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On the psychology of primary and secondary consciousness: Part 1

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Abstract

A theoretical approach to account for the psychological natures and functions of primary and secondary consciousness is elaborated. Based upon historical, evolutionary and functional considerations, it is suggested that perhaps the fundamental evolved function of human (and animal) primary consciousness is the enhancement of survival within the surrounding environmental world of nature by control over endogenous, nonverbal primary knowledge that arises from ensembles and cell assemblies of interacting neurons. And, that in human evolution, perhaps the fundamental evolved function of secondary consciousness (in addition to its hierarchical ability to readout and control the contents of primary consciousness) is enhancement of survival within the social world of nurture by executive control over acquired exogenous, language-based secondary knowledge originating from ensembles of socially interacting brains. Distinctions are drawn between the primary and secondary levels of consciousness of the fundamental processes in psychology (sensation, perception, motivation, emotion, cognition and personality-self-individuation). Distinctions are also drawn between some of the primary and secondary levels of consciousness manifested by some of the basic constituents of psychology (such as, language, thought, memory, the specious present, reaction time, etc.).

On the psychology of primary and secondary consciousness: Part 1

Introduction

This is the first of a planned series of papers that will attempt to elaborate an objective and comprehensive theoretical approach to the study of the fundamental principles underlying the psychological natures and functions of primary and secondary consciousness. Following this introductory statement the organization of this paper shall consist of the following sections:

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Many distinctions shall be proposed in this work, but perhaps the most essential distinction is that primary consciousness is a psychological-level phenomenon that evolved over time from neuron-to-neuron interactions within individual human and some animal organisms as such organisms were stimulated by, and responded to, moment-to-moment sensory events within their natural environments. Primary consciousness may be further defined as the awareness of events in the immediate environment that are combined with existing information in the short-term, implicit, memory span to improve the survival value of the organism's responses to such environmental stimulation. Whereas, secondary consciousness is a hierarchical expansion of primary consciousness that evolved from human brain-to-brain interactions within that part of the natural world that is composed of cultural collectivities whose products are learned and incorporated by developing young in every new generation as a function of the cultural process of acquired socialization. Thus, primary consciousness evolved out of interactions of humans and animals with nature, whereas human secondary consciousness emerged out of *homo sapiens'* interactions with nurture.

Although, (1) as noted below the distinction between two levels of human consciousness has roots reaching back to antiquity in the Western world; and, although, (2) in the early days of American psychology James (1981/1890, p. 201) briefly noted a difference between a primary and a secondary consciousness; and, although, (3) as of July 15, 2019 there were 54,737 citations in the PsycINFO

database listed under the term “*consciousness*”; and, although (4) in our planned papers several other theories related to the notion of a two-tiered consciousness will be discussed; the present work proposes a theoretical approach to total human consciousness as a naturally-emergent, composite psychological system whose fundamental structure in the successfully socialized adult consists of a mostly endogenous primary consciousness and a mostly exogenous secondary consciousness.

Consciousness defined

It is widely recognized that there is no one common definition of consciousness among the many psychologists, psychiatrists, biologists, linguists, neuroscientists, physicists and philosophers currently publishing in the interdisciplinary field of consciousness studies (See Velmans & Schnieder, 2007; Zelazo, Moscovitch & Thompson, 2007).

In the absence of a commonly accepted definition across these seven disciplines, the present writer, a psychologist, can take some solace in the fact that the American Psychological Association has now issued two editions of the *APA Dictionary of Psychology* (2007, 2015) that attempt to provide “...*the definitive information on the language of the field, including 25,000 entries offering clear and authoritative definitions*” (APA, 2007). It should be noted that no claim is herein made that the APA definitions are superior to any others; but the field of consciousness studies may derive some heuristic value from these standardized attempts to provide further definitional and conceptual clarity within the many controversies currently taking place.

The entry in the 2015 edition on ‘**consciousness**’ is, in part, as follows:

consciousness n. *1. the state of being conscious. 2. an organism’s AWARENESS of something either internal or external. 3. the waking state (see WAKEFULNESS) 4. in medicine and brain science, the distinctive electrical activity of the waking brain, as recorded via scalp electroencephalogram, that is commonly used to identify conscious states and their pathologies. [...]* (p. 236)

This APA definition of consciousness is obviously a definition of what shall be herein referred to as ‘total consciousness’ that does not contain an appreciation of a major purpose of the present work, which is to survey selected areas of the field of psychology when one attempts to study the distinctions between the psychological natures and functions of primary and secondary consciousness.

The fact of multiple definitions of consciousness in the expanding interdisciplinary field of consciousness studies is acknowledged in a further part of the above 2015 definition that “...*there are intricate philosophical and research controversies over the concept of consciousness and multiple perspectives about its meaning.* (p.236).

It is suggested that perhaps one reason why there is so much disagreement about the meaning of the concept of consciousness is because consciousness is often studied as an indivisible totality rather than as a composite of two fundamentals: primary consciousness that evolved out of our interactions with nature and secondary consciousness that subsequently hierarchically evolved out our interactions with that part of nature that is human culture.

One reason for so much confusion may be that two theorists may disagree about some aspect of total consciousness because one is implicitly referring to primary consciousness while the other is implicitly dealing with secondary consciousness. For instance, in response to the question “Do all primates have consciousness?”, the postulated answer can be both ‘yes’ or ‘no’. A theorist implicitly thinking about primary consciousness common to primates and humans (as primates) might answer ‘yes’; however, a theorist implicitly thinking about secondary consciousness restricted solely to humans (as the only social species with a fully developed sophisticated linguistically-based cultural system) might answer ‘no’.

Given the lack of a singular, generally agreed-upon definition for total consciousness, perhaps one way for the field of consciousness studies to move closer to a clearer and more widely acceptable definition is to examine the etymology of the word *consciousness*. The Latin roots of *con* [with]+ *scire* [knowledge] combined with the suffix *ness* [a state of] (see Merriam-Webster, 1986) yield a literal definition of consciousness as ‘*a state of being with knowledge*’.

Although other workers may emphasize the subjective, first-person aspects of what states of consciousness may feel like; the present work shall concentrate on an attempt to present a comprehensive theoretical account of the objective, third-person aspects of the psychological-level differences between the natures and functions of primary and secondary consciousness when they are taken to be states of knowledge.

Primary and secondary knowledge

Application of the above literal definition to the proposed distinction between primary and secondary consciousness has resulted in the idea that if there exists a true distinction between primary and secondary consciousness; then there may well exist a fundamental distinction between a state of being with primary knowledge and a state of being with secondary knowledge.

The distinction between primary and secondary knowledge is inherent in the definition provided by the *APA Dictionary of Psychology* (2007) as follows:

knowledge *n.* **1.** *information and understanding of a specific topic or of the world in general, usually acquired by experience or by learning.* **2.** *an awareness of the existence of something.* (p. 516)

It is herein suggested from the above definition that primary knowledge can be acquired from the endogenous, direct, moment-to-moment interactions and raw personal sensory and sensory-perceptual “*experiences*” that the individual animal or human organism has with the objective, surrounding natural world of physical-object reality. On this view a state of being with primary knowledge arises within primary consciousness as an awareness of the experienced products of neuron-to-neuron interactions.

The definition also states that knowledge can be acquired by “*learning*”. Two early forms of learning seem to be of importance: the initial, unintentional observational learning of the young child prior to the acquisition of full speech and language competence; and the later direct, intentional social learning achieved by the child following conscious instruction by conspecifics. Further discussion of early forms of human learning in young children shall be undertaken in future planned papers with especial emphasis on the work of Piaget (1955; 1970). However, it should be noted that observational learning may be the result of processes operating mostly at the level of primary consciousness; and that learning following direct verbal instruction may well be mostly a matter of processes initially operating at the level of secondary consciousness.

For the present it is suggested that secondary knowledge is acquired within secondary consciousness not only by acquisition of information from readouts of existing amounts of primary knowledge; but, in addition, and more importantly, secondary knowledge can be generated by the acquisition of psychological-level, higher-order, nonsensory conceptualizations and other cognitions resulting from the influence of exogenous, inter-individual linguistic interactions of children competent in speech and language with the objective, surrounding social world of human culture. On this view a state of being with secondary knowledge arises within secondary consciousness as an awareness of the learned products of brain-to-brain socio-cultural interactions.

Thus, in this scheme, primary knowledge of the surrounding physical world is something you initially generate yourself from the results of your own sensory experiences, reactions and actions with nature predominantly without the use of

language; and, secondary knowledge of the surrounding human cultural world is something that you acquire from the mostly linguistic interactions with nurturing others predominantly by the use of language.

Perhaps one of the most heuristic theoretical distinctions between the two systems is the notion that primary knowledge within primary consciousness arises from the Pavlovian mechanism of first signaling system activity (Pavlov, 1955/1934); whereas secondary knowledge within secondary consciousness arises from the Pavlovian mechanism of second signaling system activity. This distinction between signaling systems shall be taken up below as one of the organizing principles of the work at our Human Learning Laboratory.

A new metaphor: An estuary of consciousness?

Given that the present theory assumes that the structure of total consciousness is composed of an initial primary consciousness followed in both the phylogenetic evolution of the species as well as the ontogenetic development of the individual by the emergence of a subsequent secondary consciousness; it is suggested that the widely evoked Jamesian metaphor of the stream of consciousness (James, 1981/1890) may be profitably elaborated so as to be henceforth thought of as a composite continuous and ongoing estuarial system (as part of the water cycle on Earth). The proposed metaphor of an estuary of consciousness would imagine consciousness to metaphorically exist as an estuarial system with streams of primary consciousness flowing at the lower level composed of saline seawater at bottom that is a contiguous part of the ancient deep oceanic realms; and, with streams of secondary consciousness flowing at the top level composed of more recent freshwater draining from the more recently emergent dry lands after falling as rain. Thus, an estuary of consciousness would be a metaphor of interaction between streams of primary consciousness composed of older waters at bottom; and streams of secondary consciousness composed of newer waters on top.

An obvious advantage of this two-level metaphor based on the mixing of the two streams in an estuary to produce brackish water, is that it alludes to both bottom-up primary-to-secondary processing, as well as to top-down secondary-to-primary processing while retaining the central idea of an ever-changing, continuous and dynamic system (that is reminiscent of the famous ancient statement by Heraclitus that no man ever steps twice into the same river).

The specious present

Although according to the *APA Dictionary of Psychology* (2015, p. 1036) the metaphor of the ‘stream of consciousness’ represents total consciousness as a

continuous and dynamic flow of ideas and images rather than a static series of discrete components, and emphasizes the subjective quality of conscious experience as a never-ending and never-repeating stream; humans can indeed experience a psychological moment in time. The concept of the specious present as a psychological moment in time is defined in the *APA Dictionary of Psychology* (2015) in the following way:

Specious present *the lived present, experienced as a distinct “moment” characterized by certain sense impressions and mental events. This sense of inhabiting a particular moment called “the present” is psychologically strong but actually specious, because (a) time is continuous and ongoing and (b) the present instant is so infinitely short that it cannot be experienced.* (p.1014)

It is theorized that there are two forms of specious present. The first is the **primary-specious-present** that takes place at the level of primary consciousness and contains “*sense impressions*” and elementary perceptions such as the moment you experience a dark room turn from darkness to light upon the flip of a switch. The second is the **secondary-specious-present** that takes place at the level of secondary consciousness and is composed of higher-order emotional, perceptual and cognitive “*mental events*” such as the peak experience characteristic of the “Aha!!” moment of creative discovery that represents the first moment when a solution to a problem comes to mind. The “Aha” moment may be theorized to be part of secondary consciousness because it represents the moment of awareness of a solution to a problem that is a reorganization of the disparate component parts of the problem at hand into a synthesized, wholistic solution.

A fundamental distinction between primary and secondary consciousness is inherent in the distinction between the psychologically “lived present” in the above definition and what may be called the psychological “stored past” and the psychological “anticipated future” because primary consciousness is restricted to the “lived present”; whereas secondary consciousness is the sense of inhabiting not only a particular moment called “the lived present”, but of also being able to recall a particular moment of “the stored past” and/or to predict a particular moment of “the anticipated future”. Therefore, it is suggested that whereas the lived present can be either a primary-species-moment event or a secondary-species-moment event, awareness of both past and/or future events are functions restricted to secondary consciousness.

The interplay between aspects of primary and secondary consciousness in the creative process that may lead to dramatic new solutions to problems, as suggested by Wallas (1926) and others, shall be discussed in further papers.

Section 1: Historical considerations

Among the many historical precursors of the present view of primary and secondary consciousness is Aristotle's ancient assertion that man by nature is a social animal (more precisely a political animal, see Aristotle, translated 1928); thereby indicating the venerable philosophical assumption that the dual composite nature of humanity contains what may be taken to be a primary animal component and a secondary social component. As we shall see, Pavlov (1955/1934) later echoed this duality when he stated that the human mind was composed of the animal brain with its first signal system and the human brain which encompassed the second signal system.

The present theory of consciousness has been based, in part, upon two further nested assertions added to this ancient philosophical notion of the dual composite nature of humanity: (1) that over time, the continuous interactions of the inherited Aristotlean animal component with the external natural world served as the evolutionary foundation for the emergence of a primary consciousness with its personal, primary knowledge within the animal and the human mind; and, (2) that over time, the continuous interactions of the Aristotlean inherent social component, within that part of the natural world that became our social world, caused an expansion of primary consciousness that led to the subsequent emergence of a secondary consciousness within the human mind, that in every generation becomes the young individual's repository of acquired collective social secondary knowledge following successful socialization.

Based upon the nested assumption that primary consciousness promotes survival in the natural world and that secondary consciousness promotes survival in the natural *and* in the social world, the present theory assumes that just as the collective human social-cultural world may be said to have evolved to a hierarchically-dominant position within the previously existing natural physical-biological world; within the human mind a secondary consciousness that is based upon incorporated, inter-individual, collective, social secondary knowledge, may be assumed to have evolved to a hierarchically-dominant position over a primary consciousness that is based upon intra-individual, personal, primary knowledge.

Given the physical fact that all living organisms exist in a quantitative continuum that ranges from the single individual at one end to the whole species population at

the other end, it is a thesis of the present theory that primary consciousness within the animal component of humanity generates individual behaviors that tend to exist toward the individualistic, ideographic, endogenous and autocentric end of the single-individual-to-population continuum; whereas acquired secondary consciousness within the secondary social component of humanity generates socially-influenced behaviors that tend to exist toward the collective, nomothetic, exogenous and allocentric end of the single-individual-to-population continuum.

Based upon this idea of a continuum, in the present work there will be an emphasis upon the notion that primary and secondary consciousness, while differing in their natures and functions; are not so much mutually exclusive as they are mutually interdependent, so that they most often seamlessly work together to promote the organism's wellness and survival in the natural and in the social worlds.

A fundamental temporal assumption underlying the present work is that moment-to-moment behaviors are the resultants of memories of past experiences interacting with present circumstances so that primary consciousness and short-term memory operate predominantly in the present time and place; whereas secondary consciousness and long-term memory expand awareness of the present to include a conscious awareness of the past and conscious considerations of the future. Given that the essence of spoken and written true human language is the socially shared, common knowledge of lexicon, syntax and semantics that permits efficient human-to-human communication across space and time; linguistic processing will be taken to be at a minimum within biologically-based primary consciousness and at a maximum within socially-based secondary consciousness. Whereas, sensory/perceptual processing will be taken to be at a maximum within primary consciousness and at a minimum within secondary consciousness.

It is also suggested that when individual humans reach the stage of full socialization, secondary consciousness takes on the role of permitting and promoting, not only effective communication, but higher-order conceptualization as well.

In short, it may be said that the present postulate of a biologically-based primary consciousness has some of its historical roots in Aristotle's presumed animal component; and that the present postulate of a socially-based secondary consciousness has some of its historical roots in Aristotle's presumed social component of humanity.

These considerations form the basis for the proposed distinction to be made in an upcoming section of this paper between the primary genes that regulate individual behavior to promote the successful survival activity of the animal and human organism at the level of the Aristotlean primary animal component; and, the

secondary genes that affect social behavior to promote the successful survival activity of the human organism and of the culture at the level of the Aristotlean secondary social component of humanity.

