Glossary

The definitions in this glossary are from the MOGUL Framework as currently implemented by Sharwood Smith and Truscott. Since there is some room for different kinds of implementation, other users of the MOGUL framework involved with particular aspects of the architecture may adjust some definitions to fit in with their particular theoretical perspective.

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A

acquisition: see growth

Acquisition by Processing Theory (APT) (► attrition, resting level).

Growth is the lingering effect of processing. APT is a specific claim made within the MOGUL framework and is supposed to be one principle that applies to *all* instances of cognitive development. Nevertheless, the specific nature of the growth is determined by the particular modular system in question. This APT for syntactic growth will be determined by the principles of the syntactic processor and not by some general cognitive set of principles. The same goes for conceptual growth, visual growth, auditory growth etc., etc.

activation (► resting level)

Structures (aka items in a memory store) are activated to various degrees during on-line processing and regularly compete with each other for selection by processors trying to make sense of input. The result of being activated may be appearance in working memory long enough to be used by some processing unit. For example, in speech perception, when sound is being processed, the interface processor between the auditory and phonological systems activates various PS, trying to find the best fit between a given AS and a PS. The phonological processor within the phonological processing unit will determine what the best fit is at the time as it attempts to build a phonological representation. It does this by manipulating activated PS that have appeared in its working memory. Some structures in working memory will not be used but be discarded that is , their activation levels will drop down again to a given resting level. Others will be selected and, as a consequence of this, undergo some change in their resting level so that they effectively become more accessible, that is, relatively more available for selection in the future.

affective structure (AfS) (►value)

Affective structures are what underlie emotion. They are processed in the affective module and are represented in capital (block) letters, e.g. !DISGUST!, !FEAR! . AfS are understood to play a crucial role in cognition and this includes cognitive growth (development). Some connections between the affective system and other cognitive systems, important for the organism's survival, are understood to be *innate* while others are formed *as a result of experience*. Affect can be positive or negative so the AfS system includes the corresponding *value* structures. The function of these structures is to connect up with other structures assigning to them either a positive or a negative value. The number and characteristics of AfS depend on which theory of affect has been selected for instantiation within the MOGUL Framework. The neural substrate of AfS, traditionally referred to as the 'limbic' system, is distributed across various brain locations including the two amygdalae.

APT (►Acquisition by Processing Theory)

attention

Attention has to do with intensive processing of any or all of the perceptual output structures (POpS). Attention does not automatically imply consciousness. If the activation levels of affected structures rise beyond a certain level they can become accessible to awareness (see also AfS) Experiments on blindsight, for example, show that we can attend to things without being aware of them.

attrition (► Acquisition by Processing Theory

A relative loss of accessibility of a given structural unit due to its infrequent involvement in building representations. Highly inaccessible items appear effectively to be 'lost' or 'forgotten' and to give credence to a 'use it or lose it' principle. Since they regularly fail to get selected, they never appear in overt performance (see also 'resting level' although they may reappear in a later stage in life as a result of ageing. This is Attrition by Processing, that is, APT in reverse.

auditory structure (AS/AS_L) (► perceptual output structures)

Auditory structures are the output of the module that processes incoming acoustic input from the environment. AS provides input to , for example, the language modules, specifically PS, but only where PS is able to build phonological structure as a result. This AS is called AS_L indicating only AS that just happens to be used by the language module to build phonological structure and is no different in other respects from the AS that 'represents' sounds like creaking doors, thunder and the rustle of leaves. AS supports the individual's experience of sound including sounds that are not triggered by input from outside, that is sounds that are imagined, sounds in dreams and auditory hallucinations. The traditional research domain of phonetics deals with the nature of AS_L, its articulation and perception and interaction with PS. In MOGUL, these auditory structures that are relevant for PS are accordingly represented in phonetic script with square bracket, e.g. [k^hæt]. More specifically, these structures will be represented following the conventions of the particular phonetic theory being applied. Non-linguistic AS are represented by a description of the relevant sound within square brackets, e.g. [sound of door creaking]. AS belong to a group of structures making up the perceptual system called POpS.

awareness (► attention, consciousness, perceptual output structures)

B

blackboard (►memory, store, working memory)

C

coindexing (► index)

