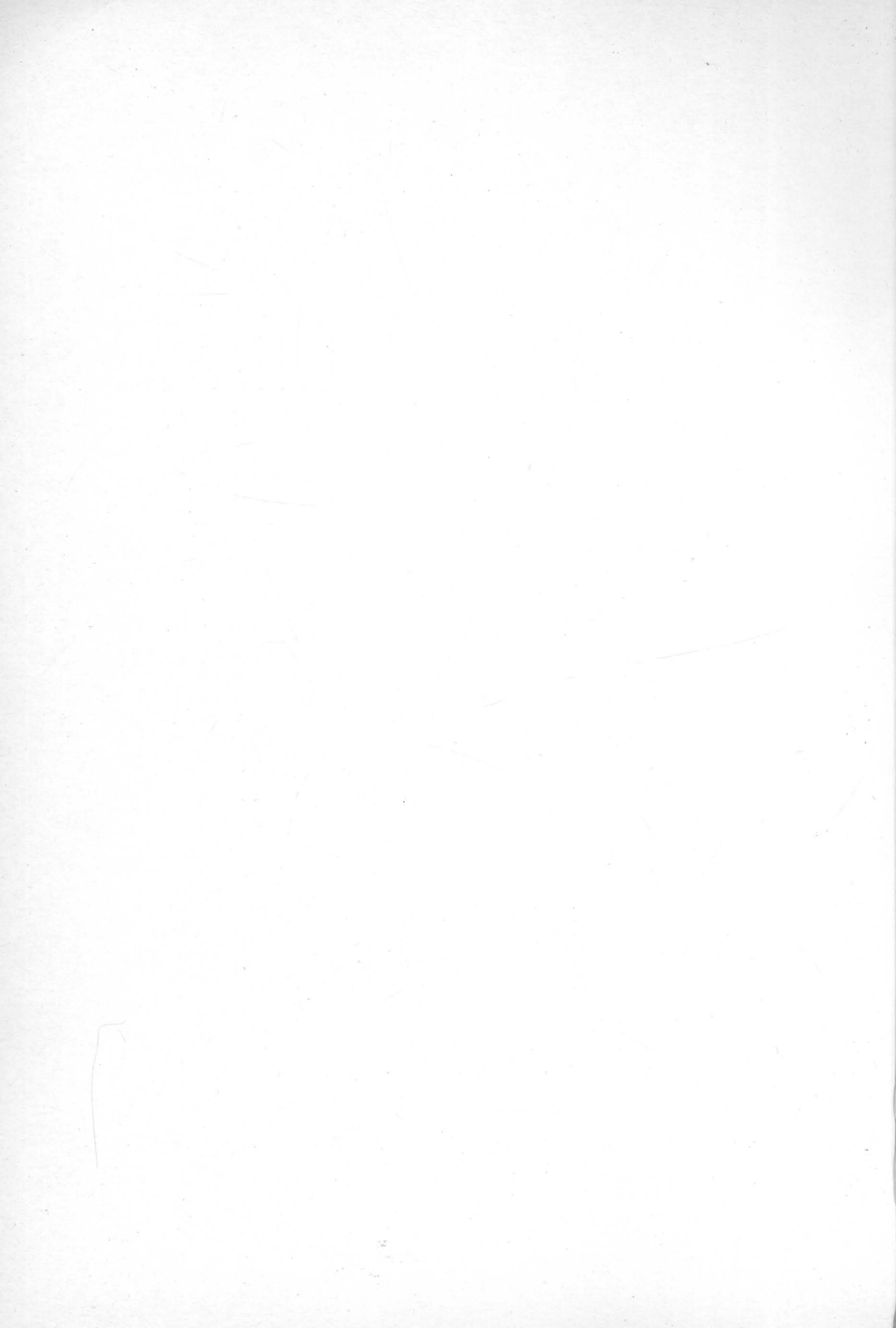


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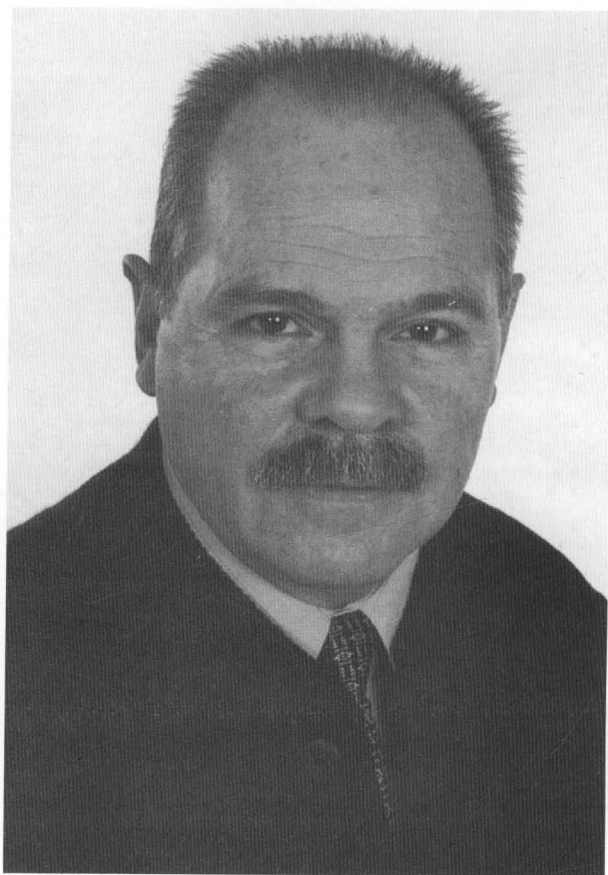