Early Greek mind-body considerations

In the ancient Greek world, distinctions between mind [soul] and body were made by Pythagoras, Plato and Aristotle among others. According to Leahey (1987):

...Pythagoras drew a sharp distinction between soul and body. Not only could the soul exist without the body, but, going further, the Pythagoreans considered the body a corrupting prison in which the soul was trapped. An important part of Pythagorean religion was directed toward purifying the flesh so the soul could more easily attain truth. (Leahey, 1987, p.39)

The present author, in sharp disagreement with Pythagoras, assumes that it is the whole living mind and its two-tiered consciousness that cannot exist without the living body. However, given the totality of the human memorial systems within societies (the spoken words of elders, troubadours and poets; the written words on stone, paper and electronic media; the physical products of artists, and the like) selected products of any deceased individual's conscious mind, when properly maintained within human memorial systems (publications, sculptures, museum artifacts, art works, etc), can often long outlive their deceased conscious creators--in some cases, like Aristotle, even after thousands of years. Thus, although the immediately accessible contents of an individual's living secondary consciousness must necessarily end at death; selected archival products of secondary consciousness when communicated to others may become a part of permanently-stored, collective, social secondary knowledge.

As to Plato, Leahey (1987) tells us that:

Plato was greatly influenced by the Pythagoreans. He too viewed the soul as a pure, knowing entity thrust into a corrupting body. His theory of knowledge held that sense perception, depending as it does on the corrupt body, is inherently untrustworthy. Instead the soul's reason should seek abstract knowledge of mathematical purity. (Leahey, 1987, p.39)

Plato's philosophical distinction between experienced conscious sense perception that is dependent upon the body, and the mind's abstract knowledge derived from inherent reason, formed the basis for the present-day psychological

distinction between sensory consciousness and abstract consciousness that is still attributed to him within the *APA Dictionary of Psychology* (2007) as follows:

consciousness *n.* [...] **Sensory consciousness** of the perceptual world depends upon the posterior sensory area of the brain. **Abstract consciousness** refers to abstract ideas, judgments specific intentions, expectations, and events of fringe consciousness; it may involve the frontal cortex in addition to the sensory cortex. The distinction between sensory and abstract experiences was originally made by Greek philosopher Plato (c. 427-c.347 BCE). (p.218)

Before further discussion of the differences between primary sensory consciousness and secondary abstract consciousness, it should be noted that the attribution of these two forms of psychological processes to different parts of the human brain will be discussed at length in forthcoming planned papers.

Sensory consciousness is defined by the *APA Dictionary of Psychology* (2007) in the following way:

sensory consciousness awareness of the visual, tactile, olfactory, auditory, and taste qualities of stimuli. Compare **HIGHER ORDER CONSCIOUSNESS**. (p.964)

Higher order consciousness is defined by the *APA Dictionary of Psychology* (2015) in the following way, (note that there is no separate entry for **abstract consciousness** in either the first or the second edition):

Higher order consciousness nonsensory conscious experiences, including abstract ideas, language-dependent thinking and self-consciousness. [Proposed by U. S. neuroscientist Gerald M. Edelman (1929-2014) and others. (p.495)

The attribution of sensory consciousness to the “*posterior sensory area of the brain*” and of abstract consciousness perhaps to the sensory cortex and “*the frontal cortex*” is a topic of discussion based on the underlying neurophysiological correlates of consciousness (NCC) that shall be presented in detail in later papers of this planned series.

Plato's concept of sensory consciousness is herein taken to be one of the historical precursors of the present notion of a primary consciousness. And Plato's concept of a higher-order, abstract consciousness, is herein taken to be one of the historical precursors of the present notion of a secondary consciousness. Further considerations of present-day theoretical conceptions of a two-tier consciousness shall be addressed in later papers of this planned series.

In contrast to his teacher Plato, Aristotle's epistemological theory held that the body with its sensory systems is the source of all conscious knowledge. According to Hergenhahn (2001), Aristotle theorized that the sensory experiences of the body were the initial basis of all knowledge and that the five senses together with the one common sense provided the empirical information from which knowledge could be derived, first by the passive mind and then by the active mind.

Within the present work, Aristotle's ancient conjecture that knowledge could be acquired first by the passive mind and then by the active mind is taken as a precursor of the hierarchical notion that the acquisition of empirical, conscious primary knowledge (about our external surrounding natural, physical world and our internal physiological world) gathered by the sensory/perceptual systems flows initially from relatively reactive, elicited states of primary consciousness and then from relatively active, emitted states of secondary consciousness.

Although one may assume that new conscious body-to-mind information about the surrounding world may originally flow bottom-up from primary to secondary consciousness; the return top-down flow of conscious information from secondary to primary consciousness within the same individual will be assumed to be the source of the mental recursive, feedback mechanism by which humans have collectively gone from merely gaining initial autocentric, personal primary knowledge about the surrounding world (and thus responding appropriately to immediately present concrete, physical stimulations from prey, predators and reproductive mates) to the subsequent achievement by collective secondary consciousness of employing allocentric, social secondary knowledge to predict, control and change the surrounding natural world. Thus, out of the successful immediate primary re-actions to the natural world that informed primary consciousness, humans have cumulatively and collectively fashioned successful planned secondary actions at the level of secondary consciousness that have changed the natural world far beyond the changes caused by the totality of all other species.

It should be noted that the distinction between passive reactions to the world and active actions upon the world are at the root of the distinction between classical and operant conditioning (see Hilgard and Bower, 1974). Classical conditioning is called elicited respondent behavior because the organism reacts to the presence of

stimulations in a controlled environment by forming associations between unconditioned stimuli (US) and novel conditioned stimuli (CS) by making novel responses, originally elicited only by the US, with new CR associative responses. Operant conditioning is called emitted operant behavior because the organism, through the process of controlled reinforcement of responses comes to increase the probability of response by the formation of associations between the reinforced stimuli and the emittance of the response.

Given that a word is spoken or written language, when there are no linguistic stimuli both classical and operant conditioning initially occur at the level of the primary consciousness system. When language is employed as stimulation, then the initial conditioning occurs at the level of secondary consciousness. Late in his career Pavlov summarized his thoughts about language and conditioning with the distinction between the first and the second signaling systems that shall later be more fully discussed below within the present work.

Empiricism and rationalism

Although philosophers still show great interest in discussing the finer points of the matter, from the perspective of modern psychology it is clear that Plato's view of the mind-body problem was mostly associated with rationalism, the doctrine described by Hergenhahn (2001) as ... "the philosophical belief that knowledge can be attained only by engaging in some type of systematic mental activity" (p.23). It is also clear that Aristotle's view of the mind-body problem was mostly associated with empiricism, the doctrine described by Hergenhahn (2001) as... "the belief that the basis of all knowledge is experience" (p.22).

In response to the Aristotlean belief that all knowledge is based upon experience, we have herein made the distinction between primary knowledge that comes about from the physical, concrete, nonverbal experiences of the individual; and secondary knowledge that comes about out of the vast linguistic store of human speech and language when the stimulations used are words rather than concrete objects or physical energies such as lights or sounds or smells.

Thus, we have seen that the distinction between rationalism and empiricism as overall approaches to the psychological study of the acquisition of knowledge by the totality of the human conscious mind that is housed within the living body has deep philosophical roots extending back to antiquity.

The present paper contains two assumptions about the role played by empiricism and rationalism at the levels of primary and secondary consciousness. The first is that an emphasis upon a data-driven, bottom-up, inductive empiricism may prove to be the most productive approach to a more complete understanding of primary

consciousness. The second is that an emphasis upon a theory-based, top-down, deductive rationalism may prove to be the most productive approach to a more complete understanding of secondary consciousness. Thus, although throughout the histories of philosophy and psychology the relationship between empiricism and rationalism has at times been taken to be a mutually-exclusive, either/or distinction; the present paper assumes a mutual-interdependence between empiricism and rationalism manifested by emphasizing bottom-up data-driven empiricism in the initial examination and investigation of new situations by primary consciousness and then emphasizing top-down theory-driven rationalism in the subsequent examination and investigation of these situations by secondary consciousness.

Mind and its consciousness

It should be stated that whereas many writers will not explicitly differentiate between consciousness and mind, our approach begins with the acknowledgement that the discipline of psychology is the study of mind and behavior with many behaviors due to automatic, covert processes, so that overt consciousness is only one part of the mind.

Another reason that consciousness is not identical to mind is the historical fact noted by Hilgard (1980) that, as late as the 18th Century, the tripartite theory of mind held that the human mind was composed of cognition, affection (emotion) and conation (motivation).

This explicit whole-to-part distinction between mind and its consciousness is accompanied in our approach by the adoption of the objective perspective that will most often assume an external, third-person point of view to study the natures and functions of primary and secondary consciousness of the observable human organism within the psychological-level Stimulus-Organism-Response formulation (the S-O-R formulation as provided by Woodworth & Schlosberg (1954) to be discussed below).

Therefore, we propose primary and secondary consciousness to be two major nested levels of the composite psychological system of total consciousness within the cognition component of the human mind. However, it must be noted that no account of either primary or secondary consciousness will provide full understanding without taking emotional and motivational aspects into consideration.

Further work on the emotions and motivations involved in consciousness is planned for future papers in this series.

Section 2: Evolutionary considerations

The overall process of evolution may be most broadly taken to be the process whereby fundamental natural entities systematically change over time. Therefore, although the word ‘evolution’ most often refers to the evolution of life (biological\physiological evolution); it is also possible to study the evolution of the energy and the matter of the universe (cosmological\physical evolution), the evolution of the mind and behavior (psychological evolution) and the evolution of society (sociological\cultural evolution).

For some time now, the present writer has attempted to develop an overall universal framework for the study of a “cosmological psychology” that would provide an evolutionary synthesis of cosmological, physical, biological, psychological, and sociological evolution which would include the fundamental natural entities of: energy, matter, life, mind and culture.

Table 1, adopted from Montare (2000), shows such an evolutionary framework for the emergence of the hierarchical human mind and its consciousness. The first column of Table 1 must be read as a bottom-up, hierarchical progression so that cosmological evolution is shown as progressing from the lowest fundamental interactions in the first column to higher-order interactions. The second column shows five stages of evolution again beginning at bottom with Stage 1. The third column shows five levels of organization with each level of organization showing a different form of evolution as one ascends in a bottom-up fashion.

It is theorized that attempts to ultimately and fully understand events occurring at any stage must somehow account for each of the terms in the fundamental interaction at such a stage. Thus, for instance, to fully understand the process of human socialization it will be necessary to account for the fundamental energy-by-matter-by-life-by-mind-by-culture interactions that comprise any given sociological-level event at Stage V of cosmological evolution. It should be noted that any attempt to specify the actual mathematical values of these variables in any given event remains a problem for future solution.

Table 1- Levels of organization in an evolutionary framework

<u>Fundamental interaction</u>	<u>Stage</u>	<u>Level of organization</u>
energy x matter x life x mind x culture	V	sociological
energy x matter x life x mind	IV	psychological
energy x matter x life	III	physiological
energy x matter	II	physical
energy	I	primordial

The evolutionary story that is inherent in Table 1 was described by Montare (2000) in the following words:

In Table 1 the emergence of mind is taken to be an integral part of the cosmological evolutionary progression set into motion some 13.8 billion years ago when our universe probably began in an incredibly hot and unimaginably dense point-event of pure, primordial energy [Stage I – primordial organization]. Energy somehow rather quickly expanded and cooled down enough for matter to exist and thereby formed the multiplicative energy-by-matter interaction that still constitutes the physical foundation of our present-day universe [Stage II – physical organization]. Some 3.85 billion years ago the energy-by-matter interaction somehow created the life forms that have continuously existed on our planet from almost as soon as it cooled from the original heat of its creation [Stage III – physiological organization]. Some several million years ago energy, matter and life combined to produce the energy-by-matter-by-life-by-mind interaction that very soon set down the antecedent conditions for the emergence of the primary/individual/ inherited mind [Stage IV – psychological organization]. And finally, some tens of thousands of years ago, the social networks produced by the cumulative interactions of individual human minds created our human cultures which today serve as the foundations for the developmental emergence in our young of learned acquisitions which constitute the secondary/collective/acquired mind that over time transform neonatal homo sapiens into socialized adults [Stage V – sociological organization]. (Montare, 2000, p. 4)

The most important concept for purposes of the present work is that present-day forms of total consciousness are interactive composites whose cosmological roots extend not only to other forms of life and mind on Earth, down through to the energy-by-matter interaction, but to the very first forms of pure energy that were present at the beginning of universal creation.

Although a fuller discussion of human consciousness as an integral part of cosmic evolution has been planned for later papers, the above scenario includes the thesis that the human mind and its primary consciousness fully emerged from its cosmological antecedents only at Stage IV (as the energy-by-matter-by-life-by-mind

interaction at the level of psychological organization prior to the emergence of secondary consciousness at Stage V).

It is now theorized from the above scenario that there are two levels of consciousness in the mind: (1) the endogenous “*primary/individual/inherited*” primary consciousness in the animal and human mind that emerges from the antecedent physiological workings evolved over time as the results of organism-environment interactions at Stage III of the energy-by-matter-by-life interaction to form the energy-by-matter-by-life-by-mind interaction at Stage IV; and, (2) the exogenous “*secondary/collective/acquired*” secondary consciousness in the human mind that is the developmental product of human socialization based on language (as the carrier of culture) at Stage V as the energy-by-matter-by-life-by-mind-by-culture interaction. In this scheme, primary consciousness forms mostly endogenously “from the inside of the individual ” *at Stage IV*; whereas, secondary consciousness forms mostly exogenously “from the outside *of* the individual” at Stage V. Thus, one may now propose that primary consciousness derives from an evolutionary history of energy-by-matter-by-life-by-mind interactions with surrounding nature and secondary consciousness derives from subsequent developmentally-acquired, immersive energy-by-matter-by-life-by-mind-by-culture interactions. In a sense, primary consciousness evolved in a bottom-up fashion from organism/environment interactions with the natural world and, subsequently, secondary consciousness evolved in a top-down fashion from acquired organism/cultural interactions with the social world.

A basic assumption of this hierarchical view of consciousness is that secondary consciousness in the normal individual exercises an executive function over the contents of primary consciousness so that it can exercise top-down control over primary responses that would otherwise occur without such secondary regulation.

Another basic assumption is the prediction that no complete account of either primary or secondary consciousness will be possible until all terms in the above interactions are assigned non-zero values; because, if any term in any of the above interactions shown in Table 1 drops to zero---then the entire interaction also becomes zero---and thus remains unexplainable. As noted above, this task awaits future work.

Based on this scenario, as noted above, it was suggested that the neurophysiological elemental units of primary consciousness are relatively micro-level neuron-to-neuron communication systems composed of ensembles and cell assemblies of interacting neurons within individual animal and human brains; whereas, the neurophysiological elemental units of secondary consciousness are relatively macro-level brain-to-brain communication systems composed of ensembles of interacting brains within human social groups that initially generate

language (that is then incorporated by the individual by use of its personal ensembles and cell assemblies of interacting neurons during socialization). Thus, it may be theorized that ensembles and cell assemblies of organized neurons at Stage III use a neural code formed at the cellular level to generate primary consciousness as an emergent function at Stage IV; and, that ensembles of collectively organized brains at Stage V use phonemes, words, sentences and other linguistic and symbolic phenomena as a neuro-linguistic code collectively generated at the brain-to-brain level to initially generate a form of collective secondary consciousness prior to its acquisition by the individual through acquired socialization at Stage IV.

It should be noted that on this view, the process of human developmental socialization is such that, over time, the overt behavior and covert thought of the human child becomes less and less a function of primary consciousness and, with the increasing acquisition of language as the carrier of secondary knowledge, more and more a function of secondary consciousness. Further discussion of the role of developmental processes in primary and secondary consciousness shall occur in our planned series of papers.

Although consideration of the fundamental status of this hierarchical distinction between neurons and brains will implicitly permeate this entire paper; more complete explicit discussions of the distinctions between neuron-based and brain-based communication systems; between animal and human consciousness; and, between individual behavior and social behavior have been planned for later publications in this series of papers.

