs that alert one to a related event, as cause to effect. Words, however, have "designative significance"; human beings invent words to designate the thing. So, fire means fire; rain means rain. Both words and non-words can be signs having signal significance, but words are primarily designators of meanings, not signals. In other words, signal-signs (when they are words) are parasitic on those words as designative signs.

So, the question looms: How do meaningless physical notations or utterances acquire their significance (meaning) as words? Secondly, how can those meanings be public, such that they can be shared between people? We cannot assume that a word's meaning consists in an existential reference; that is to say, that a word has meaning because it points to or corresponds to something that actually exists. This is initially attractive, because if it were possible, it would answer both questions at the same time. However, it simply does not work. For example, the use of the word "angel" as a name does not and cannot mean that angels really exist. Otherwise, it would not make sense to ask whether angels indeed do exist. Furthermore, it would mean that any word that seems to refer to something that does not exist (e.g., unicorn) has no meaning at all. Thus, some other "public" base for the meaning must exist.

Another initially attractive solution to the first question, at least, is that words get their meaning by referring to our ideas. However, the fact that our ideas are subjective and exist only in the privacy of our own minds is a severe challenge for the explanation of our ideas as a foundation for how language works. If language requires intersubjective communication, its objects must be public, not private. Hence, ideas cannot be the objects of knowledge upon which language is grounded. There is a way of overcoming this apparent impasse in the A-T tradition: ideas are not *that which we know* (as modern nominalists hold), but *that by*

*which we know.*¹ Ideas are indeed subjective (the ideas of one mind are numerically distinct from the ideas of another mind), but their objects are public. In this way, the human mind is able to transcend the privacy of ideas and grasp objective knowledge and make communication possible. So, two people perceive the moon. One's sense impressions (ideas) of the moon are irreducibly private. They are not the impressions of the other observer. And yet, they both have the moon as an *object* in common.

Here an important distinction is revealed: the difference between the idea, which is uninspectable and cannot be observed or examined (even if known inferentially upon reflection), and the idea's object, which can be known and is subject to public examination. We do not apprehend our ideas, since they are not the objects which we apprehend (they cannot be if private, on pain of being uncommunicable) but only the instruments or means by which we grasp objects. The ideas exist as signs of their objects. They don't refer to themselves.

At this point, one must ask how objects exist in a way that is different from ideas. As has been said, ideas have merely subjective existence. Objects, however, have *intentional* existence. Their existence consists in being apprehended or intended by subjective ideas, which exist purely as signs of objects. An idea can exist only in the private mind of an individual. But the idea's object can be grasped simultaneously by multiple minds. So, the moon as a perceptual object has a special mode of existence on the operation of one or more minds, *but none in particular*. Their existence is not the same as the subjective existence of ideas or the real existence of things. So, this triad is crucial: things (existence in the world), ideas (existence only in an individual mind), and objects (intentional existence in some mind or minds, possibly existence as instantiated in things in the world). Here we bring the reader's attention back to the A-T notion of the substantial form, which is knowable by the person in an immaterial way, and can also be instantiated in a thing in the world; this fundamental aspect of A-T metaphysics appears to return as a necessary element in understanding language and meaning. Keeping the elements of this triad distinct and understanding how they relate to knowledge and language is a challenge, but appears to be critical in understanding how words can have public meanings, and how they can be used as universals. Adler (1976) points out that evidence for universals lies in our common-sense observation that the universe does not just consist of individuals (indecipherable singulars) but in particulars, which are what they are because they belong

¹The following discussion of the importance of this seemingly small distinction is mostly drawn from Adler (1976) and uses his terms, but O'Callaghan (2003) provides a more philosophical explication of the huge implications hidden under this seemingly small distinction, and we strongly recommend O'Callaghan's book to the interested reader.

to *kinds*. The human mind can apprehend these kinds as we abstract common traits from particulars and contemplate those traits irrespective of (or indifferent to) the particulars to which they belong. Adler brings this to bear on language in the following:

When a common name is applied to particular instances, it must be emphasized that the referent is not the particular as a unique singular, but rather the particular as an instance; or, in other words, the universal as instantiated. In all other cases, common names refer to universal objects without regard to the particulars that do or may instantiate them. (p. 149)

A Reconsideration of What's Missing in Current Views of Thinking

Concepts

Spalding and Gagné (2013) made two points about the A–T approach to concepts. First, that the modern description of that approach was woefully inaccurate. Second, that the A–T approach, even though it differs dramatically from the philosophical underpinnings of modern concept research, is compatible with empirical research, and indeed can even make some headway in combining some of the results that seem incompatible from the modern perspective. Here, we wish to emphasize one other major point: modern concept research takes Locke's (and, less explicitly, Descartes') starting point that concepts (or ideas) are that which we have before our minds when we think of anything (we note the irony of modern psychology's strongly materialist orientation overlooking the strongly dualistic underpinnings of some of its most fundamental ideas). It is this fundamental assumption which leads to, and warrants to an extent, the notion of the concept as a representation. Furthermore, it leads to the notion that what we know about a thing must be a part of our concept (representation) of that thing. Unfortunately, as many people have noticed over the centuries, this means that we have no obvious way of linking from our concepts to the world of things, often called the problem of the bridge. In the A–T view, the concept is that by which we apprehend the thing, and that as such our concepts have direct, though intentional, connections to the things they allow us to apprehend (Adler, 1976; O'Callaghan, 2003; Spalding et al., 2014). Thus, much of modern concept research would not, technically, be about concepts at all in the A–T approach, though it would still be about our knowledge of things. A secondary point that might be raised here is that the sense in which cognitive psychology has developed the notion of "patterns of brain activation" as representation could fit better with the A–T approach, than with Lockean underpinnings. In particular, one of the difficult puzzles in modern thinking is how a pattern of brain activation could be that which we apprehend

or think about in the Lockean sense (i.e., we have no sensory apparatus to sense or perceive a pattern of brain activation), but it could make more sense to think of the pattern of brain activation as that by which we perceive or sense something (be it a sense object, a percept, or a memory or whatever).