A process by which associations are created between representations in different stores/modules. Representations having the same index are said to be 'co-indexed': this relationship is traditionally indicated by means of subscript numbers or letters (representation A_1 , representation B_1). When building a complex representation for a given input, the interface between the relevant processing units places a given index on certain representations with the result that they activate each other during processing. To take just two processing units as an example, English phonological structure /lip/$_1$ will become coindexed with syntactic structure N_1. In processing, indexes first have to be created for given representations after which they function as described above

competition (► resting level)

Competition is a major feature of all human processing. When comprehending or producing an utterance for example, the ultimate 'solution', i.e. the meaning we extract from the 'incoming' utterance or, alternatively, the utterance we finally produce to express our intended meaning, is only achieved after many competing candidate structures, within any of the processing units involved, have been reduced to a single chain of structures. The resolution of any competition is an interaction between the relevant working memories during on-line processing and the current resting levels of all the various items that have been activated. The system is always looking for a best-fit solution.

conceptual structure (CS) (► metalinguistic).

Conceptual structures may be thought of as meanings. This includes areas of meaning traditionally covered by the terms 'semantics' and 'pragmatics'. Meanings do not necessarily have to be linked up with the language module (PS and SS). The sound of a creaking door, for example, has a meaning. Non-linguistic conceptual structure is therefore also referred to as CS. Conceptual structure is sometimes referred to as 'mentalese' (Fodor 1975, Pinker 1994): we think (cogitate) in CS. That said, even though we are unaware of the structure of CS, its contents are accessible to awareness via POpS and, in this way, can be consciously manipulated. This means that we can go on to analyse the contents of CS in great detail and build up detailed knowledge of its properties. Knowledge about the world we live in

is built out of CS. This includes metalinguistic knowledge. In MOGUL, conceptual structures are represented in capital (block)letters, e.g. DOG.

consciousness (► attention, conceptual structure, metalinguistic, perceptual output structures)

The phenomenon of conscious awareness in MOGUL is explained in terms of activation: When a representation reaches an extreme current activation level, it becomes the object of consciousness. These extreme levels arise naturally in the richly interconnected perceptual system. To become conscious of a meaning, for example, say the meaning of 'dog', one cannot be directly aware of the conceptual structure (DOG) that underlies this concept. Rather, the conscious awareness of this meaning is created by virtue of very highly activated perceptual output structures that are linked (co-indexed) with its conceptual structure.

conventions (► MOGUL conventions)

core language system (►language module, Universal Grammar)

crosslinguistic influence (CLI) (►attrition, transfer)

A generic term for a range of different effects attributable to an interaction between linguistic systems (in the language user's mind) understood to belong to different languages, for example various forms of transfer between two languages in language learners' performance, changes in an immigrant's use of the mother tongue due to influence from the dominant language in the community (so-called language attrition or language 'loss') and avoidance behaviour by learners attributable to a strategy of keeping different languages as distinct as possible or a perception of areas of difficulty in a non-native language.

E

element (►primitive, structure)

extramodular (►language module, metalinguistic)

A term indicating any aspect of processing outside (specifically) the *language* module. By implication, 'modular' would then mean having to do with the processing and creation of phonological and syntactic structures (PS and SS), in other words aspects within the core language system (the language module in MOGUL and also in terms of Jackendoff's architecture). Extramodular processing may still involve elements that are directly related to language processing that lie outside the core language system, for example, given auditory and conceptual structures. In other words, the auditory processing of an auditory structure (AS) that activates a phonological representation (PS) would be extramodular. By the same token, a conceptual representation (CS) that happens to be linked (co-indexed) with a syntactic structure (SS) would also be extramodular. This means that metalinguistic knowledge, explicit knowledge about the structural properties of a language of which we can be consciously aware, must be extramodular because it is built out of conceptual structure, and conceptual structure is not part of the the core language system.

F

feature (► structure, primitive)

G

growth (► APT, attrition, interface)

Also referred to as 'acquisition' as in 'language acquisition'; the growth of structural combinations within modules and structural associations between modules in response to environmental stimuli that have triggered internal processing operations within those modules. According to *Acquisition by Processing Theory* (APT), growth is marked by changes in the activation levels of the implicated structures. In the case of intuitive, subconscious language acquisition this will involve at the very least the language specific systems PS and SS and also associated CS. (see also

metalinguistic). The shape of growth within a module is controlled by principles specific to that module. Hence growth in visual structures (VS) is controlled by the principles of the visual system. The same goes for growth in the phonological and syntactic module, and so on and so forth.

gustatory structure (GS) (►perceptual output structures)

Gustatory structures are perceptual output structures that relate to taste.