Another consideration in the application of our cosmological framework to the assessment of psychological phenomena is our concern with the question of how the human organism processes the fundamental universal, physical realities of time and space. One possible answer that will be further developed in subsequent papers is the possibility that the right hemisphere evolved to predominantly process simultaneous stimulus events in space; whereas the left hemisphere evolved to predominantly process successive stimulus events in time. If so, then the right hemisphere should have the capacity to see the whole visual picture, to use synthesis of parts into wholes, and to process events in an analog-processing fashion; whereas the left hemisphere should have the capacity to use language to relate passing events in a linear fashion, to use analysis of wholes into parts, and to process events in a digital-processing fashion. More about this later in our future planned publications.

A fuller discussion of the implications of our cosmological evolutionary framework for the emergence of the hierarchical mind within the S-O-R framework is also planned for later papers in this series.

At this point we shall turn to the need to provide some further definitional and conceptual clarity regarding the functions of primary and secondary consciousness.

Section 3: Functional considerations

Cognition versus cognizance

Given that ‘knowledge’, is also defined as “...the fact or condition of knowing...” (Merriam-Webster, 1986), our distinction between primary and secondary knowledge has been influenced by the old Arabian folklore quatrain that deals with the various stages of knowing, it states that:

He who does not know, and does not know that he does not know,
is a fool, shun him. (1)

He who does not know, and knows that he does not know,
is ignorant, teach him. (2)

He who knows, and does not know that he knows,
is asleep, awaken him. (3)

He who knows, and knows that he knows,
is wise, follow him. (4)

The addition of this piece of folklore may be excused once one appreciates that it deals with two important aspects of knowledge: cognition as the state of knowing and cognizance as the recursive state of knowing-that-you-know.

Anyone who has spent years in the classroom will be familiar with the first two kinds of students that do not know: (1) those who don’t know enough to ask an effective question and are often reluctant to learn; and, (2) those who are cognizant of their lack of knowledge and so may be more inclined to learn.

If we take the words “He who knows” to mean the fact of cognition, then there can be two states of knowledge about the fact of cognition: (3) a lack of awareness of that knowledge (“and does not know that he knows”) that is a state of having cognition but not its cognizance; and (4) an awareness of cognition (“and knows that he knows”) accompanied by a recursive state of cognizance (“and knows that he knows”).

In our laboratory, we distinguished between cognition and its cognizance with our definitions of “procedural cognition” and “declarative cognizance” (Montare, 1992a; 1994). Procedural cognition was exemplified by the fact that 162 male and female college students learned by inductive concept formation how to respond correctly to both the original learning phase (OL) and the reversal learning phase

(RL) of a complex discrimination-reversal learning task. Under those specific conditions procedural cognition was operationally defined as the acquisition and articulation of the correct nonverbal choice responses (pointing to the correct of two continuously displayed stimulus card when shown one of 256 response cards) required for successful criterion-level performances in both phases of the learning task (OL + RL) (for experimental details see Montare, 1992a; 1994). Declarative cognizance was exemplified by the fact that, following successful acquisition of both original and reversal learning, all students attempted to articulate by verbal reports their verbalizable knowledge acquired from learning. Given that only successful learners were included in the required verbal reports, all subjects possessed procedural cognition of both OL and RL before being asked to articulate declarative cognizance of what they had learned (for further details see Montare, 1992a; 1994). Based on these findings, a theory of hierarchical conceptualization was elaborated. It may be suggested that procedural cognition may be hypothesized to be a function of primary consciousness that was learned by inductive concept formation and declarative cognizance may be hypothesized to be a function of secondary consciousness that was learned by inductive concept formation. A theoretical summary of these findings is shown in Table 2:

Table 2 – A theory of hierarchical conceptualization *

Level	System	Conceptualization	Consciousness
4	SS-2	senscept x percept x precept x concept	PC + SC-3
3	SS-1	senscept x percept x precept	PC + SC-2
<hr/>			
2	PS-2	senscept x percept	PC + SC-1
1	PS-1	senscept	PC, but no SC

* Adapted from Montare, 1994, p.991

The theory of hierarchical conceptualization was described in the following words:

Table 2 summarizes our conclusion that each observed level of the cognitive hierarchy also represents one of four emergent systems of knowledge acquisition: (1) the foundation-level primary signalization acquisition system (PS-1) used by respondents at Level 1 to acquire procedural cognition by inductive senscept formation without declarative cognizance, (2) the emergent-level primary signalization

knowledge acquisition system (PS-2) used by respondents at Level 2 to acquire procedural cognition by inductive senscept-by-percept interactions that led to declarative cognizance of perceptions but not of rules, (3) the concrete-level secondary signalization knowledge-acquisition system (SS-1) used by respondents at Level 3 to acquire procedural cognition by inductive senscept-by-percept-by-precept interactions with declarative cognizance of percepts and precepts, and (4) the abstract-level secondary signalization knowledge-acquisition system (SS-2) used by respondents at Level 4 to acquire procedural cognition by senscept-by-percept-by-precept-by-concept interactions with declarative concepts of percepts, precepts and concepts. (Montare, 1994, p.991)

It should be noted that the line in Table 2 separates the table into two parts: a lower part that indicates learning predominantly by the use of the primary-signalization-knowledge-acquisition-system (PS-1 + PS-2) of primary consciousness and the upper part of the table that indicates learning predominantly by use of the secondary-signalization-knowledge-acquisition-system (SS-1 + SS-2).

The last column in Table 2 shows the theoretical levels of primary and secondary consciousness as follows:

1. Level 1 is a level of primary consciousness common to humans, primates and other mammals in that the proposed idea of the senscept is postulated to be lower form of primary consciousness wherein learning is proposed to take place predominantly without the use of true language. Respondents at Level 1 possessed procedural cognition of the learning tasks, but no knowledge of percepts, precepts or concepts as operationally defined in these studies.
2. Level 2 is a level of primary consciousness possessed only by humans and primates wherein the senscept-by-percept interaction is postulated to produce a higher form of primary consciousness combined by a first level of secondary consciousness. Respondents at Level 2 possessed procedural cognition of the learning tasks and could articulate only the perceptual knowledge of where the significant signals where, but no articulated knowledge about either lower-level rules or higher-level rules underlying verbal reinforcement.
3. Level 3 is a level of secondary consciousness possessed only by humans wherein the senscept-by-percept-by-precept interaction is postulated to produce a lower level of secondary consciousness as indicated by articulation of simple rules-of-thumb governing reinforcement in the learning tasks.

Respondents at Level 3 possessed procedural cognition of the learning tasks and could articulate the simple rules-of-thumb (lower level concrete rules).

4. Level 4 is a level of secondary consciousness possessed only by humans wherein the senscept-by-percept-by-precept-by-concept interaction is postulated to have produced a higher level of secondary consciousness as indicated by the articulation of the abstract rules underlying the inductive concept formation tasks. Respondents at Level 4 possessed procedural cognition and could articulate the higher-level abstract rules governing the inductive concepts underlying the learning tasks.

Further details of these studies may be found in Montare (1992a; 1944). The comparison of these findings to the stage theory of Piaget can be found in a later section of the present paper.

Recursive statements

Before turning to further consideration of the contents of consciousness, it should be noted that the literature is replete with recursive statements; such as the differences between knowing and knowing-that-you-know mentioned above. Table 3 presents a summary of some recursive statements which may be taken to be examples of differences between primary and secondary consciousness when the nonverbal aspects of the primary phenomena are considered. In the construction of Table 3 the nonverbal forms of attention, awareness, cognition, knowledge, signals, emotions and motivations that exist in animals and humans are assumed as components of the primary consciousness shared by animals and humans.

An important factor in Table 3 is the employment of the nonverbal forms of information for all primary consciousness listings (so that attention refers to nonverbal attention, and so on) and the assumption of verbal forms of information (including explicit articulation and implicit inner speech) are assumed for secondary consciousness listings. In Table 3 a numeral superscript appears after the entries for which there are definitions in the APA Dictionary of Psychology (2015) wherein the prefix ‘**meta**’ is attached to the root word, such as ‘meta-attention’ that is then defined as “*awareness of the factors that influence one’s attention.* (p.644).

Table 3 – Some primary and secondary recursive distinctions

<u>Primary consciousness</u>	<u>Secondary consciousness</u>
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Nonverbal Attention	Attention to attention ¹
Nonverbal Awareness	Awareness of awareness
Nonverbal Cognition	Cognition of cognition (cognizance) ²
Nonverbal Knowledge	Knowledge of knowledge
Nonverbal Signals	Signals of signals ⁵
Nonverbal Emotion	Emotion of emotion ³
Nonverbal Memory	Memory of memory ⁴

-
1. meta-attention (p.644)- awareness of one's own attention
 2. meta-cognition (p.644)- awareness of one's own cognitive processes
 3. meta-emotion (p.644)- awareness of one's own emotions.
 4. meta-memory (p. 644)- awareness of one's own memory processes
 5. Pavlov's distinction between first and second signal systems (Pavlov, 1955, p.590, original date 1934)

An important corollary to the presentation of Table 3 is the notion that each of the items in primary consciousness listed in the table will have specific brain centers and that each of the items in secondary consciousness will start at the same specific brain centers and, in addition, will use other specific secondary brain centers as well as the primary centers. Thus, if the brain centers responsible for nonverbal attention are taken to be A; then the brain centers responsible for verbal attention will be predicted to be (A x B). It should be noted that this idea of secondary consciousness as (A x B) interactions denotes the hierarchical interactive relationship between primary consciousness (A) and secondary consciousness (A x B).

An attempt to specify the neural correlates of primary and secondary consciousness within such a hierarchical relationship will be made in future planned papers.

Contents of consciousness

Perusal of either the definition of 'consciousness' or of 'knowledge' makes it immediately obvious that a state of consciousness must be knowing *about* something and must have some specificity which makes it a state of knowing about, or an awareness of, some specific content. Therefore, it is possible to suggest that the myriad specific contents of consciousness can be heuristically classified in two different ways: first; by consideration of primary and secondary distinctions within the fundamental psychological processes of sensation, perception, motivation, emotion, cognition and personality-self-individuation that are essential chapter headings in introductory psychology texts. And then by consideration of primary

and secondary distinctions within some of the basic constituents of psychology (such as language, speech, memory, thinking, learning, reaction time, etc.). The last two sections of the present paper will be devoted to initial attempts to demonstrate the heuristic value of distinctions between primary and secondary consciousness within these 'fundamental processes' and these 'basic constituents'.

One advantage to the study of our proposed distinctions within fundamental psychological processes and basic constituents is that, when combined, they are somewhat consonant with, but obviously not identical to, the working definition of the contents of total consciousness proffered by James during the early days of American psychology when, at a time when consciousness was the central theme of psychology prior to the rise of behaviorism (see Leahey, 1987), he wrote that: "By states of consciousness are meant such things as sensations, emotions, cognitions, reasonings, decisions, volitions and the like". (James, 1892, p.1)

Evolutionary considerations of primary and secondary knowledge

In evolutionary terms, it is theorized that the basic function of primary consciousness is to promote individual survival by allowing humans to successfully survive and thrive in the natural physical/biological world of organism-environment interactions. It is theorized that, to this end, primary consciousness evolved to provide executive control of predominantly prelinguistic, concrete, autocentric, private and direct primary knowledge of the sensations, perceptions, motivations, emotions and nonverbal lower-level cognitions (such as the procedural knowledge underlying acquired motor skills that form part of the contents of primary consciousness to be discussed later) as well as control over preverbal aspects of personality-self-individuation.

It is also theorized that, in evolutionary terms, secondary consciousness evolved to promote group, as well as individual, survival by allowing humans to successfully survive and thrive in that portion of the natural physical/biological world that forms the psychological/social world of human-to-human interactions. It is theorized that, to this end, secondary consciousness provides executive control of the predominantly verbal, abstract, allocentric, socially-based secondary knowledge that serves as the psychological foundation for the higher-order cognitive states such as planning, concept formation, problem solving and creativity that together with verbally-based aspects of personality-self-individuation form the bulk of the contents of secondary consciousness.

Based upon these evolutionary considerations, a later section of this paper will propose the twin notions that primary genes encode intergenerational information necessary for the normal structure and function of primary consciousness and that

secondary genes encode intergenerational information that facilitates the social learning necessary for the normal functioning of secondary consciousness.

Secondary consciousness, as mentioned above, is also theorized to exercise the function of executive access to the contents of existing primary consciousness. Therefore, given this proposed hierarchical relationship, secondary consciousness may be theorized to possess executive access to personal, endogenous primary knowledge as well as executive control over developmentally acquired social, exogenous secondary knowledge. Thus, primary knowledge teaches us how to manipulate a wheel; while secondary knowledge means that, at any given moment in time, we don't have to re-invent the wheel.

A more detailed evolutionary-based discussion of how human development and human socialization contribute to the growing complexity of primary and secondary consciousness is planned for later papers in this work.

Seamless functioning of the two systems

It is theorized that there exists a principle of seamless functioning that in the successfully functioning adult, secondary consciousness seamlessly controls primary consciousness so that fundamental differences in underlying organization and functioning only become apparent under unusual disruptive circumstances. A well-known example of this disruptive process in every life (provided by Woodworth & Schlosberg, 1954) is that when one pays attention to the legs while walking down a staircase, the highly-overlearned, smoothly automated, sensorimotor activity under the control of primary consciousness becomes disrupted when voluntary, conscious, attention-to-the-legs under the control of secondary consciousness throws off the smoothly unfolding release of normally automated staircase motor activity under the control of primary consciousness.

Another example of the putative disruption of a highly overlearned motor act by secondary consciousness has been provided by one of the statements widely attributed to the baseball player Yogi Berra that: "You can't bat and think at the same time". This statement may be interpreted to mean that successfully hitting a ball with a bat requires very precise nonverbal sensory, perceptual, and motor skills that will be interfered with by attempts to intellectualize the physical execution of highly-overlearned, smoothly-automated physical response repertoires (that are constantly honed by hundreds of hours of batting practice) by the inappropriate intrusion of language-based cognitive processes into the situation. If one attempts to both bat and think at the same time those precious milliseconds of excitation-inhibition conflict during which one decides within nonverbal primary consciousness to actively excite or inhibit the highly-overlearned, constantly-

practiced automatized batting response, may be disrupted by verbally controlled secondary consciousness processes; thereby decreasing response efficiency and increasing response latency; resulting in swinging at, and missing, a badly thrown ball or waiting too long to swing and/or allowing an otherwise easily hit well-thrown ball to pass by and become a called strike.

It may be suggested that these examples share a common putative explanation. Namely, that in both cases at the moment of response, smoothly-operating motor programs of the primary-specious-present were momentarily disrupted by higher-level cognitive activities of the secondary-specious-present.

A final example of the principle that fundamental underlying differences in psychological organization of primary and secondary consciousness may not become apparent until normal behavioral patterns are disrupted, is provided by the work on the surgical disruption of neural traffic between the hemispheres (Gazzaniga, 1970). A startling result following commissurotomy was that, under normal conditions, split-brain patients with a severed corpus callosum seemed perfectly normal with no outstanding sensory, perceptual, motivational, emotional, cognitive or personality-self-individuation deficits. The lack of post-operative deficits was so pervasive that someone is alleged to have joked that perhaps the function of the cerebral commissure was to hold the two hemispheres together. Although a more thorough discussion of the work on divided consciousness following commissurotomy is planned for later papers in this series, it should be noted now that the hemispheric differences empirically established by such surgical interventions are not usually apparent in everyday behavior until sensory knowledge and information is carefully manipulated and differentially provided in the laboratory to surgically isolated hemispheres. Under such experimental conditions it was found that the brain areas in the left hemisphere responsible for language processing would in some cases be totally unaware of the lower level cognitive processes undertaken by the right hemisphere to solve nonverbal cognitive tasks requiring the formation of correct concrete sensory associations or simple verbal associations between laboratory-controlled stimulations.

One assumption that may now be offered is that, in normal individuals, the left hemisphere, which most often controls speech and language, may be a global neural correlate of secondary consciousness and the right hemisphere may be a global neural correlate of primary consciousness.

An organizing principle

The organizing principle that has provided the most powerful impetus and direction to our thinking at the Human Learning Laboratory about human primary

and secondary consciousness was the essentially evolutionary suggestion set forth by Pavlov (1955/1934) that human brain signalization occurs on two hierarchically-related, neural levels of organization: a relatively primitive *first signaling system* common to animals and man; and a more recently evolved, higher-order, language-based *second signaling system* that is exclusively human.

