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The cognitive status of metalinguistic knowledge in speakers of one or more languages

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Research Article

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Abstract

The term 'metalinguistic' is used to define the kind of ability whereby people for various purposes view language as an object. It is strongly associated with consciousness and touches on many aspects of literacy, multilingualism and language acquisition. Discussions in the research literature have generally been on specific aspects of metalinguistic knowledge: the time is ripe for a more fundamental reassessment focusing on how exactly metalinguistic ability is represented and processed on line, and how it fits in with other kinds of representation and processing. To this end, a particular theoretical perspective that takes into account contemporary research in cognitive science, the Modular Cognition Framework, will be applied with the aim of supporting further empirical investigations into this area of language ability and locating it within an integrated approach to cognition in general. Finally, the usefulness of metalinguistic knowledge will be briefly considered.

1. Introduction

The basis of metalinguistic ability may be defined as consciously accessible, consciously acquired knowledge about language. It allows us to view language as an object and to think, analyse, talk and manipulate its various aspects for a whole variety of purposes. It is an ability that develops only slowly after the essential structural properties of the child's native language (s) have already been acquired. It is a particular instantiation of metacognitive ability and as such may be contrasted with whatever underlies behaviour variously described as 'implicit', 'intuitive' or 'subconscious'.

The prime notion on which metalinguistic ability depends, i.e., language, is by contrast more difficult to pin down. It may be tempting to think of language holistically as a unitary phenomenon composed like a board game with a single set of rules (grammar) that determines permissible arrangements of its 'pieces' (words): each separate language simply has somewhat different rules and mostly different words. The reality is of course much more complicated. In particular, language is best viewed as a MULTISYSTEMIC phenomenon: for example, phonological systems are distinct from syntactic systems and these are both different from systems by which language is shaped to fit different contexts of use. Even split three ways, three very different sets of rules and principles are at play. This diversity will have implications for the ways in which these different systems are represented in both mind and brain, the ways in which processing takes place and how they develop in individuals over time.

Where then does the metalinguistic ability shared by monolinguals and multilinguals fit into more precise, more complex views of what language is? The answer that will feature in the following discussion will include the claim that metalinguistic knowledge has a separate cognitive status quite distinct from the knowledge that underlies the language ability that is acquired from an early age. Along with the rest of metacognition, it happens to represent a separate type of cognition that is NOT multisystemic in the fundamental way language must be. Furthermore, contrary to the most common view, consciousness is not a necessary element in the definition of 'metalinguistic' but simply a description of what typically accompanies metalinguistic processing.

In short, the main aim of the ensuing discussion will be to develop an explanation of what is commonly referred to as 'metalinguistic' by locating it within an explicit account of human cognition as a whole. A brief overview of relevant features of the current theoretical perspective, the Modular Cognition Framework, will therefore be necessary before directly addressing specific questions: namely, how metalinguistic knowledge should be understood with respect to the rest of cognition, what role it plays in language processing and what precisely in this general explanation the role of consciousness is. Finally, there will be a brief consideration of its usefulness.

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1.1. General characteristics and manifestations of metalinguistic cognition

Metalinguistic knowledge, sometimes described as a type of 'explicit' or 'declarative' knowledge, is generally understood to be knowledge ABOUT language as opposed to OF language, using Ryle's distinction (Ryle, 1949) and it varies greatly in degree from individual to individual. As a particular instance of metacognition, its underlying representations in the mind will take their place alongside representations that underlie knowledge of geography, history, the local transport system, social conventions, and many other things that people talk and think about and which are acquired during the course of their lives. This kind of knowledge naturally begins to grow during childhood and in principle never stops growing.

The onset of first language acquisition is not the onset of metalinguistic ability. Children acquire grammatical systems at a very early age but do this subconsciously and largely without recourse to any clear ideas about what language is and what it consists of. Although they may first become aware of some simple metalinguistic concepts like 'word' and 'word meaning', most if not all metalinguistic knowledge relating to the grammatical system will be formed during their schooldays as they gradually attain sufficient cognitive maturity to grasp the relevant concepts. Learning some basic grammatical facts about the native language(s) and ability to use categories like verb, adjective and preposition may be considered to be part of a child's general education but vocabulary enrichment and a flexible and appropriate use of the system they have already acquired tend to be even more highly prized aspects of general literacy.

In the second language acquisition literature, while most people acknowledge there is at least something distinct about metalinguistic knowledge as such, the relationship between explicit and implicit grammatical knowledge has been variously understood as an intimate one where influence can flow from explicit to implicit modes of knowledge as defined by the theory (see, for example, DeKeyser 1995, 1997) or otherwise as completely independent of the knowledge assumed to drive the intuitive, non-reflecting use of language (Krashen, 1978, 1985; Schwartz, 1986). Depending upon the theoretical perspective adopted, this could mean that any aspect of metalinguistic knowledge may in time be transformed in some way – for example, through practice – into what drives an individual's spontaneous use of language to communicate or reflect upon any topic. Otherwise metalinguistic knowledge may be viewed as something that is fundamentally different with each of the two types of language-related knowledge existing and developing separately in an individual's mind.

The question of the role and value of explicit knowledge of language and particularly of explicit knowledge of grammar has been extensively debated in the second language acquisition literature ever since researchers called into question the usefulness in practical language teaching of explaining the rules. Unless approaches were espoused that tried to imitate as much as is feasible the conditions of mother tongue acquisition, the general assumption otherwise had been that (consciously) knowing the rules of a second or other language would have an important influence on the development of grammatical fluency. However, unexpected similarities between first language (L1) acquisition and the learning of languages by older learners were noted by second language (L2) researchers, suggesting that the child's ability to acquire grammar subconsciously did not atrophy once the basics of the L1 system or, in multilingual contexts, L1 systems were in place (Dulay & Burt, 1974). It was therefore hypothesised that subconscious grammatical acquisition by older learners was driven by the same intuitive processes. Accordingly, any obstacles to full acquisition of a target by older learners had to be attributed to other causes such as interference from the L1(s) and worries about making errors. Furthermore, the hypothesis was put forward, notably by Stephen Krashen, that explicit, i.e., metalinguistic knowledge of grammar was not only a qualitatively different kind of grammatical knowledge but that it had no direct impact on the development of subconscious grammatical competence (Dulay, Burt & Krashen, 1982; Krashen, 1978, 1985; see also Sharwood Smith, 1995, pp. 99–106). The matter has by no means been fully resolved but Krashen's claim about the distinct status of conscious grammatical knowledge still has many adherents even if people differ about the degree to which it can impact on the ability to develop implicit knowledge. Given its relevance to developing bilingualism, it is worthwhile reconsidering in a contemporary scientific context what metalinguistic knowledge exactly is in the first place and how it functions in both acquisition and on-line performance.