I

index (► coindexing, lexicon)

Indices/indexes are the formal mechanism by which elements in one module's memory store are chained together (placed in registration with/linked to) with elements in the memory store of an adjacent module (following Jackendoff). This should not be confused with the standard use of indices in generative linguistics to mark coreference or lack of coreference. For example, in MOGUL, the lexical item 'meat' involves the linking of a PS representation /mit/ with an SS representation indicating it is a noun thus: /mit/$_{23}$ <=> N$_{23}$ (using the number '23′ as an arbitrary index).

input

'Input' is a cybernetic metaphor used to describe what triggers a response from a particular part of the mental system. More specifically, it is what triggers the response of a particular module to activity in an adjacent system. More properly, the response to the trigger is actually mediated by an interface . For example, input to the syntactic module is when the interface between the phonological and the syntactic memory store pairs a phonological structure (PS) with a given syntactic structure (SS). By the same token, an auditory structure (AS) becomes input to the phonological module when the interface between the auditory and phonological memory stores establishes a link between this AS and a given phonological structure (PS). Input in language acquisition studies has long been thought of as the language to which a language user is exposed and which is supposed to impact on the user's system in some way. If the impact in a long term one, it is sometimes referred to as 'intake'. In MOGUL, as in Carroll's Autonomous Induction Model, input that potentially has this long-term effect should be thought of more properly as resulting from a whole chain or network of separate inputs beginning with the organism registering an environmental event (the acoustic signal created by a spoken utterance, for example). This original acoustic event would be interfaced in various steps with the relevant modules ending up with the activation of a conceptual structure assigning a meaning to that utterance. At any point in the sequence of internal events, one of the interfaces may not take place in which case the possibility of language acquisition taking place is reduced.

interface (►lexicon, index)

Interface systems link structures in modules to form chains of structure; a very simple example of a chain of three elements (PS-SS-CS) is /pig/ <=> N singular <=> (meaning of PIG) (see also lexicon). The role of an interface system is to match certain structures in adjacent modules. This matching is also termed 'co-indexing' more or less as used in generative linguistics. Activation of a structure in one module will trigger the activation of co-indexed structures in adjacent modules. Note that a word or lexical item does not exist in this system as such but is a principled linking (matching, indexing) of three structures via interfaces between three modules.

item (► structure, primitive)

L

language module(s) (►conceptual structure, Universal Grammar)

In MOGUL and following Jackendoff, 'language module' is a cover term for what is actually a *bimodular* system. That is, it consists of two independent modules (processing units), namely the phonological module and the syntactic module. This makes it different from the standard Chomskyan 'syntactocentric' conception of the language faculty. Together with their various interfaces, the two processing units (handling PS and SS) form the uniquely human core language system. Human language cognition covers a much wider area than the language module but is this bimodular system which makes human language unique. Its essential structural properties are understood to be

innate although the contents of its two memory stores will come to differ sometimes widely according to which languages are being used or acquired. Semantic and pragmatic structure lie outside the language module and are part of conceptual structure (CS). That said, semantic and pragmatic conceptual structures are created, and are therefore greatly influenced by their interaction with the core language system.

lexicon

There is no general lexicon in the conventional sense. The 'lexicon' of a language is a metalinguistic notion useful for an analytic understanding of language but less helpful in understanding the actual way the mind works. Following Jackendoff, a lexical item can be seen in two alternative but compatible ways: 1) as a rule associating three separate and independent types of structure, a phonological structure (PS) a syntactic structure (SS) and a conceptual structure (CS). In processing terms, it is best thought of as 2) a chain of structures that have been activated and put in correspondence with one another: PS<=>SS<=>CS. Each structure is processed independently within its own processing unit (module) according to the principles of that module. The nearest thing to a lexicon in MOGUL is the unique memory store of structure that each module possesses, hence the phonological processing unit contains a phonological 'lexicon' in which only phonological structures are stored, either as independent elements, or typically in various combinations specific to some language or languages known to the individual language user and formed during exposure to that language.

M

memory (store) (►interface, store, working memory)

Memory in MOGUL is an essential component of a processing-unit. In other words, memory is modularised. This means that it is not to be seen as a 'common pool' that different part of the mental system have access to. This goes both for long term memory and working memory. In fact the distinction between long term and working memory is minimal and resides in different levels of activation. . 'Memories', as used in everyday language, will very often be built out of coalitions of items linked via interfaces across individual memory stores, a classic example being 'episodic' memories which do not exist under a separate rubric in MOGUL but which can reflect complex coalitions of memories involving various perceptual structures, conceptual structures and perhaps also motor structures and structures within the language module as well

metalinguistic (►consciousness, POpS)

As with any kind of metacognition, knowledge about language, which can be raised to awareness, is created in conceptual structure and not within the language module. Raising such knowledge to awareness requires the mediation of the perceptual systems.

module (► interface, language module, interface, store).