In relation to our earlier distinction between primary and secondary knowledge it will now become apparent that we can distinguish between primary knowledge arising from the activity of the first signaling system and secondary knowledge arising from the activity of the second signaling system and thereby provide a direct theoretical linkage between the two levels of signaling systems and the two levels of consciousness.

The second signaling system was theorized by Pavlov to be the source of human cognitive achievements like science that were made possible by the addition of exclusively human language to the ancient existing foundation of human thought at the original level of the first signaling system.

Pavlov postulated an evolutionary progression from the first to the second signaling system in the following words:

When the developing animal world reached the stage of man, an extremely important addition was made to the mechanisms of the nervous activity. In the animal, reality is signalized almost exclusively by stimulations and by the traces they leave in the cerebral hemispheres, which come directly to the special cells of the visual, auditory or other receptors of the organism. This is what we, too, possess as impressions, sensations and notions of the world around us, both the natural and the social---with the exception of the words seen or heard. This is the first system of signals of reality common to man and animals. But speech constitutes a second signaling system of reality which is peculiarly ours, being the signals of the first signals. (Pavlov, 1955, 262, original date 1934)

It should be noted that in the present work a distinction has been drawn between the “natural” and the “social” such that “impressions and “sensations” are attributed to the first signaling system and to primary consciousness while the “notions” (as ideas and concepts) are attributed to the second signaling system and to secondary consciousness. Indeed, in Section 2 above, the conclusion was presented that human concept formation can exist on four different levels of increasing understanding such as: senscepts, percepts, precepts and concepts. (Montare, 1994). Recall that in that work senscepts and percepts were taken to be evidence of thought at the level of

primary consciousness and precepts and concepts were taken to be evidence of thought at the level of secondary consciousness. Further discussion of this work will appear in the future papers in this planned series.

Pavlov also wrote that:

If our sensations and notions caused by the surrounding world are for us the first signals of reality, concrete signals, then speech, especially and primarily the kinesthetic stimuli which proceed from the speech organs to the cortex, constitute a second set of signals, the signals of signals. They represent an abstraction from reality and make possible the forming of generalizations; this constitutes our extra, specially human, higher mentality creating first an empiricism general to all men and then, in the end, science, the instrument of the higher orientation of man in the surrounding world and in himself. (Pavlov, 1955, 285, original date 1934)

These two excerpts from the writings of Pavlov leave no doubt that he was proposing a fundamental distinction between our capacity to respond to our surrounding world of concrete physical reality by use of our sensory systems to create “*impressions, sensations and notions*” at a lower evolutionary level of mentation; and a hierarchically-evolved “*specially human, higher mentality*” composed of the abstractions and generalizations of reality made possible by the use of human speech and language. Much of the work that was done at our Human Learning Laboratory was originally based upon Pavlov’s dual process formulation of a lower evolutionary level of cognition composed of the concrete first signals of physical reality and the subsequent hierarchical emergence of a higher evolutionary level of cognition composed of signals-of-signals. Over the years these theoretical ideas were incorporated at the Human Learning Laboratory into the fundamental distinctions between primary and secondary consciousness which are the focus of the present paper.

Thus, Pavlov theorized that our sensations, perceptions and direct impressions of the surrounding world are the primary, concrete first signals of physical reality that [we may add] can permit animal and human survival of individuals in the immediate present under life-threatening conditions; and that human words and speech are the secondary, higher-order, abstract, language “signals of signals” of human mental reality that permit human abstractions and generalizations that [we may add] can enhance the survival of human individuals in the short term and the survival of human social groups over the long term. Further discussion of the transient and immediate nature of concrete primary signals compared to the more permanent and

generalized nature of abstract secondary signals shall await publication of future planned papers in this series.

After theorizing that the secondary signals of words and speech formed the abstractions and generalizations of higher-order human cognitive processes, Pavlov went on to state that "...it is precisely speech that has made us human..." and, in addition, that "...the fundamental laws governing the activity of the first signaling system must also govern that of the second." (Pavlov, 1955, p.262, original date 1934)

It is a thesis of the present work that primary consciousness is based upon our sensations, perceptions and direct impressions of the surrounding world as the primary signals of concrete physical reality that are the constituents of primary knowledge in primary consciousness. It is also a thesis of the present work that secondary consciousness is based, in part, upon our exclusively human words and speech as the secondary, higher-order "signals of signals" of abstract human mental reality that are the constituents of secondary knowledge. Given the proposed hierarchical relationship as already discussed above, it is assumed that the contents of primary consciousness are available to secondary consciousness so that existing primary knowledge of concrete physical reality may become the basis of new secondary knowledge of abstract mental reality.

Pavlov, Freud and Piaget revisited: Bridger's synthesis

Bridger (1967) noted a confluence of the theoretical notions of Pavlov, Freud and Piaget regarding the existence of the two major human signal systems of mental activity. Bridger wrote that:

Pavlov divided human thought into two signal systems. He said: "If our sensations, perceptions and direct impressions of the surrounding world are for us the primary signals of reality, the concrete signals, then words are secondary signals. They represent themselves as abstractions of reality and permit generalizations. Thus the human brain is composed of the animal brain, first signaling system, and the purely human part related to speech, second signaling system (Pavlov, 1955, p. 590)". [as quoted by Bridger, 1967, p. 591].

Bridger (1967) then compared the distinction between the Pavlovian first and second signaling systems to the Freudian distinction between the concrete unconscious (primary process) idea of "the thing alone" and the conscious (secondary process) idea which comprises both the concrete idea and the verbal idea

corresponding to it (Freud, 1956, p.134). Bridger (1967) also cited Piaget's contentions about two systems of human thought when he wrote that:

Piaget (1951) has stated that the child develops the symbolic function by gradually differentiating the signifier from the signified. The child transforms the signal into the symbol; words are treated more and more by second signaling system processes and less and less by first signaling system processes. This gradual transformation of the symbol from what is being symbolized is very similar to the relationship between the signal and what is being signalized. (Bridger, 1967, p.591)

Bridger (1967) went on to "...postulate that words and thoughts can have different properties..." (p.592) when he stated that:

When a word or idea is used in the general abstract categorical sense, it is called a symbol and follows the rules of second signaling system activity, logical rules. When a thought is dealt with as a particular concrete thing, it is called an image, signal or sign, and the rules of thinking at this sensory level of cognition are those of the first signaling system. (Bridger, 1967, p. 592)

Adoption of our theoretical approach allows one to employ Bridger's (1967) synthesis of the work of Pavlov, Freud and Piaget to reach four conclusions about the division of human thought into primary and secondary consciousness:

1. The first conclusion is that primary consciousness is characterized by the operation of concrete, nonverbal Pavlovian first signaling system activity functioning at the level of Freudian idiosyncratic, concrete primary process thought with the employment of Piagetian concrete, nonverbal egocentric thought processes.
2. The second conclusion is that secondary consciousness is characterized by the operation of Pavlovian abstract, verbal second signaling system activity functioning at the level of Freudian rational, verbal secondary process thought wherein Piagetian verbal, operational thought processes generate the abstract symbolic function as the child gradually transforms concrete signified-signals into abstract signifier-symbols by using words less and less by first signal system processes and more and more by second signal system processes.
3. The third conclusion is that, based upon Bridger's (1967) synthesis, if a thought or word is dealt with as a particular concrete thing (and it is called an

image, signal or sign), then the rules of associative nonverbal thinking are those of the first signaling system and primary consciousness may be invoked as the locus of mentation.

4. The fourth conclusion is that, also based upon Bridger's (1967) synthesis, if a word or idea is used in the general abstract categorical sense (and it is called a symbol); then it follows the logical rules of verbal second signaling system activity and secondary consciousness may be invoked as the locus of mentation.

It should also be noted that our view is consonant with the theory of cognitive development proposed by Piaget (1969, 1970) who posited four stages: two initial stages marked by egocentric thought and two later stages characterized by operational thought (similar to autocentric thought in the present work). Indeed, for purposes of the present paper, one may theorize that Piaget's first two stages (sensorimotor and preoperational) may be mostly attributed to the workings of autocentric primary consciousness characterized by the accumulation of personal primary knowledge and that the subsequent two stages (concrete operations and formal operations) may be mostly attributed to the workings of allocentric secondary consciousness characterized by the accumulation of collective social secondary knowledge.

Examples of distinctions: cats, dogs and children

As a first example of the distinctions between the two signaling systems consider the following. If I see a cat, two things can occur: (1) I can become consciously aware of the presence of an object (the cat as a first signaling system instance of concrete reality currently impinging upon my visual sensory system); and, (2) at a later point in time, when the cat is no longer present, I can exercise my conscious volition to inform my social companion by use of the second signaling system of human speech that I saw a cat. Animals share our capacity to see and become aware of the cat, and--- by use of alarm signals of immediate reality-- even to inform conspecifics of the looming presence of a predator cat; but only humans can linguistically inform conspecifics of past experiences with the cat.

As another example of the distinction between the two systems, consider the concrete reality of a dog that, as you walk in town, comes into your line of sight as the signal of a natural living object that gives rise to conscious primary sensations, primary perceptions and primary emotions of the first signaling system of immediate reality. The physical, natural-thing-unto-itself that is the dog gives rise to visual signals of the first signaling system of concrete reality that humans share with animals. In contrast, consider the abstract reality that is elicited when you

consciously hear the word “dog” in the complete physical absence of a dog. Provided that you have previously learned the meaning of the word, the word “dog” can function as a secondary signal of reality that elicits an association to the primary signal of the physical object; thus, the word alone may function as a signal of the dog thereby acting as a “signal of a signal.” As noted above, according to Pavlov, the spoken word “dog” gives rise to signals of the second signaling system of secondary abstract reality that humans share exclusively only with other humans.

It is a thesis of the present work that the physical object that was the dog in this example gave rise to concrete physical signals of reality that were initially processed at the level of the first signaling system within primary consciousness. On this view, primary consciousness of concrete physical reality is present in some animals as well as in all normal adult humans.

In light of the arguments for and against animal consciousness (see Allen & Bekoff, 2007 for a review), it may be concluded that: if an animal is capable of appropriate associative learning whereby new first signaling system associations can lead to relatively stable new learned behaviors; then the animal may be said to possess primary consciousness of acquired learned associative behaviors that promote survival in the natural world. One indicia of primary consciousness in animals would be the use of tools by chimpanzees such as stones employed as hammers and anvils to obtain food from nuts. Such tool-using behaviors are relatively stable behaviors showing that appropriate associations have been fashioned between the tool and the food.

Another more formal example of the putative possession of nonverbal primary consciousness was provided by Pavlov’s (1927) demonstrations of successfully acquired classical conditioning of the relationship between the bell (CS) and the food (UCS) that was empirically manifested when dogs learned to respond to the novel bell (CS) with a novel associative response (CR) originally only made to the food (UCS) prior to training. Thus, the empirical evidence of newly acquired nonverbal primary knowledge (the new CS-CR association) is herein proffered as empirical evidence for the possession of primary consciousness by Pavlov’s dogs.

It is also a thesis of the present work that the spoken word “dog” by humans in the above scenario gave rise to abstract signals-of-signals at the level of the second signaling system within secondary consciousness. On this view, the word “dog” as a “signal of signals” represents a second-order abstract reality compared to the first-order physical reality of the visually-observed dog. In light of the arguments for and against animal consciousness, it may also be concluded that: if an animal can be shown capable of appropriate linguistic acquisition (and subsequent use) of second signaling system syntax and semantics (within a sign language when appropriate

vocalizations are not possible) then it should be said that the animal possesses some amount of secondary consciousness.

In addition, given the centrality of the concept of collective social secondary knowledge as a prerequisite for secondary consciousness, one may conclude that secondary consciousness may exist if the animals in question are social animals capable of the acquisition of collective social secondary knowledge from their respective social systems. Therefore, one possible indicia of secondary consciousness in animal behavior would be animal tool-making wherein it could be shown that the tool was fashioned following appropriate sign language signals-of-signals communicated by another chimpanzee to the toolmaker. Thus, it is suggested that tool-using behavior occurs at the level of primary consciousness and that tool-making behavior, if ever possible, following deliberate language-based instructions from a conspecific would occur at the level of secondary consciousness.

It may be also theorized that concept formation in humans at the level of secondary consciousness occurs when sufficient prior empirical observations of individual dogs at the level of primary consciousness become associated with the spoken word “dog” and reach the critical point needed for the rational processes in secondary consciousness to achieve the abstract mental reality of the concept of “dogness”. The concept of ‘dogness’ represents all generalized instances of real and/or imagined dogs generalized over all possible spaces and all possible times. Therefore, concept formation may be theorized to be the cognitive process whereby primary signals in primary consciousness become the basis for secondary signals-of-signals in secondary consciousness.

Two important themes for our work were inherent within these simple examples:

- (1) Over time, at our laboratory, the first signaling system of concrete reality was taken to be an essential foundation that underlies the subsequent development of primary consciousness and the second signaling system of abstract reality was taken to be an essential foundation that underlies the subsequent development of secondary consciousness; and,
- (2) Another of the guiding principles at the Human Learning Laboratory was based upon an analysis of temporal organization that emphasized the acquisition of learning against the temporal perspectives of the past, the present, and the future. The first signaling system common to animals and humans was assumed to consist of the concrete stimulations of immediate reality that exist in the temporal present combined with the accessible traces and/or full memories of past stimulations of reality that can be brought to bear upon present circumstances. Indeed, at the Human Learning Laboratory our working definition of the process of learning was that the several learning

processes may be defined as acquired modifications of present behavior and thought that are directly based upon accessible past experiences brought to bear on present circumstances.

Also at our laboratory, the second signaling system was assumed to predominantly consist of human words (oral or written) that permit humans to abstract, conceptualize and generalize reality and thereby to expand the temporal horizon to include projections of future events.

Thus, the first signaling system composed of concrete signals of reality presumably operates only in the immediate, transcendent present of the 'concrete now' in interaction with the processing of memories of accessible past events. Whereas the second signaling system presumably operates not only in the 'concrete now' of the present combined with remembered abstract 'nows' of the past; but also in the projected abstract 'nows' of the future.

In neurological terms, as noted above, Pavlov concluded that: "...the human brain is composed of the animal brain, the first signaling system, and the purely human part related to speech, the second signaling system". (Pavlov, 1955/1934, p. 590)

Although in his lifetime, Pavlov provided neither empirical results dealing with the elaboration of the distinction between the first and second signal systems (Hilgard and Bower, 1975) nor provided an extensive theoretical treatise on the subject (Windholz, 1990), Pavlov did intersperse in his many writings references to the importance of the first and second signal systems. According to Razran (1971) the first published mention by Pavlov of the unique-to-man second signaling system appeared in Pavlov (1927) in the following words:

Obviously, for man speech provides conditioned stimuli which are just as real as any other stimuli. At the same time speech provides stimuli which exceed in richness and many-sidedness any of the others, allowing comparison neither qualitatively nor quantitatively with any conditioned stimuli that are possible in animals. Speech, on account of the whole preceding life of the adult, is connected up with all the internal and external stimuli which can reach the cortex, signaling all of them and replacing all of them, and therefore it can call forth all those reactions of the organism which are normally determined by the actual stimuli themselves. (Pavlov, 1927, 407 as reported by Razran, 1971).

Although, as mentioned above, it has long been recognized that "...Pavlov did not further develop these ideas experimentally or theoretically..." (Hilgard & Bower,

1981, p. 57), the Pavlovian suggestion of a distinction between a predominantly nonlanguage-based, nondeclarative first signaling system of concrete signals and a predominantly language-based, declarative second signaling system of abstract signals-of-signals and symbols has been extended and elaborated at our laboratory.

The theory of primary and secondary consciousness as presented in this paper is, in large part, a recent extension and elaboration of the Pavlovian distinction between signaling systems.

As the cumulative result of our previous laboratory-controlled observations and theoretical attempts at explanations, primary consciousness has come to be viewed as the lower-order, relatively primitive, predominantly nonlanguage-based level of nondeclarative consciousness. Primary consciousness, on this view, is the resultant of first signaling system processes that provide animal and human organisms with an immediate, online consciousness composed of concrete thought processes (such as those arising from sensation, perception and sensorimotor actions) concerning external physical reality and internal physiological reality.