It should be noted that an individual's metalinguistic 'knowledge' can be UNRELIABLE. This means that what is here described as 'knowing' reflects consciously held beliefs and assumptions not all of which may stand up to scrutiny. In other words, what in the present context is still defined psychologically as 'knowledge' can nonetheless be judged by others as false or misleading. This leads to an interesting distinction when observing a child's (or L2 learner's) regular use of a past tense form like 'run*ned*' on analogy with 'walk*ed*' when exposed only to adult, native speaker examples of 'ran'. A metalinguistic judgement based on conscious reflection and external norms might well be that this language user is using an 'incorrect' form but, from the point of view of the user's current mental grammar, any such value judgement of wrongness is irrelevant. It is simply the way that mental grammar currently works for that individual and is therefore neither right nor wrong. It only becomes open to external value judgements once it has been manifested in an individual's performance. Then what has been expressed intuitively and hence without reflection can be viewed, analysed and evaluated metalinguistically either by the individual concerned or by a third party always assuming that either has the requisite metalinguistic knowledge to do so. In this metalinguistic exercise, the term 'external' relates to the individual concerned who is making a judgement metacognitively from the point of view of both his or her consciously reflective self, as it were looking in from 'outside' at the product (i.e., the linguistic forms that have spontaneously emerged) and it also relates to other individuals judging that same individual's performance. There is therefore a discrepancy between metacognitive knowledge that can freely admit of value judgements in this way and a different kind of knowledge that seems to require our acceptance as simply reflecting the current state of affairs however much its observable outcomes happen to violate external norms.

It is easy to elicit an individual's metalinguistic knowledge since it is open to introspection and discussion. However metalinguistic experimental tasks can also be deployed, paradoxically one might say, to investigate implicit, intuitive knowledge. A classic example is the grammatical judgement or 'acceptability' test as commonly used by generative linguists and language acquisition researchers whereby subjects are asked in the instructions to simply express their intuitions by judging as acceptable or unacceptable stretches of text containing versions of some target

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grammatical construction that are of special interest to the researcher. Whereas the test instructions require the participants to view the test items as language objects, the research goal is not itself aimed at investigating their metalinguistic ability at all: the researcher rather seeks to elicit and analyse responses that are by hypothesis based on grammatical intuitions. The hybrid character of such tests has left them open to criticism especially where the acceptability judgements are not time-limited (see discussion in, for example, Plonsky, Marsden, Crowther, Gass & Spinner, 2019).

As already mentioned, metalinguistic ability is typically associated with the involvement of conscious awareness. Given that we have so little access to the internal processes of the mind, not least to the processing of linguistic systems and also given the literature on affective bias guiding appraisal and decision-making beneath the level of awareness, it is generally accepted nowadays that much mental processing takes place below the level of consciousness (see, for example, Öhman, Flykt & Lunquist, 2000; Morsella, Godwin, Jantz, Krieger & Gazzaley, 2016; Soon, Brass, Heinze & Haynes, 2008). Nevertheless, as conscious thought takes up much of our waking lives and appears to exert an important influence on our behaviour, its significance cannot be ignored and this also goes for its role in language use and its acquisition.

Even if consciousness is viewed as a non-essential part of the definition of 'metalinguistic' and even if the ultimate goal of explaining consciousness itself remains beyond reach, explaining metalinguistic abilities still requires a commitment to some principled approach to conscious processing. Setting aside theoretical controversies, there are certain things that most people would probably now agree: namely, that it is slow, serial, and limited when compared with fast subconscious parallel processing (Mandler, 1975). Deciding what knowledge, if any, remains permanently subconscious and hence unavailable for conscious introspection and what can be made available for the purposes of conscious reflection and language learning remains, as just suggested, a major theoretical issue. Furthermore, since thought processes involve not only consciousness but feelings and intentions, a fuller discussion of metacognition than is possible at present would certainly need to include the notion of SELF (but see, for example, Truscott, 2015, pp. 82–89, 94–95, 225; Truscott & Sharwood Smith, 2019, pp.175–208).

Finally, although awareness of language as an objective phenomenon appears to be enhanced in multilinguals[1] from an early age, much of what will be discussed below in relation to the role of consciousness and to language processing in general will also be relevant for metalinguistic ability in individuals who only have one language (Bialystok, 1986, 2001; Bialystok & Ryan, 1985; Jessner, 2005; Karmiloff-Smith, Grant, Sims, Jones & Cuckl, 1996). Young monolinguals like their multilingual counterparts in the process of acquiring their language also become aware of language as an objective phenomenon (Smith & Tager-Flusberg, 1982). This awareness is normally supplemented and refined later on at school by more concepts (beginning with words, syllables, rhyme and so on) enabling them to think systematically and talk about simpler aspects of language structure and language usage: at this point systematised KNOWLEDGE and not just unsystematised AWARENESS becomes an appropriate description of what underlies their metalinguistic ability.

[1]To be completely clear, 'multilingual' does not imply the use of more than two languages: 'bilingual' is included in this definition.

1.2. Framing the theoretical discussion

The metalinguistic concept has been around for some time in the research literature but arguably requires reframing more precisely in line with contemporary theoretical accounts of how ALL aspects of language are represented and processed in the mind.

Some broader-scope discussions about language and its place in the MIND are framed within a psychological perspective, while others focus on neural implementation, on the BRAIN in other words, and, in some accounts, both levels of explanation are involved (for example, cf. Anderson & Lebiere, 1998; Berwick, Frederici, Chomsky & Bolhuis, 2013; Carruthers, 2006; Kroll, Bobb & Hoshino, 2014; Lakoff, 1987; Paradis, 2014, Sharwood Smith, 2017). The current approach relates straightforwardly to mental rather than neural organisation and will be described in more detail in section 2 below. This approach remains open-ended in that it leaves it up to researchers with the relevant expertise to develop the details of how the architecture is implemented with respect to different types of cognition (Truscott & Sharwood Smith, 2019). It is also framed in such a way as to take account of and facilitate research associating mental and neural functioning (Sharwood Smith, 2015). To date, the majority of refinements and applications of the framework has been focused on contributing to an understanding of more closely language-related aspects of cognition (see, for example, Sharwood Smith, 2019; Truscott & Sharwood Smith, 2011, 2017).

Much has been written about metalinguistic ability over a number of decades from various perspectives. In L2 acquisition research, identifying the role of metalinguistic knowledge as 'conscious knowledge of language' has been a recurrent topic almost since this research field came into being especially with regard to grammatical acquisition (Krashen, 1978, 1985; Sharwood Smith, 2004; Truscott, 2015). Older, motivated acquirers with their greater cognitive maturity are naturally inclined to use whatever metalinguistic knowledge they may possess to critically examine their progress in the new language, reflect on the rules, correct their errors and consciously try in various ways to facilitate further learning.