In MOGUL, modules are also called 'processing units'. Each module operates with its unique code and unique set of principles. For example, phonological module operates with phonological code and phonological principles that are not shared or translatable into any other code. At the same time the basic structure of a module is generic and applies across the cognitive system as a whole. That is, any module consists of an integrative processor and a memory store. Memory stores are interfaced with one or more different modules allowing the formation of chains or networks of structure. In MOGUL, reflecting their status as the twin components of the human language faculty, PS and CS are informally referred to together as 'the language module' despite the fact that they form two separate processing units.

MOGUL conventions

The way various categories are represented in MOGUL may be illustrated as follows, in most cases using the dummy word 'cat' as a substitute term preceded by an equals sign and then the abbreviated term. To date, these category conventions are recommended (and the L, O and S subscripts are used for the convenience of the researcher to indicate structures associated with language and do not imply the existence of separate processing units)

Affective structure = AfS !FEAR! (sometimes written in lower case as !fear!)

Auditory structure = AS: 1) = $AS_{L,}$ linguistically relevant AS: [k^hæt])

2) =AS not linguistically relevant: [sound made by cat]

Conceptual structure = CS 1) = $CS_{L,}$ linguistically relevant CS: CAT

2) = CS not linguistically relevant: MEANING OF STOP SIGN

Gustatory structure = GS

Motor structure = MS_L (linguistically relevant MS)

Olfactory structures = OfS

Perceptual Output Structures: POpS

Phonological structure = PS (follow conventions of your chosen linguistic theory)

Processing Unit = PU

Somatosensory structure = SmS

Syntactic structure = SS (follow conventions of your chosen linguistic theory)

Visual structure = VS: 1) = $VS_{O,}$ linguistically relevant: *"cat* (orthographic VS)

2) = $VS_{S,}$ linguistically relevant VS: *cat* (sign language VS)

3) = VS VS that is *not* linguistically relevant: ['image' of cat]

motor structure (► somatosensory structure)

Motor structures control the articulation of body parts including those involved in linguistic activity (MS_L), especially the production of speech, writing and sign language. For example, in speech production, PS are linked to those MS that are responsible for the movement of the speech organs. Many body parts are multifunctional so the MS that control precise tongue movements during speech activity (the linguistic motor structures, MS_L) exist alongside other MS that control the articulatory activity associated with, for instance, tasting and swallowing. The neural correlates of MS are distributed over various parts of the brain and notably the (primary, secondary and supplementary) motor cortices and related areas like the cerebellum and basal ganglia. The rich interconnectivity within the system as a whole means that motor structures may undergo some degree of sympathetic activation even where they are functionally irrelevant. One example would be the occurrence of minor movements in the vocal tract ('subvocalisation') when reading silently.

N

O

olfactory structure (OfS) (► perceptual output structures)

Olfactory structures belong to a group of structures making up the perceptual system called POpS, in this case, having to do with the sense of smell (►perceptual output structures).

orthographic structure ($VS_{L),}$► VS, perceptual output structures, visual structure)

Orthographic structures do not exist independently from visual structures as a whole, i.e. as a separate type of POpS . They are visual structures (VS) that have links with/are interfaced with PS and CS . This makes them part of language in the broadest sense. In other words, they are visual structures that *happen* to have been created specifically as a result of interaction with the language module and as a result of reading experience. In the same way, auditory structures that happen to have been created specifically as a result of interaction with the language module

and as a result of *listening* experience, might be called 'phonetic' structures. As far as the cognitive system is concerned, neither orthographic structures nor phonetic structures have any separate status. If it is convenient to identify structures that are either orthographic (spelling-related) or phonetic, this can be done by adding the optional subscript L which serves only to act as a reminder of their association with language. For example, an 'orthographic' structure is signalled thus: VS_L.