Secondary consciousness has come to be viewed as the higher-order, relatively recent, predominantly language-based level of consciousness wherein second signaling system processes provide humans with a capacity for a reflective, offline consciousness capable of abstract and symbolic thought processes concerning the ultimate nature of all forms of physical, physiological, psychological and sociological realities.

We have demonstrated at our laboratory the heuristic value of the Pavlovian distinction between the first and second signaling systems as a psychological-level organizing principle in the analysis of the language-aggression hypothesis (Montare and Boone, 1973; Boone and Montare, 1976); the temporal correlates of discrimination learning (Montare, 1983); and the effects of knowledge of results upon time estimation (Montare, 1988a). Following these publications, a distinction was made at our laboratory between primary and secondary signalization associative learning processes as learning processes that are based upon the distinction between the first and the second signaling systems. The distinction between primary and secondary signalization learning processes were explored at our laboratory in the classical conditioning of beginning reading responses (Montare, 1988b); the distinction between procedural cognition and its declarative cognizance (Montare, 1992a); the conditioning of the reaction time response (Montare, 1992b); and the knowledge acquired from learning (Montare, 1994).

A more complete integration of these publications within the theory of primary and secondary consciousness is planned for future publication.

Young children have been known to permanently acquire naming-function-associations between objects (dogs) and words (the spoken word “dog”) in one trial. On this point, it is of interest to note that at our laboratory we provided empirical evidence of the fact that printed words (such as ‘dog’) and pictures (such as an associated picture of a dog) can be empirically associated very rapidly so that some young children can acquire classically-conditioned-beginning-reading-responses (CCBRR’s) in a single training trial (Montare, 1998b). It had long been known that young children can acquire correct speech associative responses to particular objects in just one trial; our work showed that they can also acquire correct meaningful reading responses in just one trial.

These considerations support the thesis of the present paper that human consciousness evolved in two separate stages: an initial stage of the acquisition of a primary consciousness based upon the first signaling system of immediate natural physical reality; followed by the subsequent emergence of a secondary consciousness based upon the second signaling system of abstract socially-based mental reality that functions to allow consideration of not only immediate reality, but of future reality as well. Therefore, in more modern terms: primary consciousness is restricted to processing first signaling system events that occur as online, immediate signals of physical reality; whereas, secondary consciousness expands our spatial and temporal horizons to permit the offline, contemplative processing of second signaling system events and, in addition, permits the consideration of possible scenarios of future events.

In historical retrospect, it may be concluded that Pavlov provided a modern corollary to Aristotle’s designation of man as a social animal when he concluded that the human brain is hierarchically composed of two parts: an animal brain component common to animals and man with its first signaling system; and, the exclusively human part of the brain, the social brain component with its second signaling system of human speech and words that gives rise to higher-order-thought processes (Pavlov, 1955, p.590, original date 1934).

This section may be concluded with two observations:

(1) that the present work represents an attempt to extend the fundamental historical Aristotlean/Pavlovian assertion of the dual animal/social nature of humanity by examination of the implications of the thesis that primary consciousness evolved from the primary animal component of human nature with its first signaling system; and, (2) that secondary consciousness evolved from the secondary social component as the product of the interaction of primary consciousness with human socialization that in successfully socialized humans becomes the second signaling system.

Section 4: The fundamental processes of psychology

An important part of the present theoretical approach to primary and secondary consciousness is the examination of the heuristic value of such an enterprise. If the distinction between primary and secondary consciousness is indeed a true account of the objective reality of the nature, structure and function of total human consciousness; then it should be possible to undertake a survey of the field of psychology and find a substantial amount of differences between the two systems. Therefore, this paper will undertake an initial attempt to survey some of the fundamentals of the field of psychology to discern such bifurcated distinctions; first within a series of fundamental psychological processes and then within some of the basic constituents of psychology.

As herein adopted, the “fundamental psychological processes” are those that are to be found in all basic introductory psychology textbooks that describe the field of psychology by use of some variant of the definition of psychology as the study of behavioral and mental events. The chosen fundamental psychological processes are: sensation, perception, motivation, emotion, cognition (broadly defined as: knowledge, conditioning, learning, problem-solving, memory, language, thinking, etc.) and personality-self-individuation.

As herein adopted, the basic constituents of psychology are some of the content areas of psychology that may be shown to have aspects of primary and secondary consciousness.

The strategy employed to survey the field of psychology shall be to use various standardized definitions found in the APA Dictionary of Psychology as the starting point; and, then to inspect these definitions for their primary and secondary aspects of consciousness.

Primary and secondary sensation

Before an analysis of primary and secondary sensation is undertaken, it should be noted that there exists a very intimate relationship between sensation and perception. In the *APA Dictionary of Psychology* (2015; p.962) sensation is defined, in part, as “...perceiving through the senses” and perception is defined, in part, as “becoming aware of objects...by means of the senses’ (p.775). Indeed, throughout the literature of psychology, sensation and perception are sometimes used interchangeably.

Given the intimate relationship between sensation and perception, we therefore begin this section with a brief comparison of sensation to perception. Sensation may be broadly defined as the transduction of exteroceptive and interoceptive physical

signals by receptor systems so that physical, sensory energies of various kinds (visual, auditory, olfactory, tactile, etc.) are transduced into neural energies that travel from receptors over afferent neurons to specific brain centers in the central nervous system. For instance, vision begins when the photic energies in light waves are transduced into neural energies within the retinal receptor cells of the eye into neural impulses that then travel principally over the thalamocortical system to the primary visual processing centers in the occipital lobe. Perception may be broadly defined as the subsequent meaningful interpretation of the neural energies of sensations. Perception will be further defined and discussed in the next section of the present paper.

Therefore, it is possible to conclude that sensation is a fundamental psychological process that must successfully occur prior to any possible correct interpretative perception of the same stimulus event.

The *APA Dictionary of Psychology* (2015) defines **sensation** and **sense** in the following ways:

sensation *n.* **1.** *The process or experience of perceiving through the senses.*
2. *an irreducible unit of experience produced by stimulation of a SENSORY RECEPTOR and the resultant activation of a specific brain center, producing basic awareness of a sound, odor, color, shape, or taste, or of temperature, pressure, pain, muscular tension, position of the body, or change in the internal organs associated with such processes as hunger, thirst, nausea, and sexual excitement. [...]* (p. 962)

sense **1.** *n.* *any of the media through which one perceives information about the external environment or about the state of one's body in relation to this. They include the five primary senses---- vision, hearing, taste, touch, and smell---- as well as the senses of pressure, pain, temperature, kinesthesia, and equilibrium. Each sense has its own receptors, responds to characteristic stimuli, and has its own pathway to a specific part of the brain. [...]* p. 836

The key to our proposed distinction between primary and secondary sensation within consciousness is provided in sense 2 of the first definition that essentially states that a sensation is produced by the stimulation of a sensory receptor and the resultant activation of a specific brain center.

It is suggested that a primary sensation occurs when a stimulus activates a sensory receptor with the resultant activation of a specific nonlanguage brain center that results in awareness of "...a sound, odor, color, shape, or taste, or temperature,

pressure, pain, muscular tension, position of the body, or change in the internal organs.”

It is also suggested that a secondary sensation occurs when a stimulus activates specific language-processing brain centers that not only can produce the awareness of primary sensations of sounds, etc.; but in addition, can produce meaningful interpretations of verbal language (words, phrases, sentences, etc.) in secondary consciousness.

On this view, primary consciousness of primary sensation is possible after any stimulus event produces nonlanguage awareness by the resultant activation of a specific sensory brain center. In addition, secondary consciousness of secondary sensation is possible when any given stimulus event is processed in the verbal centers of the brain to produce meaningful, conscious linguistic awareness.

Thus, it is possible to conclude that sensation is the processing of information about the world and that perception is the interpretation of such processed information about the world. Given the reality that we are constantly bombarded by myriad sensations that are not further processed; one can easily see that sensation of reality can occur without perception, but perception of any given physical reality can not occur without prior sensation.

As an illustration of the workings of primary and secondary sensation, consider the familiar classroom demonstration wherein students are asked to choose any noun, such as “house”, and then are asked to slowly repeat that same word aloud in unison as an entire class exercise (absent any instructions as to when to stop). Upon the instruction to “Start now” students begin to say the word aloud like a mantra. Usually in about thirty seconds or less the class spontaneously falls into a joint rhythmic pattern; and then shortly thereafter an increasing number of students spontaneously drop out and fall silent so that in another few moments the entire class stops. Upon questioning, some members of the class usually report that they stopped repeating the word because of an uneasy awareness of finding themselves merely making a sound, repeating a meaningless utterance, rather than speaking a word signifying a familiar object.

It is possible that the disruptions of speech found in my students is related to the findings reviewed by Yates (1961) on delayed auditory feedback who noted that: “when S hears his own voice with a small time delay his speech may be seriously affected” (Yates, 1961, p. 231). However, my usual interpretation of this experience is to inform my classes that what happened was that the original linguistic spoken word for “house” had become experienced as merely the physical audible sound of “house”. In this illustration, conscious awareness of the higher-order secondary sensation of the word ‘house’ had, by continuous out-loud-repetition, unwittingly

become regressed into the lower-order primary sensation of the auditory sound 'house'. The continuous repetition of the spoken word had somehow stripped away the secondary sensation of the spoken word and revealed to the students the underlying primary sensation of the spoken sound.

It is suggested that this illustration shows that the hierarchical relationship between primary and secondary consciousness is such that, although all sensation requires responses by receptors and transmission of information to specific brain centers; the same spoken word can carry two different levels of information. As a concrete sound a spoken word may be merely the primary sensation of a sound within primary consciousness that has been repeatedly processed by the use of the inherited capacity to transduce auditory neural impulses into spoken concrete sounds ; *and in addition*, as a part of a meaningful linguistic code, the same spoken sound may function as an acquired abstract word in secondary sensation within the secondary consciousness that is a carrier of meaning. Primary consciousness is limited to the production and awareness of the sound. Secondary consciousness, in addition to the regulation of the production of explicit speech that carries an awareness of the sound, *also* contains an awareness of the linguistic code that assigns meaning to the sound and thus constitutes the comprehension of the sound. Under ordinary circumstances awareness of the physical medium is subordinated to the awareness of the abstract meaning. Thus, in this example the breakdown of comprehension of secondary sensations in secondary consciousness reveals that under normal circumstances there is an underlying awareness of the mechanisms of the production of primary sensations within primary consciousness. Thus, the production mechanisms of speech of primary consciousness form the neural substrates for the comprehension mechanisms of spoken language of secondary consciousness.

This example shows that the usual relationship between primary and secondary sensations is normally so seamless that at times only special circumstances (such as repetitive recitation) can reveal the differences between them.

It is planned to more fully explore in later papers the differences between production and comprehension of language in primary and secondary consciousness.

It should be noted that the spoken auditory sound was a Pavlovian first signal system stimulus of concrete reality and the spoken sound-as-word was a Pavlovian second signal system stimulus of abstract reality that operated as a "signal of a signal".

Another example of the difference between primary and secondary sensation is provided by the work of Kurt Goldstein (1939) who described the behavior of some of his neurologically damaged patients. Goldstein noted that some of his patients, when walking down a hospital corridor to the restroom, and coming to its end in an

intersection, could correctly turn left if the sign was a picture of a hand pointing left, but could not make the correct choice if the sign was an arrow pointing left. Goldstein interpreted the situation as follows: correct ambulatory choice behavior following the presentation of the picture of a hand was interpreted as a concrete representation (a signal) because it only required a concrete attitude for interpretation of finger pointing as part of the familiar physical human gesture conventionally used to point out directions worldwide; whereas, the arrow (which was a linear symbol) required the deployment of a damaged abstract attitude and could not be used to guide the correct choice behavior. The patients were able to correctly read the primary sensation of the signal, but not the secondary sensation of the symbol.

Thus, it may be suggested that the signal of a pointing hand operated at the level of primary consciousness as a primary sensation and that the arrow as a symbol of direction operated at the level of secondary consciousness as a secondary sensation which was unavailable to the patient who had lost the abstract attitude.

It should be noted that sensation and perception are not only linked to each other, but they are also both linked to consciousness. The definition of sensation in sense 2 above that sensation produces "...basic awareness ..." of various forms of concrete stimulations, inextricably links sensation to primary consciousness. The definition of perception quoted above that perception is the process of "...becoming aware of objects, relationships and events..." that includes the activities of "...recognizing, observing and discriminating..." inextricably links perception to meaningfulness in secondary consciousness.

Further discussion of the process of perception will be taken up in the next section.

It is suggested that unlearned primary sensations are present in the human child long before social learning systems allow sensations to become the carriers of abstract cultural meanings in addition to their original functions as carriers of information about the concrete natural world. Thus, primary sensations in the course of human development contribute to the production of primary knowledge (as defined above) residing in primary consciousness and secondary sensations in the course of human development contribute to the production of secondary knowledge (as defined above) residing in secondary consciousness.

It is also suggested that secondary sensation is a hierarchical, transcendent process created when primary sensations produce not only basic awareness of stimulation and the resultant activation of the first signal system; but in addition, the basic awareness-of-awareness of the second signal system made possible when prior exogenous experiences of associative learning of languages transform stimulations into signals-of-signals. Thus, secondary sensation is the process whereby secondary-

consciousness-experiences are produced by initial stimulation of sensory receptors at the level of primary consciousness followed by the resultant activation of the second signaling system at the level of secondary consciousness.

It should be noted that primary sensation occurs following stimulation of sensory receptors by forms of physical energies emanating from internal or external concrete physical or biological entities. Whereas, secondary sensation occurs following stimulation of sensory receptors by forms of symbolic human language systems carried by linguistic codes such as spoken or written words, as well as by visual sign languages and braille writing systems.

It is also suggested that processing of sounds as constituents of primary consciousness may well take place at different brain centers than the brain centers used to process language at the higher level of secondary consciousness. A detailed discussion of the neuroscience of the different brain centers involved will be treated in a later paper in this planned series of publications.

Anyone who has heard other people speaking an unintelligible foreign language has had the experience of hearing the conversation as merely primary sensations of sounds; while having no understanding of the meanings of the words as secondary sensations carrying the linguistic code of that foreign lexicon.

Considerations of using sound, text, signs and touch as the fundamental sensory stimulation used in various communication systems are summarized in Table 4 below:

Table 4 –Four human language systems

Language System	Sensory Receptor	Primary Sensation Awareness of:	Secondary Sensation Awareness of:
Speech	Hearing receptor	Sound as stimulus	Sound as lexicon
Writing	Visual receptor	Text as marks	Text as lexicon
Sign language (ASL)	Visual receptor	Signs as movements	Signs as lexicon
Braille	Touch receptor	Touch as raised points	Touch as lexicon

The first and second columns of Table 2 show each of four human language systems and the sensory receptors that have been used to receive stimulations in each system. The third and fourth columns show the contents of primary and secondary consciousness for the same stimulus in each of the four systems. For example, in the first row, hearing receptors transduce the vibratory energy of the spoken word “house” into either the awareness of a supra-threshold concrete noise in primary consciousness with no additional meaning or into the awareness in secondary consciousness that the sound of that same noise is a part of the linguistic code that comprises the English lexicon. The third column contains examples of primary sensations and the fourth column contains examples of secondary sensations.

The above considerations suggest that the hierarchical relationship between primary and secondary consciousness is such that:

- 1.) all sensation, in either primary or secondary consciousness, requires transduction by receptors and transmission of information to specific brain centers;
- 2.) an acquired lexicon of secondary sensations of abstract reality can be erected by use of the second signaling system upon a foundation of unlearned primary sensations of concrete reality of the first signaling system, and,
- 3.) primary and secondary consciousness in successfully socialized adults operate in such a normally seamless manner that the distinctions between primary and secondary consciousness are not immediately apparent.

Given these considerations and the APA definitions quoted above, the following two subsidiary definitions are proposed:

(1) A primary sensation may be defined as a Pavlovian first-signaling-system sensory process common to animals and humans that is caused by a primary stimulus of concrete reality as the unit of irreducible experience within primary consciousness that activates a sensory receptor and the resultant activation of a specific nonlanguage brain center, producing basic awareness of a sound, odor, color, shape, or taste, or of temperature, pressure, pain, muscular tension, position of the body, or change in the internal organs associated with such processes as hunger, thirst, nausea, and sexual excitement. Accumulation of primary sensations over time contribute to the production of primary knowledge. Indeed, the learning of required motor skills by the novice can, over time, provide the necessary levels of primary knowledge of manual dexterity required by motor skills so that the novice with time and practice becomes an expert.