Given existing differences of opinion as to whether metalinguistic knowledge is different in some fundamental way from the linguistic knowledge that drives fluent and spontaneous language performance, it becomes important to establish whether or not what is known and used consciously can or cannot in principle be transformed into the second implicit, subconscious kind of knowledge. Since the 1970s this question has been pursued by those interested in shedding light on the possible facilitating role of explicit grammatical knowledge in the acquisition of languages by older children and adults (for example, Ellis, 2011; DeKeyser, 1995, 2003; Ellis, 2005; Krashen, 1985; Schmidt, 1990; Schwartz, 1986; Sharwood Smith, 1981, 1996). Someone can have an extensive technical knowledge of the grammar of a language and yet have only a faltering and deficient command of it. The reverse is also the case: given the right circumstances, fluent command of the grammar of a new language can be achieved in time without much in the way of (meta)knowledge about how that grammar actually works. The only tangible practical benefit of metagrammatical knowledge it would seem is the ability to spot some grammatical errors and correct them, not that this provides any guarantee at all that these errors will not reoccur again and again. Resolving this and other questions about metalinguistic knowledge must depend to a great extent on the theoretical stance taken about the nature of linguistic knowledge and knowledge in

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general and degree of explicitness with which the mechanisms responsible for creating, storing and activating representations during online processing are defined. The chosen approach will crucially affect the framing of hypotheses and the analysis of data.

2. The Modular Cognition Framework (MCF)

The discussion from now on will be framed in terms of the MCF, and will provide a specific baseline explanation of what constitutes any kind of metacognitive knowledge, linguistic or otherwise; as well as how it is created and accessed. This framework already provides a sufficiently high level of detail concerning the architecture and mechanisms of cognitive processing which can enrich the analysis and explanation of existing empirical data as also the formulation of new hypotheses for further investigation (for a full account of its principles, see Truscott & Sharwood Smith, 2004, 2019; Sharwood Smith, 2017).

The MCF represents an integration of theoretical approaches and empirical research across a range of different research domains within cognitive science. It provides a basic, flexible architecture embedded in contemporary thinking about the mind: it can be used to explore any given aspect of cognitive functioning. Two very important points need to be made at the outset. Firstly, so-called 'modular' explanations in no way suggest the notion that the mind is a rigid, fixed system. When modular systems interact in various ways in on-line processing, this naturally gives rise to many dynamic, constantly shifting holistic effects. In other words, as implied above, 'holistic' and 'modular' are not mutually incompatible characterisations of mental activity (Barrett & Kurzban, 2006; Carruthers, 2006; Truscott, 2015, pp 30–34). What 'modular' means is that the mind is composed of a network of functionally specialised systems that humans use to process and internally organise their experience of the external environment. One example of such a system is the auditory system where all sound representations are created, stored and processed. Another one, especially important for the present discussion, is the CONCEPTUAL SYSTEM where all meaning representations are processed. These specialised systems each handle a specific type of representation but are continually collaborating with one another. Mental activity is characterised by representations of various types being activated together to form different 'representational networks' also called schemas (Truscott & Sharwood Smith, 2019, pp.26–27, 59–67). These schemas are brought into action to simultaneously handle multiple tasks. In this way, even the basic architecture provided by the MCF permits explanations not only of what is fixed or constrained about cognitive processing but also what in various quarters has been described as the mind's dynamical, variable character. The network formed by the different specialised systems is relatively stable but the myriad networks of representations (schemas) that it can generate are characterised by a very high degree of variability. The second important point to bear in mind is that the MCF is a framework for explaining MENTAL facts, not neural facts although, for a full account of human cognition, both mental and neural accounts of cognition will need to be kept systematically related as research in both domains progresses.

To sum up, the MCF represents a systematic attempt to reflect and integrate a range of contemporary theoretical and empirical research across various disciplines concerned with human cognition. To date, however, applications of the framework have focused on how various aspects of language representation and functioning fit in to current ideas of how the mind works as a whole: for the most part, the following discussion will be no exception although what is said about metalinguistic cognition holds for metacognition in general. The MCF will now be applied to consider the nature, the use and supposed advantages and the limitations of metalinguistic ability in the light of contemporary theory. Only those features needed for this discussion will be described and the rationale for adopting MCF architecture will be left aside as it has been extensively discussed elsewhere (Sharwood Smith & Truscott, 2014a; Sharwood Smith, 2015; Truscott, 2015; Truscott & Sharwood Smith, 2004, 2019 and for further relevant discussion, full bibliography and glossary, visit https://cognitionframework.com/).

2.1. The basic organisation of the mind.

The MCF adopts a common view of the mind as being composed of an interactive network of specialised systems each responsible for processing a particular type of cognitive structure, also referred to as representations (Fodor, 1983; Chomsky, 1972; Jackendoff, 1987, 2002; Cosmides & Tooby, 1994; Carruthers, 2006). Metalinguistic knowledge is based on representations in one of these systems, as will shortly be explained. These structures are the basic units of cognition. Within their own system, they can be combined in various ways to form more complex structures of the same type. Various types of representation from different systems can, in turn, be associated with one another via connecting INTERFACES: these interfaces between systems consequently enable both parallel and serial COACTIVATION of associated representations. Fig 1 shows a coactivated schema comprising seven different types of association across six (here unspecified) specialised systems. These schemas generate more complex multisystemic representations activated in order to handle some current situation.

As implied above, representations are coded according to the structural principles of their own particular system. Association of differently coded representations across systems does not imply a merging of information: there is, in other words, no way in which the coded information structures from different systems can be combined in order to form larger informational units. Instead the associated representations are 'run' together in parallel during processing. This implies that incompatibly coded structures belonging to different systems can still be associated and coactivated with one another. For example, a meaning (conceptual representation) may be associated and coactivated with a sound or visual representation such that activating one will trigger the coactivation of its associate. In this way, a doorbell can activate a visual representation of someone standing outside the door coded in one particular way or the sound of the simple word 'dog' can evoke images (visual representations) of dogs coded in a different way. Both these coactivated pairs of representation may also coactivate particular meanings, i.e., conceptual representations, and so on and so forth. Later this principle will be illustrated using words and word meanings that represent metalinguistic concepts.

All such specialised cognitive systems comprise a PROCESSOR and a STORE. As stated earlier, any specialised cognitive (mental) system will have a neural implementation that is considerably more complex: both processing and storage in the brain may well be distributed across numerous different physical locations. Even though the processing of, say, a visual representation, will activate different regions of the brain and connecting pathways, the complete pattern of activity will be recognisably visual and

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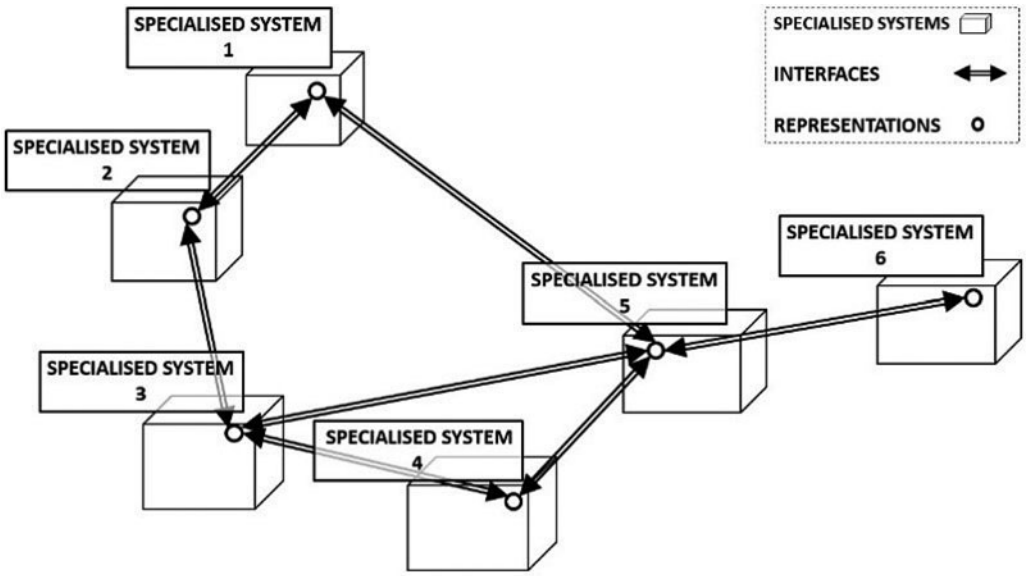