P

perceptual output structures (POpS) (►auditory structure, gustatory structure, olfactory structure, somatosensory structure, visual structure)

A generic term covering all the structures (like auditory structures -AS - and visual structures - VS) that constitute the output of the perceptual systems. Of the various possible types of perceptual structure, only five have figured in the discussions and illustrations in this book: this has been simply for reasons of convenience. A crucial feature of POpS is the existence of strong interconnections between the individual memory stores so that, together, they form a well integrated system. POpS play a crucial role in the MOGUL account of awareness. They account for hallucinations , dreaming and self-initiated imagining as well. Whereas an acoustic stimulus occurring the environment , say a door chime, can activate a particular auditory structure and trigger the awareness of the sound of a door chime, the selfsame experience can arise from the activation of the auditory structure *alone*, i.e. without anything actually happening in the environment. POpS typically undergo high levels of activation: this has evolved in this way presumably since it is important for survival. This may also help account for differences occurring between species such that for example, in dogs, olfactory structures, the output of the sense of smell, play a greater role than is the case in human perception. Humans have highly developed visual systems so that it is much easier, if asked to, to imagine an object (recreate the experience without any environment stimulus) than imagine a smell or a touch. Although this is a very simplified account it gives an idea of the innate biases in the functioning of different types of perceptual output structure (POpS). The characteristics of POpS and the number of different types (corresponding to the number of senses) naturally depend on which theory of perception has been selected for instantiation within the MOGUL Framework.

phonetics (►auditory structure)

What might otherwise be called 'phonetic' structures in MOGUL do not exist independently from auditory structures (AS) as a whole, i.e. as a separate type of POpS. This means that phonetic strings, traditionally represented using square brackets (e.g. [kæt]) are actually auditory strings, i.e. auditory structures (AS) that *happen* to have been created specifically as a result of interaction with the language module and as a result of *listening* experience (see also the discussion in the section on orthography). If it is convenient to identify auditory structures that are phonetic, this can be done by adding the optional subscript L which serves only to act as a reminder of their association with language, thus : AS_L.

phonological structure (PS) (►auditory structure, phonetics)

The storing and processing of phonological structure is carried out within a closed-off expert system or module: even though we can become aware of features of auditory structure with which PS is linked (like stress, rhythm sibilants, etc, we remain completely unaware of the structure of PS itself (cf. Jackendoff 1978: 88, its contents are inaccessible to awareness and therefore cannot be consciously manipulated in any direct manner. Phonological structures in MOGUL are represented following standard phonological convention in simple phonetic script e.g… /kæt/. More specifically, phonological structures will be represented following the conventions of the particular phonological theory being applied.

primitive (► growth, Universal Grammar)

Primitives are the essential building units that make up representations. They are supplied in advance, i.e. they are innately given. They are used either independently or in combination with other primitives. The principles of combination are determined entirely by the given processing unit in question, for example, visual primitives combine in ways determined uniquely by the visual processor. The actual combinations however will be greatly influenced by the individual's processing history which explains, for example, why a Chinese speaker's phonological memory store contains combinations not shared by a Hausa speaker's memory store. Even though the same set of phonological primitives are available to both of them, the individual's processing history has meant that the shared stock of primitives has been configured in different ways. This is a general principle and holds for all types of structure.

processing unit (PU) (► interface, module).

A key component of this highly modularised (Jackendovian) view of cognition. A processing unit has a dedicated processor and a dedicated memory store, akin to a lexicon, containing only structures specific to that processing unit/module. Although the more general term 'module' is also used to characterise this component of MOGUL architecture, 'processing unit' is the specific term used in this framework to designate a processor-store combination: the definition excludes interfaces between stores. All PUs have the same basic structure but each one is also unique in that it cannot deal with structures in another 'alien' memory store. A syntactic processor for example cannot handle phonological structures. The store in a given processing unit is interfaced with one or more other stores: the activation of a structure in its own memory store will then trigger the activation of a given structure or structures in the stores of those other processing units. The degree of encapsulation of a module is related to the amount of access it has to the memory stores of that modules or those modules with which it is interface.