(2) A secondary sensation may be defined as a Pavlovian second-signaling-system sensory process restricted to humans possessing a linguistic code that is initiated by a secondary stimulus of abstract reality (a spoken or written word or visual sign language or raised-point stimulus) as the unit of irreducible experience within secondary consciousness that activates a speech receptor, or hearing receptor, or visual receptor, or touch receptor and in addition the resultant activation of a specific speech brain center or hearing brain center or visual sign language brain center or touch brain center producing basic awareness of the associated cognitive, motivational, emotional or perceptual meaning of the components of the linguistic code. Accumulation of secondary sensations over time contribute to the production of secondary knowledge.

We now turn to the fundamental process of perception.

Primary and secondary perception

At the start of the previous section it was noted that there exists a very intimate relationship between sensation and perception. In short, sensation is the process of providing raw sensory information about the world and perception is the process that provides meaningful interpretations of that sensory information.

Two of the major functions of perception are: (1) the localization, and, (2) the recognition--- of environmental stimulations. Object localization refers to observing and discriminating 'where' objects are in the surrounding world; whereas object recognition refers to recognizing the meaning of objects in the sense of 'what' they are (Atkinson, et al, 2000). The importance of information about the location and the recognition of environmental stimulation was noted by Schiffman (1976) when he wrote that:

Virtually every living species has evolved some means of extracting information from its habitat for its survival---information such as the location and identification of food, water, prey, predators, and mates.
(p. 6)

The processes of object localization and object recognition are incorporated into the *APA Dictionary of Psychology* (2015) definition of **perception** in the following way:

perception *the process or result of becoming aware of objects, relationships, and events by means of the senses, which includes such activities as recognizing, observing, and discriminating. These activities enable organisms to organize and interpret the stimuli received into meaningful knowledge and to act in a coordinated manner. (p. 775)*

If one accepts the above APA definition as a definition for the totality of the process of perception; then it possible to edit this definition in two ways: first as a definition of **primary perception** within primary consciousness, and then as a definition of **secondary perception** within secondary consciousness as follows:

1. A primary perception may be defined as the process or result of becoming aware within primary consciousness of objects, relationships, and events in the individually experienced physical, natural surrounding world (by means of primary sensation as defined above). These activities enable organisms to organize and interpret the concrete stimuli received into meaningful primary knowledge (as herein defined) and to act in a coordinated individual manner when stimulated by objects in the natural world.
2. A secondary perception may be defined as the process or result of becoming aware within secondary consciousness of objects, relationships and events in the collective, social human world (by means of secondary sensation as defined above) which includes such activities as recognizing, observing, and discriminating words and other abstract symbols. These activities enable human organisms to organize and interpret the abstract, linguistic stimuli received into meaningful secondary knowledge (as herein defined), and to act in a coordinated social manner when stimulated by objects in the cultural world.

As a preview of forthcoming work, Tables 5 and 6 present some of the topics that will be further elaborated in future papers of the present series as attempts to specify distinctions within the fundamental process of perception between primary and secondary consciousness.

Table 5 - Summary of proposed distinctions in perception

<u>Primary Consciousness</u>	<u>Secondary Consciousness</u>
<u>Primary perception</u>	<u>Secondary perception</u>
Primary knowledge	Secondary knowledge
Concrete objects	Abstract words
Concrete sounds	Sounds as words
Individual awareness	Social awareness
Coordinated individual behavior	Coordinated social behavior
Neural code	Neuro-linguistic code
Dorsal stream (See Table 6)	Ventral stream (See Table 6)

Table 6– Summary of four streams and two pathways

<u>Primary Consciousness</u>	<u>Secondary Consciousness</u>
<u>Primary visual perception</u>	<u>Secondary visual perception</u>
Visual dorsal stream (VDS)	Visual ventral stream (VVS)
Where is it?	What is it?
Vision for action	Vision for perception
Visual object localization	Visual object recognition
Visual cortex to parietal lobe to frontal lobe	Visual cortex to temporal lobe to frontal lobe
<u>Auditory dorsal steam (ADS)</u>	<u>Auditory ventral stream (AVS)</u>
Speech production	Speech recognition
Auditory sound localization	Auditory sound recognition
Auditory cortex to parietal lobe to frontal lobe	Auditory cortex to temporal lobe to frontal lobe
<u>Magnocellular Pathways</u>	<u>Parvocellular Pathways</u>
Large cells	Small cells
Fast response	Slow response
Transient response	Sustained response
Dominant input to VDS	Dominant input to VVS
Dominant input to ADS	Dominant input to AVS
Monochrome response in VDS	Color response in VVS

High contrast gain in VDS	Low contrast gain in VVS
Lower spatial resolution in VDS	Higher spatial resolution in VVS

Primary and secondary motivation

According to the *APA Dictionary of Psychology (2015)* the distinction between primary and secondary motivation already exists within the field of psychology. Motivation is defined in the following ways:

motivation *the impetus that gives purpose or direction to human or animal behavior and operates at a conscious or unconscious level (see UNCONSCIOUS MOTIVATION). Motives are frequently divided into (a) physiological, primary, or organic motives, such as hunger, thirst, and the need for sleep, and (b) personal, social or secondary motives, such as affiliation, competition, and individual interests and goals. An important distinction must also be drawn between internal motivating forces and external factors, such as rewards or punishments, that can encourage or discourage certain behaviors. See EXTRINSIC MOTIVATION: INTRINSIC MOTIVATION. (p. 670)*

As may be seen in the above definition, primary motivation at the level of primary consciousness exists as physiological, primary, or organic motives such as hunger, thirst, and the need for sleep. Secondary motivation at the level of secondary consciousness exists as personal, social or secondary motives such as affiliation, competition, and individual interest and goals.

The distinction between primary and secondary motivation is also directly provided by the the *APA Dictionary of Psychology (2015)* as follows:

primary motivation *motivation created by the presence of a PRIMARY NEED. Compare SECONDARY MOTIVATION. (p.831)*

secondary motivation *motivation that is created by personal or social incentives (e.g., the urge to learn classical music or become a movie star) rather than by primary physiological needs (e.g., for food). Compare PRIMARY MOTIVATION. (p.946)*

The distinction between primary and secondary needs are contained in the *APA Dictionary of Psychology (2015)* as follows:

primary need *an innate need that arises out of biological processes and leads to physical satisfaction, such as the need for water and sleep. See also PHYSIOLOGICAL NEED; SECONDARY NEED. (p. 831)*

secondary need *a need developed through with or generalization from a PRIMARY NEED. Also called derived need. (p. 946)*

The distinction between primary and secondary drives are provided by the *APA Dictionary of Psychology (2015)* as follows:

primary drive *an innate drive, which may be universal or species-specific, that is created by deprivation of a needed substance (e.g., food) or by the need to engage in a specific activity (e.g., nest building in birds). Compare SECONDARY DRIVE.*

secondary drive *a learned drive; that is, a drive that is developed through association with or generalization from a PRIMARY DRIVE. For example, in an AVOIDANCE CONDITIONING experiment in which a rat must go from one compartment into another to escape an electric shock, the secondary drive is fear of the shock and the primary drive with which it is associated is avoidance of pain. Also called **acquired drive**. (p. 945)*

Finally, the distinction between extrinsic and intrinsic motivation is provided by the *APA Dictionary of Psychology (2015)* as follows:

intrinsic motivation *an incentive to engage in a specific activity that derives from pleasure in the activity itself (e.g., a genuine interest in a subject studied) rather than because of any external benefits that might be obtained (e.g., money, course credits). Compare EXTRINSIC MOTIVATION (P. 550).*

extrinsic motivation *an external incentive to engage in a specific activity, especially motivation arising from the expectation of punishment or reward. (e.g., completing a disliked chore in exchange for payment). Compare INTRINSIC MOTIVATION. (p. 403)*

If one substitutes the word ‘endogenous’ for ‘intrinsic’ and the word ‘exogenous’ for ‘extrinsic’, then the above distinction can be clearly seen as the difference

between motivation arising from internal sources versus the motivation arising from external sources and, it may be concluded that intrinsic (or endogenous) motivation can be taken as a form of awareness in primary consciousness and that extrinsic (or exogenous) motivation can be taken to be form of awareness in secondary consciousness.

Summarizing these considerations already present in the definitions provided by the APA, it may be concluded that primary motivations, primary needs, primary drives and intrinsic motivations occur most often within primary consciousness and that secondary motivations, secondary needs, secondary drives, and extrinsic motivations occur most often within secondary consciousness.

These considerations are summarized in Table 7.

Table 7 – Summary of proposed distinctions in motivation

Primary consciousness:

Primary motivation
Primary need
Primary drive
Intrinsic motivation

Secondary Consciousness:

Secondary motivation
Secondary need
Secondary drive
Extrinsic motivation

Primary and secondary emotion

According to the *APA Dictionary of Psychology (2015)* the distinction between primary and secondary emotion already exists within the field of psychology. Emotion is already defined in the following three ways:

emotion *n.* A complex reaction pattern, involving experiential, behavioral and physiological elements, by which an individual attempts to deal with a personally significant matter or event. The specific quality of the emotion (e.g., FEAR, SHAME) is determined by the specific significance of the event. For example, if the significance involves threat, fear is likely to be generated; if the significance involves disapproval from another, shame is likely to be generated. Emotion typically involves FEELING but differs from feeling in having an overt or implicit engagement with the world. (p. 362)

primary emotion *any one of a limited set of emotions that typically are manifested and recognized universally across cultures. They include FEAR,*

*ANGER, JOY, SADNESS, DISGUST, CONTEMPT, AND SURPRISE. Some theorists also include SHAME, SHYNESS and GUILT. Also called **basic emotion**. Compare SECONDARY EMOTION. (P.729)*

secondary emotion *an emotion that is not recognized or manifested universally across cultures or that requires social experience for its construction. For some theorists, PRIDE represents a secondary emotion, stemming from the conjunction of a PRIMARY EMOTION (JOY) and a favorable public reaction. Other secondary emotions include ENVY, LOVE and JEALOUSY. (p. 822)*

Based upon these definitions, it may be concluded that primary emotions most often occur within primary consciousness and that secondary emotions most often occur within secondary consciousness.

Primary and secondary cognition

Within the history of psychology, for many years during the 18th and 19th centuries the nature of the human mind was taken to consist of what Hilgard (1980) referred to as the ‘triology of mind’ composed of affect (emotion), conation (motivation) and cognition. This historical view of the human mind has been incorporated into the APA definition of cognition.

According to the *APA Dictionary of Psychology (2015)* ‘cognition’ may be defined in the following manner:

cognition *all forms of knowing and awareness, such as perceiving, conceiving, remembering, reasoning, judging, imagining, and problem solving. Along with AFFECT and CONATION it is one of the three traditionally identified components of mind. 2. An individual percept, idea, memory and the like. (See also SYMBOLIC PROCESS; THINKING. (pp. 201-202)*

Given that cognition is defined as “...all forms of knowing and awareness...”, the distinction between primary and secondary cognition may be based upon our earlier distinction between primary and secondary knowledge. Recall that it was suggested that primary knowledge can be acquired from the endogenous, direct, immediate, moment-to-moment interactions and raw personal sensory and perceptual “*experiences*” that the individual animal or human organism has with the objective, surrounding natural world of physical-object reality. It was also suggested that secondary knowledge can be acquired by “*learning*”, not only by acquisition of

information from readouts of existing amounts of primary knowledge; but, in addition, and more importantly, secondary knowledge can be generated by the acquisition of psychological-level, higher-order, nonsensory concepts and other cognitions resulting from the influence of exogenous, inter-individual linguistic interactions with the objective, surrounding social world of human culture. The process whereby human young initially acquire secondary cognition may be referred to socialization or acculturation. Learning may be the product of direct, conscious attempts by conspecifics to teach the young or it may be the product of indirect, unplanned learning often referred to as observational learning by the young.

It is a thesis of the present work that there are two fundamental forms of cognition: primary cognition reflected in primary consciousness and secondary cognition reflected in secondary consciousness.

Given these considerations, the following two new definitions are proposed:

primary cognition all forms of primary knowing, primary awareness, and primary consciousness, such as perceiving, conceiving, remembering, reasoning, judging, imaging, and problem solving that are based upon the primary nonverbal knowledge acquired from endogenous, direct, moment-to-moment interactions and raw sensory experiences that the individual animal or human organism has with the objective, surrounding natural world of physical-object reality.

and,

secondary cognition all forms of secondary knowing, secondary awareness and secondary consciousness such as perceiving, conceiving, remembering, reasoning, judging, imaging and problem solving that are based upon the secondary verbal knowledge acquired from exogenous, inter-individual verbal/linguistic interactions with the objective, surrounding social world of human culture. There is assumed to be a hierarchical relationship between primary and secondary cognition such that the moment-to-moment bottom-up products of primary cognition are made available to secondary consciousness for top-down control and executive functions.

‘Affect’ and ‘conation’ as contained in the APA definition are defined as follows:

affect *n. any experience or feeling of emotion, ranging from suffering to elation, from the simplest to most complex sensations of feeling, and from the most normal to the most pathological emotional reactions. [...]* (p.26)

conation *n. the proactive (as opposed to habitual) part of motivation that connects affect, drives, desires, and instincts to behavior. [...]* (p.227)

Within the present work primary and secondary emotion and primary and secondary motivation have already been discussed.

Symbolic process, symbol, symbolic thinking and thinking are all mentioned above in the *APA Dictionary of Psychology (2015)* definition of cognition and they are all defined as follows:

symbolic process *in cognitive psychology, any cognitive activity in which ideas, images, or other mental representations serve as mediators of thought.* (p.1056)

symbol *n. any object, figure, or image (e.g., flag, logo, pictogram, religious symbol such as a cross) that represents something else. A written or spoken word can be regarded as a particular kind of symbol* (p.1056)

symbolic thinking *the ability to think in terms of signs, symbols, concepts and abstract relations, as evidenced by language, numeracy, and artistic or ritual expression.* (p.1057)

thinking *cognitive behavior in which ideas, images, mental representations, or other hypothetical elements of thought are experienced or manipulated. In this sense thinking includes imagining, remembering, problem solving, daydreaming, free association, concept formation and many other processes. Thinking may be said to have two defining characteristics: (a) It is covert, that is, not directly observable but must be inferred from behavior or self-reports; and (b) it is symbolic, it seems to involve operations on mental symbols or representations, the nature of which remains obscure and controversial (See SYMBOLIC PROCESS)* (p.1084)

It may be concluded that symbolic process, symbol, symbolic thinking and thinking as defined above most often occur at the level of secondary consciousness.

However, the complex relationship between higher forms of cognition in secondary consciousness and lower forms of cognition in primary consciousness shall be addressed in future papers of this planned series.

Primary and secondary personality-self-individuation

According to the *APA Dictionary of Psychology (2015)* the related concepts of personality, self and individuation may be defined in the following ways:

personality *n. the enduring configuration of characteristics and behavior that comprises an individual's unique adjustment to life, including major traits, interests, drives, values, self-concept, abilities and emotional patterns. Personality is generally viewed as a complex, dynamic integration or totality shaped by many forces, including hereditary and constitutional tendencies; physical maturation; early training; identification with significant individuals and groups; culturally conditioned values; and roles; and critical experiences and relationships. Various theories explain the structure and development of personality in different ways, but all agree that personality helps determine behavior. (p.782)*

self *n. the totality of the individual, consisting of all characteristic attributes, conscious and unconscious, mental and physical. [...] (p. 951)*

individuation *n. 1. in psychology, the physiological, psychological and sociocultural processes by which a person attains status as an individual human being and exerts himself or herself as such in the world. 2. in the psychoanalytic theory of Carl Jung, the gradual development of a unified, integrated personality that incorporates greater and greater amounts of the UNCONSCIOUS, both personal and collective, and resolves any conflicts that exist, such as those between introverted and extroverted tendencies. (p. 535)*

Perusal of the above definitions leaves no doubt that personality, self, and individuation are concepts that describe the totality of the individual and can be described by a hyphenated term that includes all three concepts.