Fig. 1. A co-activated representational schema.

distinct from identifiable patterns triggered by the activation of, say, an auditory representation. The complexity of neural descriptions can be considerable reduced when talking about the mental processing at a more abstract level of description (Sharwood Smith, 2015).

The store is a repository of 'structures' of a particular type; it may be regarded in processing terms as the module's 'memory'. The visual store, for example, contains various visual structures that may at any given moment be at rest or in a state of activation. Structures can only be constructed according to the principles of the given specialised system: this process entails combinations of certain pre-existing elements called the PRIMITIVES of that system: in other words, they are the system's biologically predetermined building blocks. In the case of the visual system, they are used to construct complex visual representations that consequently reflect the particular characteristics of human vision. Structures in a store will accumulate over an individual's lifetime by virtue of its processor putting together various structural combinations in response to, in this example, visual experience. In this way, a processor handles the structures in its memory store, builds new representations and combines them during processing according to its own principles of construction; these principles are defined not by the MCF itself but by whatever the preferred theoretical account of those principles happens to be. For example, the visual representations associated with the MEANING **DOG** will be structured differently from the representation of the SOUND "dog"[2] which is a complex AUDITORY structure (AS) therefore coded according to auditory principles. Note in passing that applying the framework also means choosing and applying a particular theoretical approach, compatible with MCF architecture, to whatever particular aspect of cognition happens to be under investigation, e.g., as auditory, visual or linguistic cognition. This relative freedom of choice reflects the function of the MCF as an open-ended theoretical FRAMEWORK and not a grand 'theory of everything'.

2.2. The central role of the conceptual system

One of the systems that will be especially important for the discussion of metalinguistic ability is the CONCEPTUAL system, the prime focus of this section, which handles all abstract meanings whether they are associated with linguistic structures or not. Despite its close involvement in language-related activity, the conceptual system is therefore not itself a linguistic system. Not all abstract meanings need, for a given individual, to have a linguistic expression in one or other of that individual's languages. Obvious examples of such non-linguistic meanings are those associated with musical experience. Sensory experiences in general – smells, visual images, sounds, touch sensations etc. – may certainly be associated with meanings that are not necessarily expressible (or at least not without a lengthy paraphrase) in language.

As far as neural implementation goes, there is certainly evidence to suggest that the brain also has a separate conceptual system involving areas in the pre-frontal cortex such as the dmPFC, and posterior areas for what in the MCF would be identified as storage of the neural equivalent of conceptual structures (Baetens, Ma & Van Overwalle, 2017; Fuster, 2015; Kiefer & Pulvermüller, 2010; Lambon, Jefferies, Patterson & Rogers, 2017; see also Truscott & Sharwood Smith, 2019, pp 74–6).

Another very important part of any account of cognition is the AFFECTIVE system which influences the values that activated representations are currently assigned although limitations of space mean that it will not be in focus in the present discussion[3] (Truscott & Sharwood Smith, 2019, pp. 83–87). Finally, two other relevant systems which are related to language ability in general can be described as having a specifically LINGUISTIC function since they deal with, respectively, PHONOLOGICAL STRUCTURES (PS) and SYNTACTIC STRUCTURES (SS). The particular associations between PS and SS representations that are created and activated

[2]Note that the *sound* of a word is not the same as the *phonological* structure that gives the sound the linguistic status of *speech*. Establishing its phonological status presupposes the existence of a separate specialised system, in this case the phonological system (Jackendoff 1987, 2002).

[3]The affective system is also where basic emotions are processed.

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during performance will naturally differ depending on current circumstances but these two systems serve both monolingual and multilingual language users (see Truscott & Sharwood Smith, 2014, pp. 185–194). All other mental systems involved in language activity are by definition not specifically 'linguistic' since they serve non-linguistic purposes as well. This will become clearer as the discussion proceeds: in some cases, language performance can even reflect the lack of any significant involvement of the two specifically linguistic systems.[4]

Notwithstanding the special role the two linguistic systems play in language processing generally, the position taken here regarding the source of metalinguistic knowledge is that NEITHER of these two linguistic systems are responsible for the development of metalinguistic knowledge. Rather, knowledge about language as an object of reflection is built up, stored and processed in the conceptual system. Metalinguistic representations are therefore formulated in conceptual code following conceptual principles in the form of conceptual structures (CS). In short, in terms of the MCF, they are conceptual representations and not specifically linguistic ones. The concept expressed by the technical term 'adjective', i.e., **ADJECTIVE**[5] is a conceptual structure no different in kind from **DOG**, the meaning of 'dog'. This has important implications for how the notion of grammar is viewed. It means that, when considering the nature of grammatical knowledge, a distinction should be made between a) the GRAMMATICAL knowledge reflected in the spontaneous unreflecting performance that is composed of linguistic (phonological and syntactic) representations and b) conceptually coded METAGRAMMATICAL knowledge, which is knowledge 'about' grammar and which can figure in conscious reflection.

Since, in the MCF account, a requisite for conscious awareness to be triggered is the presence of representations which are able to attain very high levels of current activation (Baars, 2002), any aspect of metagrammatical knowledge, provided the relevant conceptual representations that support it have the potential to attain these high levels, can then feature in an individual's conscious experience. Although we cannot literally become aware of the supporting conceptual representations themselves, their content becomes available to our conscious minds especially thanks to co-activated perceptual representations. This potential for conceptual structures to feature in consciousness is influenced by the current RESTING LEVELS OF ACTIVATION possessed by given CS. A regularly activated representation will have attained a relatively high level so that on those occasions when it is activated it will, all other things being equal, be readily accessible for online processing in working memory. This also includes an increased possibility of it achieving the very high levels required for conscious processing[6].

Grammatical knowledge, which is composed of LINGUISTIC representations alone, will never feature in conscious processing since, by hypothesis, the linguistic systems need to and do operate rapidly, effortlessly and hence efficiently, at relatively low levels of activation and so never need to attain the high levels necessary for conscious, often effortful serial operations. Since linguistic (phonological and syntactic) representations are never projected into conscious awareness, they never participate in conscious manipulations of language. This separation of linguistically-based and conceptually-based knowledge of language fits in with what has been investigated so far concerning grammatical acquisition at any age (Jackendoff, 1996, 2012; Truscott & Sharwood Smith, 2014). Section 2.4 will look at linguistic and conceptual processing in more detail.