R

representation (► structure, primitive)

A structure in the memory store of a processing unit. Representations are manifested in two ways in MOGUL, statically, as simple or complex structures stored within a memory with particular resting levels, or dynamically, that is, during on-line processing, as activated structures, again of greater or lesser complexity. A single structural item in a memory store can be thought of as a 'representation'. During processing, structures are chained together to form a representational chain or network in working memory. One example would be a sentence like 'Benjamin hid the watch' which is built out of individual representations activated in, respectively, the SS, PS and CS stores The term 'representation' must be understood flexibly because strictly speaking structures do not 'represent' anything (Jackendoff 2002: 20). (►primitive, memory store)

resting level (►activation)

The particular base level of a given structural unit: this can be higher or lower relative to the resting level of other units; the higher the resting level, the more accessible it is and, all other things being equal, the better chance it has in any competition to be selected when a representation is being built on line. Frequent selection has the effect of raising the resting level. Items that are not selected will experience a decline in their resting level. Marked reductions in rest

S

somatosensory structure (SmS)(►perceptual output structures)

Somatosensory structures are the output of a group of sensory systems relating to touch, pain, temperature, body position and sense of the body generally.

store (► memory, primitive)

Another name for a facility which stores structures of a particular type, some of which will be primitives and others combinations of structures within that store that have been formed through experience. The totality of an individual's memory is the complete set of all these various specialised memory stores and the connections between them. Given this modular view of memory, there is, therefore, no single all-encompassing memory facility.

structure (► index, memory, primitive, representation)

Structure is the most neutral name to describe what can also variously be called 'representation', (structural) 'element', (structural) 'feature' or (structural) 'item'. Structures are the contents of the memory stores that form part of each processing unit. A structure, when activated, causes those structures that are co-indexed with it also to be activated. The result is co-indexed chains or networks of activated structures (representations, elements, units) ranging across different memory stores. Within a given memory store, as a result of the individual's earlier experience, structures may be combined together in various ways to form complex structural units. The original structural elements in any store, its 'primitives', form the basis for such combinations.

T

transfer (►crosslinguistic influence)

This is a term conventionally used in language acquisition studies to describe the modelling of structures in a developing language on the patterns of some structure in another language known to the user. Transfer is one type of crosslinguistic influence. Transfer is thought to be either a transitory phenomenon associated with on-line processing strategies or a longer term phenomenon whereby the structure in question is actually incorporated into the new language system. In MOGUL, this distinction is a relative one depending especially upon the resting level activation involved.

U

UG (►Universal Grammar)

Universal Grammar (UG) (►language module, primitive)

In MOGUL, this means the principles underlying the innate structure of the language module including the primitives in PS and SS that constrain and dictate the way linguistic structure is constructed on line and stored. The processors that do the constructing in these two modules embody the principles of UG.

V

value (►affective structure)

A crucial aspect of the affective system has to do with assigning positive or negative value. Value is about what matters to us. It has its roots in the basic need of every organism to avoid potentially harmful things, like predators, and seek potentially beneficial things, like food and sex. But in the complex human mind/brain, it has naturally taken on a much broader role, namely evaluation of everything we experience in terms of positive/negative and intensity. Mental representations in general are connected to representations of positive and/or negative value. The intensity of the valuation is the resting activation level of the index that is the connection. Value is the foundation of emotion and plays a crucial role in all aspects of cognition and behaviour, including the acquisition and use of a second language. Positive and negative value structures combine with other AfS to represent a whole range of emotional states. In Truscott's book on consciousness (Truscott forthcoming, see Publications page), positive and negative value are represented by, respectively, the affective structure !val! and the affective structure !harm!

visual structure (VS) (►perceptual output structures)

Visual structures are the output of the module that processes incoming visual input from the environment. VS is interfaced with, amongst other systems, the language module. This means that 'orthographic' structure is a variant of VS_L (visual structures involved in language). Orthographic structures are also referred to as VS_O (orthographic visual structures) indicating a particular type of VS that happens to be used by the language module and which are interfaced with PS. By the same token, sign language involves the development of specialised visual structures, VS_S, that will also serve as input to PS. VS supports the individual's complete visual experience including the experience of visual events that are not triggered by input from outside, i.e., sights that are imagined, in dreams and visual hallucinations. In MOGUL, VS_O are represented in italics between double inverted commas, e.g. "*dog*" and VS_S are represented as follows *sign for *dog, or ***dog***. Otherwise VS are simply referred to by means of a paraphrase for example 'the visual memory/ representation of a dog'. VS belong to a group of structures making up the perceptual system called POpS.**

W

working memory (►memory, store)

MOGUL follows the line of thought that sees working memory as patterns of highly activated structures in given memory stores along the lines proposed by Cowan (1993, 2001). This means there is no fundamental distinction between long and short (or working) memory. Rather, the distinction is explained as a difference in the level of current activation of particular stored items. In some models, working memory is represented as a blackboard or sketchpad separate from long term memory. In both ways of representing working memory, structures very briefly held in working memory are used to build cognitive representations on-line.