Given the above definitions, a distinction may be drawn between primary and secondary personality-self-individuation in the following manner:

1. **primary personality-self-individuation** those biologically-based processes within primary consciousness heavily influenced by the physiological processes that allow one to get along in the natural world

of primary sensations by experiencing primary perceptions; by satisfaction of primary needs and primary motivations and primary emotions; and by acquisition of primary cognitions.

2. **secondary personality-self-individuation** those socially-based processes within secondary consciousness heavily influenced by the sociocultural processes that allow one to get along in the social world of secondary sensations and secondary perceptions: by satisfaction of secondary needs and motivations and by experiencing secondary emotions; and by acquisition of secondary cognitions.

Given the above second definition of individuation, it should be noted that two Jungian conceptions are consonant with the present views. The first is the idea that there exists a personal unconscious that would presumably more heavily influence primary consciousness and a collective unconscious that would presumably more heavily influence secondary consciousness. The second notion is that personality-self-individuation may be oriented towards the self (introversion) or towards the social world (extroversion); a distinction that gives rise to the following definition in the *APA Dictionary of Psychology* (2007):

introversion-extroversion *the range , or continuum, of self-orientation from INTROVERSION , characterized by inward self-directed concerns and behaviors to EXTRAVERSION characterized by outward social concerns and behaviors. (p.499)*

The idea that introversion-extraversion is conceived to be a continuum of self-orientation that may range from introversion processes contained in primary consciousness to extroversion processes contained in secondary consciousness raises the question of the extent to which primary and secondary consciousness themselves may exist as a continuum rather than as a dichotomy.

Although this issue will be discussed in future papers of this series, it should be clear that the present writer believes that primary and secondary consciousness are much better described as a continuum in personality-self-individuation than as a dichotomy within the totality of total personality-self-individuation.

Further discussion to follow in future papers in this series.

Section 5: Some basic constituents of psychology

Primary and secondary memory

Although James (1890/1891) in his chapter on memory distinguished between primary memory (later to be called short-term or working memory) and secondary memory (later to be called long-term-memory) based upon temporal distinctions; it is theorized that it is possible to distinguish between a *primary memory* and a *secondary memory* as differential functions of primary and secondary consciousness respectively. According to the *APA Dictionary of Psychology* (2007) memory may be defined as:

memory *the ability to retain information or a representation of past experience, based on the mental processes of learning or encoding, retention across some interval of time and retrieval or reactivation of the memory.*(p. 565).

Given this definition of memory it is possible to proffer the following definitions as differential functions of primary and secondary consciousness respectively:

1. **Primary memory** may be defined as the nondeclarative capacity to retain primary knowledge comprised of information or a representation of past experience characterized by primary stimulation, primary awareness and primary reaction of first-signaling system activity. Primary memory is based on the mental processes of learning, encoding, retention and the retrieval or reactivation of memory at the level of primary consciousness.
2. **Secondary memory** may be defined as the declarative capacity to retain secondary knowledge comprised of information or a representation of past experience characterized by secondary stimulation, secondary awareness and secondary action of second signaling system activity. Secondary memory is based on the mental processes of learning, encoding, retention and retrieval or reactivation of memory at the level of secondary consciousness.

It is theorized that primary memory includes images, signs and signals of the first signaling system; autocentric episodic memories; procedural and skill memories and a relatively high loading toward implicit memories. Secondary memory includes symbols of the second signaling system; allocentric episodic and semantic memories; and a relatively high loading toward explicit memories.

Primary and secondary attention

Primary and secondary attention that may be contained in primary and secondary consciousness respectively have been defined as follows:

primary attention *attention that does not require conscious effort, such as attention to an intense, powerful or arresting stimulus. In classical psychology, the term is used to denote the basic kind of attention that is common to all animals and the first to develop in humans. (p. 830)*

secondary attention *active attention that requires conscious effort, such as the attention needed to analyze a painting or sculpture. In classical psychology, developed in humans after PRIMARY ATTENTION. Also called **active attention**. See also VOLUNTARY ATTENTION. (p. 944)*

Primary and secondary genes

According to the *APA Dictionary of Psychology* (2007) a gene may be defined in the following way:

gene *n. the basic unit of heredity, responsible for storing genetic information and transmitting it to subsequent generations. The observable characteristics of an organism (i.e., its PHENOTYPE) are determined by numerous genes, which contain the instructions necessary for the functioning of the organism's constituent cells. Each gene consists of a section of DNA, a large and complex molecule that, in higher organisms, is arranged to form the CHROMOSOMES of the cell nucleus. Instructions are embodied in the chemical composition of the DNA, according to the GENETIC CODE. In classical genetics a gene is described in terms of the trait that it determines... At the molecular level most genes encode proteins, which carry out the functions of the cell, or regulate the expression of other genes... A minority encode vital components of the cell's protein-assembling apparatus, such as ribosomes. (...) (p.402)*

Given this definition of a gene, the following new definitions may be proffered:

1. **primary gene** a primary unit of heredity that is defined in a manner identical to the complete above definition of the gene as it appears on p.402 of the *APA Dictionary of Psychology* (2007).
2. **secondary gene** a secondary unit of heredity, responsible for preparing the organism to receive social information and for transmitting the inherited facilitation of social learning to subsequent generations. Secondary genes are primary genes that contain instructions necessary for the organism to successfully function within its social world. As primary genes specialized to facilitate social behaviors, secondary genes must therefore operate by following all of the necessary laws and principles governing the activities of primary genes.

Examples of primary genes underlying normal consciousness would be the numerous genes responsible for the successful physiological prenatal development of the human brain with its many structures and functions. One example of such primary genes is LIS1 which is a human gene that apparently plays a fundamental role in the successful sulcation of the human brain. Montare (2002) noted that:

Abnormal anatomical failure of sulcation in smooth, unconvoluted, unsulcated human neocortex (lissencephaly) is a rare, severe pathological condition that is fatal if there is a complete lack of expression of the LIS1 gene and that when nonlethal "...results in epilepsy, mental retardation and motor impairment..." (Leventer, et al, 2001)." [as quoted in Montare, 2002, p. 380]

Theorized examples of putative secondary genes would be the numerous as yet unknown genes that would make up the proposed "language acquisition device (LAD)" that is defined in the *APA Dictionary of Psychology* (2007) in the following manner:

language acquisition device (LAD) *a hypothetical faculty used to explain a child's ability to acquire language. In the early model proposed by U.S. linguist Benjamin Lee Whorf (1897-1941), the LAD is an inherited mechanism that enables children to develop a language structure from linguistic data supplied by parents and others. In Noam CHOMSKY'S reinterpretation, however, the LAD contains significant innate knowledge that actively interprets the input: only this can explain how a highly abstract competence in language results from a relatively deprived input. See NATIVISTIC THEORY. (p. 522)*

A specific example of an actual secondary gene is to be found in the recent literature describing the role of the FoxP2 gene as an example of an allocentric secondary gene that is involved in the development of human speech and language. Webb and Zhang (2005) state that: “FoxP2 is the first identified gene that is specifically involved in speech and language development in humans”. (p.212)

Therefore, it may be hypothesized that LIS1 is a primary gene that appears to be involved in the normal developmental precursors of the Pavlovian first signaling system of primary consciousness and FoxP2 is a secondary gene that is involved in the normal development of the second signaling system of secondary consciousness.

Another proposal that would constitute an example of the involvement of putative secondary genes in language development would be the proposed “language acquisition support system (LASS)” that is defined in the following way:

language acquisition support system (LASS) *the processes whereby adults and older children help a young child to acquire language. It is suggested that adults and older children have learning devices that interact with the LANGUAGE ACQUISITION DEVICE of the younger child. [proposed by U. S. developmental psychologist Jerome Seymour Bruner (1915-). (p.522)*

If one interprets the concept of the LASS to include the idea that perhaps it is a system of putative epigenetically determined learning devices expressed in adults and older children, then the LASS, as well as the LAD, (and most importantly the LASS-by-LAD interactions) would constitute examples of the expression of secondary genes that are as yet to be fully identified.

A more complete discussion of primary and secondary genes and their expressions within normal and diseased human consciousness is a task for future publications.

Primary and secondary stimulus

According to the *APA Dictionary of Psychology* (2007) a stimulus may be defined as:

stimulus “any agent, event, or situation--internal or external—that elicits a response from an organism.” (p. 895).

Given this causal definition and the preceding sections, the following new definitions may be proffered:

- 1 **primary stimulus** any agent, event or situation within concrete physical

reality—internal or external—that elicits a first-signaling-system response from an organism at the level of primary consciousness. A primary stimulus is always some concrete physical object, agent, event or situation that causes a sensory receptor to transduce the physical energy of the stimulus into neural impulses.

2. **secondary stimulus** any socially-derived agent, event or situation within abstract mental reality that elicits a second-signaling-system response from an organism at the level of secondary consciousness. A secondary stimulus may be a nonverbal symbol or a verbal word. Whenever any nonverbal primary stimulus within concrete physical reality has gained the symbolic function as the result of associative learning it becomes a secondary stimulus within abstract mental reality. Whenever the primary stimulus is a word followed by linguistic interpretation it becomes a secondary stimulus. A written or spoken word processed without resulting in any syntactic, semantic or symbolic knowledge simply remains a physical primary stimulus.

On the first definition, primary stimulation would tend to consist of the physical concrete stimulations that comprise what has already been cited above from Pavlov called “... our sensations, perceptions and direct impressions of the surrounding world [that] are for us the primary signals of reality, the concrete signals”. On the second definition, secondary stimulation would tend to consist of words and symbols because Pavlov stated that “...words are secondary signals. They represent themselves as abstractions of reality and permit generalizations...” and Piaget invoked the symbolic function as the process whereby the child gradually differentiates the abstract-signifier from the concrete-signified.

An example of the difference between primary and secondary stimulation would be the onset of a red traffic light as seen by both an infant passenger and an adult driver. To the infant, who has not yet learned its symbolism, the red light is merely another primary stimulus. To the adult the red light is both a primary stimulus and a secondary stimulus that, as the result of prior socially-based driver-education learning, has become a social symbol of the need to apply the brakes in compliance with traffic rules and regulations. Another example of secondary stimulation would be the words “red light!!” anxiously spoken by another adult in the car (with the intention of eliciting the symbolic function in the driver) to an otherwise distracted driver that could elicit the braking reaction even if the driver had been otherwise temporarily distracted and did not actually see the primary stimulation of the onset of the red light.

It should be noted that the definition of a stimulus does not depend upon the nature of the stimulus as much as it depends on the knowledge of the organism that transduces the physical energy of the proximal stimulus into neural energy. In the above example, the same physical stimulus of the red light produced two very different responses in two different humans. Both the infant and the adult were consciously aware of the same primary stimulus (the red light)—however only in the adult did the primary stimulus evoke knowledge contained in secondary consciousness and thus became a secondary stimulus as herein defined.

Primary and secondary response

According to the *APA Dictionary of Psychology (2007)* a response is defined in the following way:

response “*any glandular, muscular, neural, or other reaction to a stimulus. A response is a clearly defined, measurable unit of behavior discussed in terms of its result (e.g., pressing a lever) or its physical characteristics (e.g., raising an arm).*” (p. 793).

Based upon this definition and the preceding definitions of primary and secondary stimulation, the following new definitions may be proffered:

1. **primary response** any glandular, muscular, neural or other reaction to a primary nonsymbolic stimulus. A primary response “...*is a clearly defined, measurable unit of behavior discussed in terms of its result (e.g., pressing a lever) or its physical characteristics (e.g., raising an arm)*”.
2. **secondary response** any glandular, muscular, neural or other reaction to a secondary symbolic stimulus. A secondary response is a clearly defined, measurable unit of verbal behavior (e.g., speaking or writing) or a clearly defined, measurable unit of nonverbal symbolic behavior (e.g., pressing a brake as a means of stopping a car in order to obey social traffic rules).

In the above example the child made an unlearned primary response (an orienting response) to the red light and the driver made a socially-learned secondary response (pressing the brakes) to the red light. The driver also made a socially-learned secondary response (pressing the brakes) to the verbal exclamation by the other adult passenger.

It should be noted that a repetitive secondary response such as pressing a car's brake pedal is often automatized to the extent that an experienced driver sitting in the front passenger's seat will sometimes emit the braking response elicited by a perception of an emergency traffic situation in the absence of a brake pedal. One

interpretation of this realistically irrational response (pressing an imaginary pedal can't stop a car) is that the originally explicitly learned braking response in the novice driver that was so consciously initially acquired as a secondary response within secondary consciousness over time in the experienced driver becomes an implicit part of the entire driving scenario and becomes efficiently automatized as a primary response within primary consciousness. A further discussion of the relationship between such primary and secondary responses and of the process of conditioned automatization may be found in Montare (1992b).

Primary and secondary S-O-R formulation

In the history of psychology it is generally recognized that the S-O-R formulation was originally set forth by Woodworth and Schlosberg (1954) in an attempt to formalize the task of the experimenter (E). They stated that:

A psychological experiment can be symbolized by S-O-R, which means that E (understood) applies a certain stimulus (or situation) to O's receptors and observes O's response. This formula suggests a class of experiments in which E's aim is to discover what goes on in the organism between the stimulus and the motor response. (Woodworth & Schlosberg, 1954, p.2)

Although the S-O-R formulation was originally developed for use in experimental psychology, over the years it has been generalized to serve as the framework for any type of psychological discourse wherein the aim is to "...discover what goes on in the organism..." so that today S-O-R psychology provides psychologists with an overall framework for psychological discourse when defined in the following way in the *APA Dictionary of Psychology* (2007):

S-O-R psychology *stimulus-organism-response psychology: an extension of the S-R Psychology of behaviorists incorporating the notion of R. S. Woodworth that factors within the organism help determine what stimuli the organism is sensitive to and which responses may occur. The O factors may be biological or psychological. [...]* (p.876)

Given the above definition and our distinction between primary and secondary consciousness, the following new definitions may be proffered:

1. **primary S-O-R** an S-O-R formulation that contains a primary stimulus (independent variable), an intra-organismic intervening variable of the first

signaling system at the level of primary consciousness, and a primary response (dependent variable).

2. **secondary S-O-R** an S-O-R formulation that contains a secondary stimulus (independent variable), an intra-organismic intervening variable of the second signaling system at the level of secondary consciousness, and a secondary response (dependent variable).

As an example of the primary S-O-R formulation, consider the herein previously discussed classical demonstration by Pavlov (1927) in the dog that a conditional stimulus (a bell) can come to elicit a conditional response (salivation) following previous associative pairings of bell-food presentations presumably as an intervening variable function of the first signaling system activity of primary consciousness. As an example of the secondary S-O-R formulation, consider a college student in a word-association reaction time situation who responds as quickly as possible with a response-word when presented with a stimulus-word presumably as an intervening variable function of the second signaling system activity of secondary consciousness.

Primary and secondary awareness

According to the *APA Dictionary of Psychology (2015)* awareness may be defined as follows:

awareness n. perception or knowledge of something. Accurate reportability of something perceived or known is widely used as a behavioral index of conscious awareness. (p.101)

Given that the concept of awareness is central to the idea of consciousness, there should be a heuristic value to a bifurcated distinction between *primary awareness* and *secondary awareness*. It is theorized that a function of primary awareness is to provide conscious primary knowledge *that something is there*; whereas a function of secondary awareness is to provide conscious secondary knowledge of *what is there*. In terms of its survival function, it is more important to a prey animal to respond in an immediate fashion to the localization of a predator and so one would expect that conscious primary awareness *that something is there* would be linked to a motor pathway for immediate emergency evasive action. In terms of its survival function, if prior identification of the localization of predators places the predator beyond immediate striking distance, then there is time for the prey to allow consciousness of the recognition process to unfold and to proceed to the secondary issue of *what is there*.

Given this proposed distinction, the following new definitions may be proffered:

1. **Primary awareness** an organism's increase in informational knowledge following the reception of primary stimulation at the level of primary consciousness that provides conscious knowledge *that something (internal or external) is there*.
2. **Secondary awareness** an organism's increase in informational knowledge following the transformation of experienced primary stimulation into interpretive secondary stimulation at the level of secondary consciousness that provides conscious knowledge of *what (internal or external) is there*.