2.3. The conceptual system and consciousness

Without being able to go into much detail here, something still needs to be said about consciousness and how conceptual representations can, during online processing, come to feature in conscious reflection. Structures as used in the present context are said to 'represent' something. A given VISUAL STRUCTURE (VS) may be said to represent a visible object, for example. In line with certain contemporary approaches to consciousness, the generation of any conscious experience relies on coactivation in the perceptual systems, the visual system being one example (Carruthers, 2015; Prinz, 2007). For a concept to become part of conscious experience, the relevant conceptual structure has to be provided with perceptual 'clothing', i.e., it must be projected into the systems responsible for sensory perception so that what is conceptual become perceptual. For survival purposes, the richly interconnected perceptual systems themselves are typically highly active already: this means that perceptual awareness is readily and almost continually generated. For the meaning content of any given structures in the conceptual system to be projected into conscious awareness, these CS need to be associated with perceptual representations in the first place and above all be capable of attaining the required high levels of activation.

It should be noted in passing that the initial source leading to conscious awareness may vary. Take, for example, the triggering of a feeling of rightness or wrongness (Truscott, 2015, pp. 100–101). As feelings, they are directly based on high levels of activation within the affective system. The interpretation adopted here, consistent with the MCF, is that any kind of awareness, affective or otherwise, depends on sufficiently high levels of synchronised activation in the perceptual systems as well. Those conscious processes that go beyond the level of basic 'unreflecting' awareness – metalinguistic processing, for example – would then minimally engage the synchronised activation of not only the relevant conceptual representations but representations in the perceptual system. In fact, in any type of awareness, which is characterised by high levels of activation in multiple locations, both the perceptual and the affective system will be implicated one way or the other.

It should also be emphasised as far as conceptual representations are concerned that not all CS on a given occasion may be activated or need to be activated sufficiently to participate in conscious processing. Thinking about language, however, means activating those CS that represent the metalinguistic concepts to be used at the requisite high levels of activation. Then they can participate in the sequential, resource-hungry conscious processing that is characteristic of all types of thinking. This high processing load will place limits on the use of metalinguistic knowledge when deployed alongside spontaneous performance in order to monitor and control it (Krashen, 1978).

2.4. The conceptual system as a potential source of superordinate 'control'

The conceptual system described here might appear to reflect ideas about the mind having some kind of 'domain-general'

[4]Other similar well-known approaches to language, not necessarily incompatible with an MCF perspective, would see this dual distinction as reflecting the presence of one specifically linguistic system (cf. Fodor 1983; Hauser et al, 2002; cf. Jackendoff, 1987, 2002)

[5]CS by convention are written in uppercase letters.

[6]In any given situation, activation levels of conceptual representations can be indirectly boosted temporarily via particular associations with other representations. In particular the boost may come from the affective system. (for illustration, see Truscott & Sharwood Smith, 2016.

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system (Fodor, 1983; cf. Tooby & Cosmides, 1992). The MCF has a specific stance on this matter: as indicated above, the conceptual system has the same basic organisation as any other system and has no unique status. It is similarly specialised. It also has its own memory store and its own processor and its representations are also structured in a unique code that makes them incompatible with representations in any other system.

The absence of any special, superordinate, domain-general system means that there is no 'central processor' or single supervisory system in the mind: this avoids falling into the trap of the homunculus fallacy, i.e., implying the existence of a 'mind within a mind'. Rather, the relationship between the various specialised systems is HETERARCHICAL, not hierarchical, which means that control shifts locations depending upon the internal and external situation (Truscott & Sharwood Smith 2019, pp.126–129, 280–281).

The conceptual system is 'amodal' in that its structures may be associated with all types of perceptual representation; furthermore, between the conceptual system and the syntactic system there is also an interface, the workings of which will be illustrated later and which allows meanings like **DOG** AND syntactic structures (SS) like *N(oun)* to be associated. This also has the effect that the conceptual system regularly plays the part of a 'hub' where all kinds of representational networks are interconnected. Hubs do not have to be control centres nor need they have any kind of proactive, coordinating function that might suggest the existence of a supervising homunculus.

Fig. 2 provides an example of a representational network which shows the conceptual system acting as a 4-way hub for, respectively, the syntactic, affective and two perceptual systems (visual and auditory). Note that also selected for display are four direct connections that bypass the conceptual hub. This example not only shows the role of the conceptual system as a hub but shows how language processing is not just concerned with linguistic structure but rather involves the activation of many different cognitive systems across the mind and, by extension, also the brain.

In sum, conceptual hubs account for much processing traffic across the system as a whole. This has implications for how data obtained from techniques such as brain imaging is interpreted since it seems inevitable that even mere complex neural networks covering many or most regions of the brain are going to show activation whenever the conceptual system is being used in this way. This hardly improves the ease with which such data can be interpreted without the guidance provided by a well-developed explanatory framework for cognitive functions and, of course, much further refinement of the required technology.

2.5. More on metalinguistic versus linguistic representation and processing

Amongst all the complex networks of representations that get activated within and across the various specialised systems in the mind, those networks that can be categorised as 'metalinguistic' will have certain defining features. At the centre of the network will be the conceptual system. The key conceptual structures (CS) involved will be ones that express concepts that reflect various features associated with languages. Some will be very basic conceptual structures such as **LANGUAGE** and **WORD**. Others may be more sophisticated depending upon the individual's personal history and interests ranging widely from CS like **SYLLABLE**, **RHYME, WORD ORDER, NOUN, FRENCH**, up to ones representing more complex technical linguistic terms like **LEXICON, TENSE, ASPECT, AFFIX, CODA, MERGE, FINNO-UGRIC, AGGLUTINATING** and so forth.

By distinguishing between generic meaning representations (CS) and linguistic representations (PS and SS), it becomes an easier matter to explain why metagrammatical knowledge, however well established in the mind of an individual, does not turn out to have a palpable and straightforward effect on the development of grammatical ability. Consider, for instance, what happens when an individual hears the following information about French grammar, ignoring to what extent it happens to be a completely accurate statement:

"In French, adjectives follow nouns".

This principle is exemplified by the final position of 'rouge' (red) in 'le moulin rouge' (the red mill). How then is this metalinguistic information actually processed and where is it stored? MCF architecture provides a baseline account of the way it will be represented and the millisecond-by-millisecond processing operations that will take place as the statement is heard and comprehended. Although in reality, the direction of processing is not limited to a fixed linear sequence of stages but admits of much to-and-fro movement and parallel activation, consider first the following simplified sequence of events based on Fig. 3.

The sound of the utterance, in the form of complex acoustic patterns, is picked up by the hearer and the first step in cognitive (representational) processing is carried out by the auditory system which will activate a generic sound representation (AUDITORY STRUCTURE) corresponding to the acoustic input. The activation of this AS will immediately trigger the coactivation of a matching phonological structure associated with the auditory representation: at this point the input is now processed as speech rather than as generic sound. The activated phonological representation (PS) will coactivate a syntactic representation (SS), which will be something like: *Subject Plural Noun + Transitive Verb + Object Noun*[7].