Language

The A–T approach to language clearly provides an alternative way of thinking about how language allows us to communicate. Here we focus on just two. First, the important insistence that concepts are that by which we apprehend, not that which we apprehend, has important consequences for our understanding of language (as it does for our understanding of concepts, of course). In particular, the modern translational view of language, in which words are translated into mentalese, and that the words of mentalese then are more or less directly connected to representations that are themselves what humans apprehend, contrasts with the A–T view very sharply. Indeed, Adler (1976) spends a great deal of time on this particular issue, showing the importance of this point for a sound theory of language (see also O’Callaghan, 2003). In short, to the extent that modern work on the psychology of language is interested in how words can have meaning, the A–T approach provides a way out of the kinds of problems that have arisen and which have led to a solipsistic position in which everyone’s language is private, and we must simply rely on some hoped-for similarity of life experience to allow communication.

A second aspect of the A–T approach to language is also very interestingly different from the modern approaches. Recall our discussion of the question whether we think in our natural language or in some other abstract, language-like, entity (i.e., mentalese). Modern work on this issue has generally taken these to be the only two possibilities and assumes that they are competing and indeed incompatible possibilities. Although this exact question did not seem to arise in the A–T tradition, the A–T approach would seem to answer this question with a kind of “yes, both” answer. There are a number of reasons for this. The first is that, unlike modern views, the A–T approach does not ultimately understand thinking as something done by the mind, but by the person. Second, it understands the person to have various powers, most relevantly here sensory and intellectual, and that these various powers operate together in all the activities of the person: we apprehend a given thing using both sensory and intellectual powers (otherwise, we could not apprehend it as a member of a class at all, but just as a particular thing), and similarly when we make any judgment about a thing, we use both the intellect and the sensory information (in this case, the phantasm). Critically, then, in the A–T approach, the “language” we think in must both be our natural language (at least in that the words, for example, have been captured by our sensory powers, and will be active as we think) and a more abstract, non-language set of

apprehended objects and logical relations (often encapsulated with syncategorematic natural language words or logical terms). Unlike the modern translational view, there is no “translation” from one language to another, and unlike the modern “think-in-natural-language view,” there exist apprehended objects of the intellect, which condition our thinking about their instantiations, and these are not words in our natural language.

In sum, then, as with concepts and memory, much of the empirical work in the psychology of language is relatively unaffected by the underlying philosophy of language which is chosen. However, we hope that the descriptions we have provided make clear the kinds of questions that are chosen, and some of the possibilities of answering those questions.

The Information Processing Approach and Semantic Meaning

As described previously, underlying the cognitive approach to the psychology of thinking is the information processing, computational approach to cognitive science; and this approach is put forward as the causal explanation of meaning. As stated above, this claim lies at two levels. First, each theory, to a greater or lesser degree, uses the information processing, computational approach to generate further theory and data regarding concept formation and meaning claims. Second, at the metaphysical level, each theory, though most often without formal recognition, claims a materialist monism as the full explanation of semantic meaning. In contrast, the A–T approach asserts a moderate (non-Cartesian) dualism as an explanation of concept formation and semantic meaning. Hence a key issue: Can a brain-based electro–chemical metaphysics fully account for conceptual meaning?

Feser (2005, Chapter 6) summarizes his objections to the computational/representational approach regarding semantics (meaning) along two lines, one an argument from reason and the other following Searle (2014). Briefly, he acknowledges that a computer and the human brain can process meaningful mental states, such as Socrates is a man, and can construct valid reasoning about Socrates. However, that process does not produce the meaning of that mental state. As Searle points out, that meaning is observer-relative. Feser (2005) summarizes:

The problem Searle wants to pose for the computational conception of mind should now be evident. If computation is observer-relative, then it means that its existence presupposes the existence of observers, and thus the existence of minds; so, obviously, it cannot be appealed to in order to explain observers or minds themselves. That would be to put the cart before the horse... it is computation that must be explained in terms of the human mind, not the human mind in terms of computation. (pp. 161–162)

Regarding consciousness, Feser again follows Searle: “Searle argues that there can in principle be no such thing as an entity which is both literally a thought and

totally unconscious. This is the ‘connection principle’ in which there is an inherent connection between something’s being a thought and it being conscious” (p. 164).

The concept and its relationship to memory and language is foundational to the psychology of thinking. In this paper, we have examined the philosophical underpinnings of concept formation, memory, and language as tied to the information processing, computational approach. We have demonstrated that the information processing, computational approach assumes a physicalist–monist metaphysics, although this claim is rarely made in an overt manner. As an alternative, we have proposed the moderate dualism of Aristotle and Aquinas as a better metaphysical underpinning for concept formation, memory, and language. We hope we have convinced the reader that the A–T approach is better equipped to solve some problems of modern approaches to the cognitive psychology of thinking.

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