Given the above distinction, it may be seen that dictionary definitions of awareness tend to cluster around two basic ideas: a first cluster that can be collectively identified with our notion of primary awareness consisting of the constellation of concepts composed of the words *consciousness; alertness; responsiveness; attentiveness; sentience*; and a second cluster that can be collectively identified with our notion of secondary awareness consisting of the constellation of concepts centered on the words: *knowledge; understanding; grasp; appreciation; familiarity; recognition; perception; discernment*.

If one accepts the difference between sensation and perception to be the difference between sensation as consciousness of a proximal stimulus (sensation) and perception as interpretation of a distal stimulus (perception = sensation + interpretation); then primary awareness is a sensory-based process that occurs at the level of primary consciousness and secondary awareness is a perceptually-based, higher-order cognitive process that occurs at the level of secondary consciousness.

Therefore, it is proposed that primary awareness is the consciousness of autogenetic, autocentric knowledge (primary knowledge) consisting of sensations and perceptions of objects and concrete thoughts; whereas secondary awareness is the consciousness of allogenetic, allocentric knowledge (secondary knowledge-about-knowledge) consisting of higher-order cognitions of abstract, logical symbols, words, thoughts and concepts. It is also proposed that primary awareness is the awareness of concrete objects and internal physiological states (such as pain, fear, panic, etc) directly related to continued immediate survival; whereas secondary awareness is the awareness of relationships between concrete objects, and the awareness of abstract and logical relationships between and among words and other symbols that tend to be one step removed from immediate physical survival needs and in the world of long-term social survival needs.

As an example of the difference between primary and secondary awareness consider another driver of a car which at the bottom of a hill noticed that a puppy

dog at the top of the hill was crumpled up alongside the road and said “Poor puppy got run over”. As the car climbed the hill, and the driver approached the puppy dog, he looked for a second time and noticed that what was at first interpreted as a puppy dog was in reality only a crumpled burlap bag and not a dog at all. The actual proximal stimulus in this example was the same physical photo-electromagnetic frequency impinging upon the eyes of the driver from the physical reality of the same object. The difference between the proximal stimulus at the bottom and then later at the top of the hill was in the size of the retinal image produced by the same object which increased as the distance between the car and the puppy dog decreased. In this example the physical fact that the object was a burlap bag did not change. However, the interpretation of the identity of the object was a function of the distance between the burlap bag and the driver’s eyes: the far distal stimulus at the bottom of the hill was incorrectly interpreted to be a puppy dog while the near distal stimulus at the top of the hill was correctly interpreted to be a burlap bag.

In this example it may be said that the driver twice experienced primary awareness of something at the side of the road, once at a distance and then closer. However, it may also be said that the driver also twice experienced secondary awareness, first an incorrect secondary awareness of a puppy dog and then a correct secondary awareness of a burlap bag. It may be concluded from this example that primary awareness and secondary awareness of the same physical stimulus reality in the same individual at different times can in fact differ and that there is some value to a distinction between primary and secondary awareness.

It should be noted from this example that the reason why one is normally not cognizant of the fundamental underlying difference between primary and secondary awareness is that rarely would the driver upon first seeing the object have simply said: “I see an object.” The primary awareness of the object is usually omitted in normal speech probably because primary awareness of a primary stimulus is a fundamental prerequisite to any subsequent secondary awareness of a secondary stimulus. So the driver would most likely refer to what was seen and say: “I see a puppy dog” or later “I see a burlap bag” because both statements must inherently include the fact that something was first seen as a primary stimulus before it could be visually identified as a secondary stimulus.

Primary reaction and secondary action

It is also theorized that it is possible to distinguish between primary reaction and secondary action. Primary reaction would include all forms of unplanned, spontaneous, elicited behavioral reactions to stimulation coming from either the

external physical environment or from the internal physiological environment in order to *react to the world or to the self*. Secondary action would include all forms of planned, deliberative, emitted behavioral actions that a person sends out in order to *act upon the world or upon the self*.

In the history of psychological learning theory, Skinner (1938) distinguished between the elicited behavior (respondent behavior) that was the basis of classical conditioning wherein the stimuli that elicited the behavioral reaction was known; and emitted behavior (operant behavior) that was the basis for operant conditioning wherein the emitted behavioral action was not usually elicited by known stimuli.

In terms of the present distinction, primary consciousness would contain conscious awareness of primary reactions as elicited behaviors and secondary consciousness would contain conscious awareness of secondary actions as emitted behaviors.

It is of interest to note that Skinner (1938) distinguished between primary and secondary reinforcement of responses with primary reinforcers being concrete objects that fulfill physical needs such as food, drink, sex, clothing and shelter; and, secondary reinforcers being such things as the social needs for approval, attention and affection. Skinner recognized money as a form of *generalized secondary reinforcer* because money provided access to many kinds of primary reinforcers (Skinner, 1953).

Given that the contents of primary consciousness are theorized to be available to secondary consciousness, past experiences with previous primary reactions often form the basis for deliberative planned future secondary actions.

Primary and secondary thought

1. **Primary thought** may be defined as the concrete form of thought that focuses upon immediately present online concrete experiences of primary consciousness with specific objects or physical events. A primary idea or concept always has reference to a particular internal or external conscious experience. Abstraction, generalization and linguistic processes are assumed to be at their minimum in primary thought so that thinking is either nonverbal or words are used merely to describe objects and/or events with syntax and semantics at a minimum level.

Primary thought as herein defined includes the following definition from the *APA Dictionary of Psychology* (2007):

concrete thinking *thinking focused on immediate experiences and specific objects or events. It is characteristic of young children and may also be seen in people with schizophrenia and people who have suffered brain damage. Compare ABSTRACT THINKING. (p.212)*

2. **Secondary thought** may be defined as the abstract form of thought that focuses upon reflections of absent offline experiences within secondary consciousness and is marked by the processes of abstraction and generalization from the particular example to the class or category. A secondary idea or concept within an individual may take one or two basic forms: 1) an abstraction formed by previous empirical experiences with particular objects (such as the above example of the concept formation of “dogness”); or 2) a generalization of previous abstractions to form concepts that have no particular material referents (such as the concepts of “beauty”, “truth” and “justice”).

A central aspect of the present theory is the notion that secondary thought processes are socially shared by humans as a fundamental part of human socialization. Abstractions, generalizations and linguistic processes are assumed to be at a maximum in secondary thought with an emphasis upon relationships between objects and/or events and a maximal use of syntax and semantics. Secondary thought as herein defined includes the following definitions from the *APA Dictionary of Psychology* (2007):

abstract thinking thinking characterized by the use of abstracts and generalizations. Compare CONCRETE THINKING. See also ABSTRACT ATTITUDE; CATEGORICAL THOUGHT. (p.4)

categorical thought in Jean Piaget’s theory of cognitive development, ABSTRACT THINKING that involves the use of general concepts and classifications. It is particularly lacking in young children, who tend to think concretely (see concrete thinking). Also see ABSTRACT THINKING. (p.152)

Among the many examples of the distinction between primary and secondary thought the work of Pavlov, Freud and Piaget discussed above in the section dealing with Bridger’s synthesis stand out. Aspects of primary thought were described by Pavlov as first signaling system activity; by Freud as primary process thought and

by Piaget as preoperational perceptually-based thought. Aspects of secondary thought were described by Pavlov as second signaling system activity; by Freud as secondary process thought; and by Piaget as operational categorical thought.

Goldstein (1939) provided empirical evidence observed in brain damaged individuals of the present distinction between primary thought and secondary thought. According to the *APA Dictionary of Psychology* (2007), Goldstein was the source of the following definitions:

concrete attitude *a COGNITIVE STYLE that is directed to specific objects and immediate stimuli. A person who exhibits a concrete attitude tends not to make abstract comparisons and will not usually respond to abstract qualities, concepts or categories. Compare ABSTRACT ATTITUDE. [defined by German-born U.S. neurologist Kurt Goldstein(1878-1965). (p. 212)*

abstract attitude *a COGNITIVE STYLE that involves the ability to grasp essentials and common properties, to keep different aspects of a situation in mind and shift from one to another, to predict and plan ahead, and to think symbolically and draw conclusions. These capacities are often impaired in people with certain neurological or psychological disorders. Also called **categorical attitude**. See also ABSTRACT THINKING. [defined by German-born U.S. neurologist Kurt Goldstein (1878-1965)]. (p. 4)*

Given these two definitions, it may be observed that in the normal adult both cognitive styles exist seamlessly and harmoniously within the totality of human consciousness with the primary concrete thought of primary consciousness applied to some situations and the secondary abstract thought of secondary consciousness applied in other circumstances. It may be that clear-cut behavioral distinctions and separations between the two modes of thinking are only fully revealed following brain damage because when higher order secondary consciousness functions are lost only the lower order primary consciousness functions remain intact.

Primary and secondary words

Given the centrality of language in the present theory of primary and secondary consciousness, a separate distinction between primary and secondary words borrowed from linguistics seems appropriate. This distinction is based upon the following two definitions from the *APA Dictionary of Psychology* (2015):

concrete word in linguistics, a word denoting a real and perceptible entity, such as 'tree', 'airplane', 'James'. Compare ABSTRACT WORD. (p.229)

abstract word in linguistics, a word denoting a concept or idea not readily perceptible to the senses, such as 'curiosity' or 'metaphor'. Compare CONCRETE WORD. (p.5)

It is theorized that given the previously postulated notion that linguistic processes will be taken to be at a minimum within biologically-based primary consciousness and at a maximum within socially-based secondary consciousness; it is suggested that at the level of primary consciousness primary-concrete words will be employed to name objects and secondary-abstract words will not be readily available for use. It is also suggested that given the proposed hierarchical relationship, both primary-concrete and secondary-abstract words are used at the level of secondary consciousness.

Further discussion of the bifurcation of words into primary and secondary forms is being planned for future publication.

Primary and secondary learning

According to the *APA Dictionary of Psychology* (2007) learning may be defined as: "*the process of acquiring new and relatively enduring information, behavior patterns or abilities, characterized by modification of behavior as a result of practice, study or experience.* (p.529).

Based upon the above definition, it is possible to distinguish between primary and secondary learning in the following way:

1. **primary learning** the process at the level of the first signal system of acquiring new and relatively enduring concrete information, nonverbal behavior patterns or abilities, characterized by modification of behavior as a result of practice, study or experience. *Primary learning* includes habituation of primary stimuli, classical conditioning of the first signaling system; operant conditioning of sensory and perceptual responses, and the acquisition of sensorimotor and perceptual skills requiring the employment and manipulation of physical objects.
2. **secondary learning** the process at the level of the second signal system of acquiring new and relatively enduring abstract and symbolically generalized information, verbal behavior patterns or abilities, characterized by modification of behavior as a result of practice, study or experience.

Secondary learning is often marked by the acquisition of learning sets and other forms of learning-to-learn behaviors. *Secondary learning* includes classical conditioning of the second signaling system, language acquisition, verbal learning, operant conditioning of verbal responses, learning to read, concept formation, problem solving and creativity requiring the employment and manipulation of abstractions and generalizations.

The working definition of learning at our laboratory takes learning to be the modification of behavior that is based upon past experiences. Learning and memory are taken to be intimately connected because memory must serve as the repository from which the effects of past experiences can be brought to bear upon any given present circumstances in order for learned behaviors to occur. Therefore, without appropriate memories, learning can not lead to correct performances in any given situation.

Primary and secondary RT's

It is also possible to distinguish between a *primary reaction time* and a *secondary reaction time*.

- 1. Primary reaction time** would include reaction and response times to all forms of concrete physical stimulation wherein the task of the person is to respond as quickly as possible to either the absence or presence of stimulation (simple RT); or the absence or presence of a difference in stimulation (choice RT and discriminative RT).
- 2. Secondary reaction time** would include reaction and response times to all forms of verbal stimulation (words and sentences) wherein the task is to respond as quickly as possible not to the physical concrete aspects of the stimulations but to their various forms of linguistic associations (association RT).

It has been known since the early days of experimental psychology that the average simple RT to visual stimuli, auditory stimuli and touch stimuli are about 180 milliseconds, 140 milliseconds and 140 milliseconds respectively and that the average RT to word association tasks are about 1000 to 1200 milliseconds (Woodworth, 1938; Woodworth & Schlosberg, 1954).

Comparing these two types of reaction times, Woodworth (1938) stated that:

The question, how all the time is consumed, has some point when we compare the

associative RT of 1000-2000 ms with the simple RT of only 100-200 ms. The associative reaction is both slow and exceedingly variable. (p. 362)

These results supply empirical evidence that average primary RT is faster than average secondary RT and also provide some support for the idea that different response systems underlie these observed differences in RT. It may be suggested that primary RT is a function of primary consciousness and secondary RT is a function of secondary consciousness. A fuller investigation of these differences is planned for future publication attempting to relate these differences to the differential reactivity of online primary and secondary offline consciousness.

Primary and secondary vision

It is also possible to distinguish between a *primary vision* and a *secondary vision*.

Goodale (2004) suggests that the dorsal visual systems which provide the most potent form of information for mammals first evolved to enable organisms not to see but to provide sensory control of their movements. These primitive dorsal visual systems provide sensory control of actions because: "In the more ancient visuomotor systems, there is a basic isomorphism between visual input and motor output." (Goodale, 2004, p. 1159). According to Goodale, the representational vision (which he calls "vision as sight") follows a ventral pathway and is a relative newcomer on the evolutionary landscape. The main thesis seems to be that:

The duplex nature of vision is reflected in the organization of the visual pathways in the primate cerebral cortex. The dorsal "action" stream projecting from primary visual cortex to the posterior parietal cortex provides flexible control of more ancient subcortical visuomotor modules for the control of motor acts. The ventral "perceptual" stream projecting from the primary visual cortex to the temporal lobe provides the rich and detailed representation of the world required for cognitive operations. (Goodale, 2004, p.1159)

Based upon the above account offered by Goodale (2004) it is possible to theoretically designate the dorsal visual stream as the basis of a primary vision that informs primary consciousness and to designate the ventral visual stream as the basis of a secondary vision that informs secondary consciousness.

Further work on this idea that the duplex nature of vision is one of the underlying physiological mechanisms of the proposed duplex nature of consciousness most obviously needs to be done.

Summary and conclusions

Perhaps the most important conclusion that may be drawn from this initial survey of primary and secondary consciousness is that although the emphasis has been on distinctions between them, one may conclude that both contain the same fundamental elements and processes and that the distinctions are manifestations of primary and secondary aspects of the same elements and processes. As an example, it was proposed that the fundamental element of awareness has a primary form and a secondary form. As another example, it was also concluded that the fundamental process of sensation has a primary and a secondary manifestation.

Table 8 summarizes some of the distinctions between primary and secondary consciousness that have been noted in this first paper devoted to an attempt to lay down the foundations for future work on this subject.

Table 8– Some distinctions between primary and secondary consciousness

<u>Primary consciousness</u>	<u>Secondary consciousness</u>
<u>General distinctions</u>	
Biologically ancient system	Biologically more recent system
Animal and human	Exclusively human
Primary knowledge	Secondary knowledge
First signaling system	Second signaling system
Autocentric	Allocentric
Endogenous	Exogenous
Nonverbal	Verbal
Neural code	Linguistic code
Individualistic	Collective
Ideographic	Nomothetic
<u>Fundamental processes</u>	
Primary sensations	Secondary sensations
Primary perceptions	Secondary perceptions
Primary motivations	Secondary motivations
Primary emotions	Secondary emotions
Primary cognitions	Secondary cognitions
Primary personality-self-individuation	Secondary personality-self-individuation
<u>Basic constituents</u>	
Primary genes	Secondary genes
Primary memory	Secondary memory

Primary thought
Concrete attitude
Concrete objects

Secondary thought
Abstract attitude
Abstract words

Another theoretical conclusion of the present work is that the nature of some distinctions is such that the salient differences are relative and not absolute differences and so are best described in terms of maxima and minima or as ends of a continuum, rather than yes/no dichotomies. As an example, it was proposed that language exists at a minimum in primary consciousness and at a maximum in secondary consciousness.

It was theorized that primary consciousness is a psychological-level entity that is rooted in the physiological level of organization and that secondary consciousness is a psychological entity whose major interactions occur at the sociological level of organization.

Finally, it should be noted that the present work is only the start of an attempt to more fully understand how it is that primary and secondary consciousness may function so smoothly and seamlessly in the successfully socialized adult that the underlying fundamental differences are not readily evident and so have not yet been more fully elucidated.

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