Finally, a set of existing conceptual representations forming a complex CS will get coactivated providing the meanings to be associated with the above syntactic structures. To the extent that this novel information, couched in conceptual code, is represented in a manner that will permit it to be retained for more than a few seconds, the new information about French grammar will be accounted for solely in terms of changes in the CONCEPTUAL store. As shown in Fig 3, the conceptual structure **ADJECTIVE** for example, apart from being associated with the syntactic structure *Noun* will be associated with visual representations (VS) of the WRITTEN word in one or more of the languages known to the individual. The CS **ADJECTIVE** will similarly be associated with the auditory representations (AS) of the SPOKEN word. Apart from any direct association with conceptual structures, this AS will also be associated, outside the conceptual hub, with corresponding phonological structures (PS). Assuming in this case that the individual concerned has a positive attitude to learning about grammar, the AFFECTIVE STRUCTURE (AfS) associated with this concept and shown in Fig. 3 reflects a current value placed on it that will be positive and strong, reflecting the fact that

[7]Note that a more accurate expression of the syntactic properties will depend on the preferred syntactic theory, a choice left open by the MCF.

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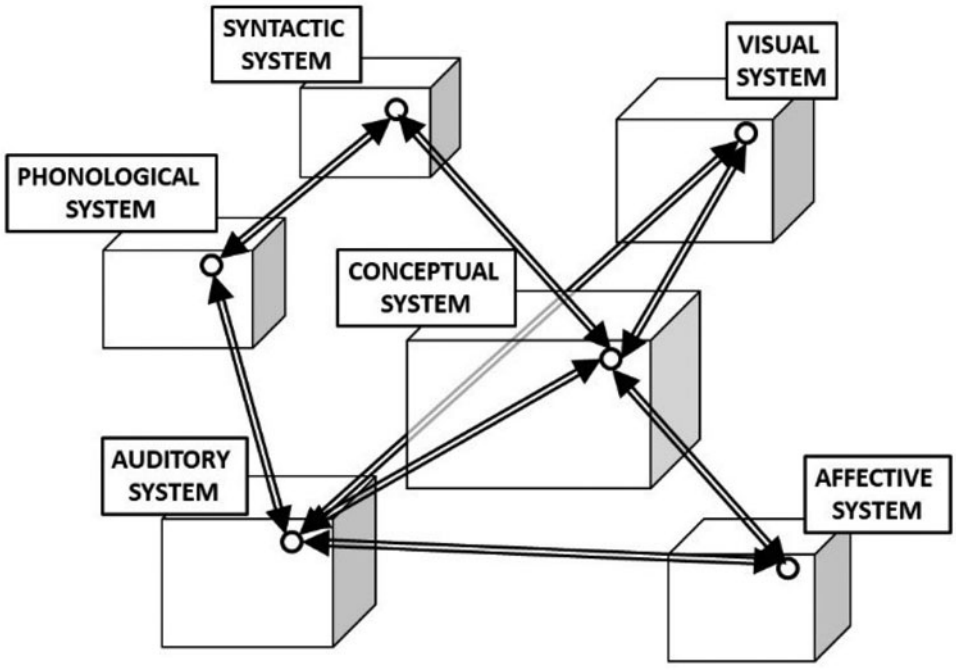

Fig. 2. A four-way conceptual hub.

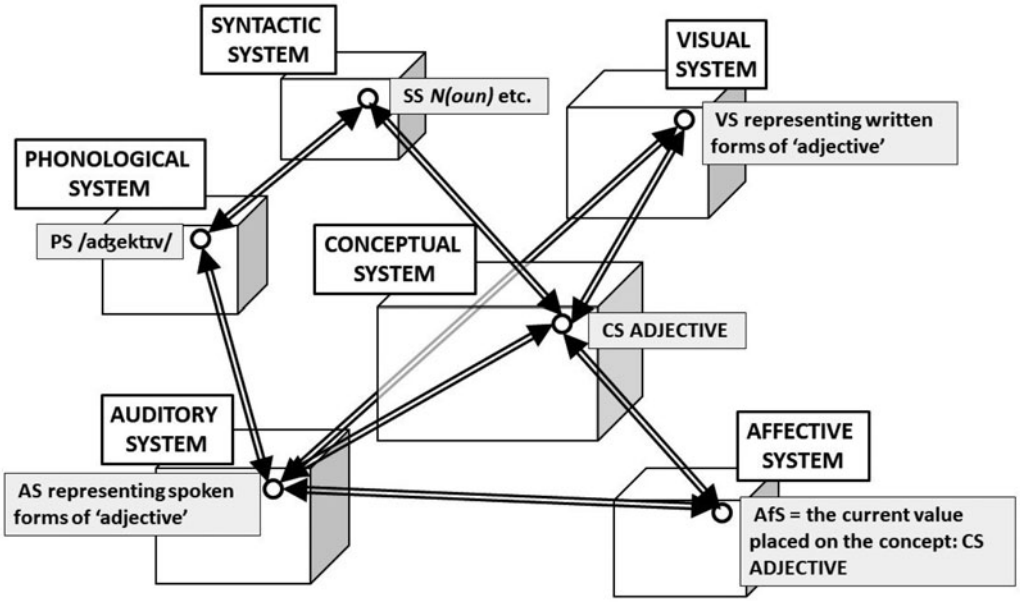

Fig. 3. Different coactivated representations corresponding to the work 'adjective'.

metagrammatical information is being conveyed to an individual who happens to value it highly. Finally, the direct AS/CS association between the sound of the spoken word 'adjective' and its meaning, **ADJECTIVE**, reflects an ability to already associate sounds and meanings irrespective of the existence of any linguistic representations defining a word's linguistic status.

The question now arises: will the new information about the syntax of adjectives produce changes in the individual's syntactic system? The answer must be 'no': the outcome of the syntactic processing yielding *Subject Plural Noun + Transitive Verb + Object Noun* did not even involve adjectives. In other words, the only possible outcome would be METAgrammatical development, an outcome of conceptual processing. Learners trusting in the effectiveness of metagrammatical instruction may therefore worry unnecessarily about their apparent inability to profit from all the syntactic information provided by teachers or textbooks (Truscott, 2004).

What promotes SYNTACTIC growth in this particular area of French grammar is the continued exposure to and regular, frequent processing by the two linguistic systems of French

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utterances containing adjectives in the relevant, postnominal position. In this way, provided the adjectives and nouns are identified and processed as such in the syntactic system, new syntactic representations (SS) may be activated accordingly and lead to the formation of new syntactic knowledge. There will still be delaying factors affecting the rate of development. For example, the fact that a group of highly frequent adjectives like 'petit' (small) and 'grand' (big) typically come BEFORE the noun as in 'le petit enfant' (the little child) will provide a boost to the prenominal position which will then compete with the default postnominal position. Competition from a multilingual's other languages with a different default adjective position may also play a role since their syntactic/conceptual associations will also be coactivated. However long it takes to form new, stable representations, the principle here should be clear: metalinguistic information promotes conceptual growth while syntactic growth is a response to input originating in exposure to samples of the language.

Theoretical perspectives that provide clarity about what the implicated processing mechanisms might be and how they might operate will provide the basis for more rigorous argumentation in the search for explanations of research data used to investigate metalinguistic knowledge. In particular, if such perspectives are informed by contemporary theoretical linguistic research, they will provide a more accurate and differentiated picture of the complexity underlying what are essentially vague concepts like 'language', 'grammar' and 'vocabulary'.

3. Possible uses of metalinguistic knowledge

The advantages claimed for possessing and using metalinguistic knowledge differ in the degree to which they are, or need to be, supported by scientific research. It is certainly not the case that metalinguistic knowledge is useless. For example, many cultures place a high value on learning about language, particularly in relation to the mother tongue or, in a multilingual, multicultural society, to different mother tongues. This would seem to reflect a widely held belief that there is an intrinsic cultural and educational value in promoting awareness of language as part of general knowledge but also about the role of language(s) in the community. Of more direct concern in the present discussion are the more controversial or just unresolved issues. In particular how, given the multisystemic nature of language, might metalinguistic knowledge facilitate the development of different aspects of language ability in older learners of a second or other language? Lexical, semantic and pragmatic representations, all of which in the current perspective are conceptual structures, should be therefore more open to explicit, conscious manipulation than those aspects of language that are controlled by systems that do not have this potential in the first place. Any conceptual representation, whether it expresses a metalinguistic concept like 'adjective' or any other concept, can, given the right conditions, be projected into conscious experience. The MCF provides the architecture to formally describe the process in some detail.

Once meanings (CS) become objects of thought, then any available perceptual representations associated with the CS in question will also be projected into conscious awareness at the same time. With regard to language-related perceptual representations, these could include the VISUAL representation of given orthographic patterns (letters, ideographs etc) or sign language patterns and the AUDITORY representations of associated sound patterns, in other words given AS and VS. Also activated in parallel will be any associated syntactic or phonological structures that happen to be available but these will operate at activation levels that preclude them being part of conscious experience. Once this configuration of coactivated structures is triggered, the consciously perceived part of it may become subject to metalinguistic management either during language comprehension or production. In other words, the language can then be directly manipulated to serve different metalinguistic goals.

3.1. Conscious learning

One metalinguistic goal might be language learning. For example, the aim may be to commit to memory given words or phrases or grammatical constructions that have hitherto been the perceived cause of errors. Words, phrases and constructions available to the CONSCIOUS mind will be limited to particular associations between meanings (CS) and given stretches of visual text and/or sound. Empirical research can establish to what degree in practice attempts to acquire words and constructions via metalinguistic activities in this way are as good as, or more efficient than, relying exclusively on exposure to the target language. On frequent exposure without any metalinguistic interventions by instructors, subconscious processes are regularly set in motion as learners attempt to comprehend stretches of written and spoken language without explicit guidance: this implies, for example, no explanations of rules and no overt identification or discussion of errors. Expressed in MCF terms, the ultimate goal of most learners is, ideally, to create in their minds stable associations between different types of representation: namely, perceptual ones (AS and/or VS) and non-perceptual ones (PS, SS and CS) such that these can get regularly coactivated and hence support spontaneous, effortless language comprehension and production. Given that meanings of any words as well as any grammatical construction can, in principle, be acquired in context, incidentally and implicitly by listeners and readers who remain focused purely on extracting meaning from what they see or hear, the onus is on providing unambiguous evidence that explicit instruction can accelerate the rate of acquisition enough to merit the extra time needed in order to provide such assistance on a regular basis.

There are aspects of language learning that seem particularly open to metalinguistic facilitation. When it comes to learning how to use words and constructions APPROPRIATELY in different contexts of use, it can be argued that what outside observers may judge to be evidence in the language learners are exposed to may not be easy at all for the learners themselves to detect without their attention being drawn explicitly to the types of context and associated forms in question. How is a learner to know, for instance, that a given word or expression is only used in formal contexts when so many words and expressions may be used in either formal or informal contexts? Learners are not necessarily sensitive to pragmatic clues that are relevant for target language usage. In principle, learners should be alert to, for example, formal situations and, given sufficient exposure to such contexts, identify and coactivate the appropriate word or construction with the relevant feature, in this case, CS **FORMAL**. Cultural differences however may obscure what in the target culture is regarded as formal. The evidence seems to suggest that even advanced acquirers of an L2 have difficulty with pragmatic acquisition (Bardovi-Harlig, 1999). Associations become even more elusive in other cases where the choice between two possible syntactic constructions is determined by subtle semantic or pragmatic discourse features, another problem that advanced acquirers of L2s have difficulty with (Sorace, 2011). Since there

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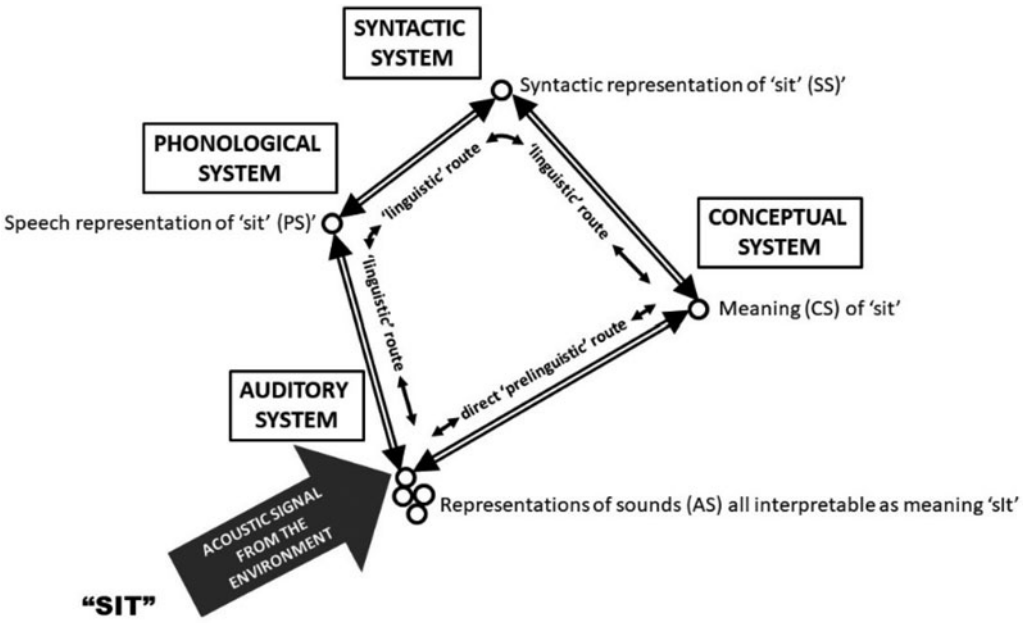

Fig. 4. Two routes between sound and meaning

exists no theory claiming the existence of an innate device that can work out how to identify semantic or pragmatic constraints on the selection of available grammatical constructions without massive, salient evidence or explicit guidance, no one will reject out of hand the possibility that such guidance might well facilitate learning these particular aspects of a complex multi-faceted language system. It therefore comes as no surprise that the idea of investigating the effects of explicit pragmatic instruction has attracted researchers in applied linguistics (see, for example, contributions to Rose & Kasper, 2001).

The next section will provide some slightly more detailed illustration of interactions between word learning and grammatical performance where conscious metalinguistic processing is or might possibly be involved, again using the resources of the MCF.

3.2. Lexical and phonological acquisition.

Lexical acquisition covers idiosyncratic forms, that is the acquisition of individual words, formulaic expressions and idioms such as 'cat', 'well, you never can tell' and 'let the cat out of the bag' as opposed to the acquisition of the underlying grammatical system (Abbot-Smith & Tomasello, 2006; Culicover, Jackendoff & Audring, 2017; Peters, 1983; Wray, 2002). One way or other, the conceptual system provides the meanings to be associated with the appropriate spoken and written forms. A subset of those stored meanings express concepts that are required to talk about language and they are, by definition, metalinguistic ones. This subset can vary in size between small (for most people) and very large (as in the case of individuals such as academic linguists and literary scholars who have a serious interest in language and how it functions).

How words and expressions should be deployed in stretches of speech or writing requires minimally an association between the meanings, their spoken or written forms and the grammatical categories (noun, adverb, adjective, etc) that they exhibit. However, as a first step, all that is strictly needed is a direct route associating a conceptual structure like SIT with a sound: namely, its AUDITORY structure (AS). In essence, this minimal sound/meaning link is not much different from what a pet dog would need, to be able to establish the same concept/sound association by interacting with its owner. If 'word' by itself is not already a misleading, inappropriate description of this simple AS/CS association, it could be called a 'pre-word', or a 'pre-linguistic' word, for example. Through an expanded network to include linguistic structure, the human but not the dog can then use the concept SIT as part of more richly structured messages such as 'This chair is uncomfortable *to sit in*, 'I *sat* there' or 'Is *sitting* easier than standing?'. Learning even a single word like 'sit' as a linguistic expression, i.e., a word and not a sound, means associating the CS that expresses its basic meaning with a number of other types of structure including two types of linguistic representation that cannot be called into conscious awareness, i.e., a PS and an SS. Before this happens, the direct sound-meaning (AS-CS) associations may have already become sufficiently well established for the activated SIT meaning to play its part in ongoing comprehension of longer utterances, most of which will be constructed via the linguistic (PS/SS) systems. Using the basic sound/meaning correspondence yielded via this direct route, the conceptual processor can integrate the activated conceptual representation along with all the other currently activated meanings to construct a more complex, coherent message (see Fig. 4). If a learner, for example, is informed explicitly by someone else, say a language instructor, of the meaning of a given word, this will be in the form of a visual or acoustic cue, i.e., by providing the written, spoken or sign language version of the word accompanied by its meaning. This allows the learner's mind to already form the direct, pre-linguistic association between a corresponding auditory (AS) or visual (VS) representation and the representation of its meaning (CS). The phonological and syntactic systems, by their nature ever ready to try and make sense of their input, may provide a first attempt at activating a candidate syntactic structure (SS) to participate in the processing of the rest of its current input. The point here, however, is that these responses by the two linguistic systems are not necessary for the meaning to get

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processed anyway. The precise phonological and syntactic status of 'sit' as an intransitive verb can be established later so as to yield a complete and appropriate AS⇔PS⇔SS⇔CS chain. The 'helpful' intervention of the instructor simply facilitates the creation of a direct, auditory-conceptual link in the learner's mind: that is, in advance of any other development. In fact, the very activation of this shorter chain will already prompt responses from the individual's linguistic systems to try to build matching PS and SS on the spot.

Metalinguistic activity, whereby conceptual structures expressing metalinguistic concepts are activated, is typically conscious. In providing the basis for a direct AS/VS⇔CS link to be formed and later boosted metalinguistically, the non-linguistic types of representation involved, CS, AS and VS, are precisely those that can under the right conditions participate in conscious awareness. With an appropriately high level of activation, the informational content of a CS can be projected into conscious experience via the perceptual systems. The other two types of representation involved, AS and VS, are already perceptual representations anyway. As such they will be richly interconnected and regularly processed at very high levels of activation. Take conscious word learning, for example. In being informed by another person – an instructor, for example – about the meaning of 'sit', the learner is simultaneously being made conscious of its spoken and/or written form and its meaning. The activation of this small set of associations can be rehearsed again and again by the individual with the aim of 'committing the word to memory', which in MCF terms means raising their resting levels of activation by repeated processing hence making them readily accessible. This is probably much less effective by itself than exposing the learner to a word in various authentic contexts, thereby promoting the growth of many more associations to support the subsequent activation of the basic AS/CS association as well the development of the word's linguistic (PS and SS) status (for possible ways for instructors to enhance language input, see Sharwood Smith & Truscott, 2014b).

4. Conclusion

There is so much more to be said about metalinguistic processing. The preceding discussion has focused on the task of providing more precision in debates about how to explain the psychological status, mechanisms and usefulness of metalinguistic knowledge. It was argued that, in order to achieve this precision, it is necessary to apply wide-ranging theoretical frameworks to these questions, ones that encompass more than just the theoretical contributions of just one research domain like theoretical linguistics, or some particular branch of psychology. Two main themes predominated: namely, the often underestimated multisystemic nature of language and the need to see metalinguistic knowledge in the context not only of metacognition as a whole but as a particular outcome of all cognitive processing. Not only is language multisystemic but so is the mind generally. Explanations of how people acquire and use what they consciously know about language has to be understood in that context. Particular emphasis was placed upon the central role of the conceptual system in all metacognitive processing. Consciousness was viewed as frequently accompanying any metacognitive behaviour but not itself a defining feature of metalinguistic cognition.

The questions posed at the beginning of this discussion were how metalinguistic knowledge should be understood with respect to the rest of cognition, what role it plays in language processing, in particular with respect to grammar, and what precisely in this general explanation the role of consciousness is. In accordance with the MCF's view of the mind as composed by functionally specialised systems, implicitly acquired grammar is created, stored and processed on line by the syntactic and phonological systems. Representations in each of these two systems are accordingly written in their own unique code. Metalinguistic representations, as types of conceptual structure, are accordingly written in the equally unique code of the conceptual system. Despite all the complex networks at work during language performance involving different systems and types of representation that in various ways have been associated and coactivated with one another, no information is ever transferred from any one system to any other. This means that conceptually coded representations with metalinguistic content cannot be merged with syntactic ones and vice versa. They live separate lives but, despite this, often collaborate online to separately perform the tasks they are uniquely designed to perform. Whatever the effects of this particular multisystemic cooperation can be is still the subject of ongoing research but at least it seems clear that resource-intensive, conscious processing, which is a feature of much metalinguistic activity, places distinct limits on how much it can affect aspects of fluent linguistics performance that are delivered by other contributing systems at lower levels of activation associated with subconscious processing. This would explain the disconnect between levels of metagrammatical knowledge and levels of syntactic development noted in the second language acquisition literature.

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