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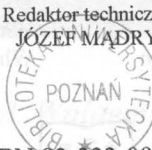
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## CONTENTS

|   |     |
|---|-----|
| <b>EDITORIAL (Izabela PROKOP)</b> . . . . .   | 5   |
| <br><b>I. ARTICLES</b>  |     |
| Sylvia ADAMCZAK, Landeskunde im fortgeschrittenen Deutschunterricht: Zugang durch Literatur . . . . .   | 17  |
| Zofia BERDYCHOWSKA, Maßgeschneiderte Fachtexte – nach was für einem Maß? . . . . .  | 35  |
| Maria DAKOWSKA, Glottodydaktyka u prognozy XXI wieku . . . . .  | 43  |
| Bjørn EKMANN, Die Erlebnishaftigkeit literarischer Texte. Erwägungen zur Methode der Textanalyse . . . . .  | 57  |
| Ilona GAWĘDA, Zu Eigennamen in deutschen und polnischen Sprichwörtern . . . . .   | 89  |
| Christian GELLINEK, Dialog über „Dutch“ und „Double Dutch“ . . . . .  | 101 |
| Gert HENRICI, Empirische glottodidaktische Forschung. Ein Beispiel: Das Projekt 'Lösungsinteraktionen' . . . . .                                    | 107 |
| Ursula HIRSCHFELD, Einige Schwerpunkte für die Arbeit an der Aussprache bei polnischen Deutschlernenden . . . . .                                   | 113 |
| Jan ILUK, Problemy tłumaczenia nazw medycznych na przykładzie języka polskiego i niemieckiego . . . . .   | 123 |
| Czesław KAROLAK, Dydaktyka tekstu literackiego w świetle potrzeb nauki języka w warunkach obcokulturowych . . . . .                                 | 137 |
| Heinrich P. KELZ, Wirtschaftsdeutsch im Anfängerunterricht . . . . .  | 151 |
| Abdullah KHUWAILEH, Vocabulary in LSP: A case study of phrases and collocations . . . . .   | 157 |
| Roman LEWICKI, Kształcenie tłumaczy na specjalizacji tłumaczeniowej filologii rosyjskiej. Założenia i realizacja . . . . .                          | 167 |
| Aleksandra ŁYP, Probleme der Bedeutungserschließung von Nominalkomposita für DaF-Lernende . . . . .   | 175 |
| Ewa MARCINIAK, Multisensory approach to teaching the visually impaired students . . . . .   | 183 |
| Manfred OSTEN, Goethe und Österreich . . . . .  | 187 |
| Bernard PIOTROWSKI, Język fryzyjski w Niemczech. Dylematy jego rozwoju i dalszego przetrwania . . . . .   | 201 |
| Bernadeta PYŚK, La vidéo – outil du développement du style personnel d'expression orale en langue étrangère au niveau avancé . . . . .              | 221 |
| Albert RAASCH, Ein Plädoyer für eine vielfältige Welt der Fremdsprachen, ...gerade im berufsorientierten Bereich . . . . .                          | 225 |
| Bogusława ROLEK, Probleme der Wortschatzarbeit im Fremdsprachenunterricht . . . . .   | 235 |
| Barbara SKOWRONEK, Überlegungen zur Zukunft des Fremdsprachenunterrichts: Medienbedingtheit, Kommunikationsfähigkeit, Lernerzentriertheit . . . . . | 247 |

|   |            |
|---|------------|
| Aldona SOPATA, Gramatyka uniwersalna w dydaktyce języków obcych . . . . .   | 253        |
| Iwona STRACHANOWSKA, Motywy wyboru studiów neofilologicznych . . . . .  | 261        |
| Marian SZCZODROWSKI, Fremdsprachige Dekodierungsprozesse und ihre Konsequenzen . . . . .  | 269        |
| Weronika WILCZYŃSKA, Une expérience d'apprentissage en semi-autonomie au niveau avancé: principes et bilan provisoire . . . . .   | 277        |
| Władysław WOŹNIEWICZ, Pragmalingwistyczno-kulturologiczna interpretacja tekstu na zaawansowanym etapie nauki języka obcego . . . . .                                    | 287        |
| Elżbieta ZAWADZKA, Wandlungen der Edukation und die Ausbildung von Fremdsprachenlehrern . . . . .   | 295        |
| Joanna ZAWODNIAK, The Role of Memory in Child's Vocabulary Consolidation and Enrichment . . . . .   | 309        |
| Grażyna ZENDEROWSKA-KORPUS, Zur sprachlichen Routine in Lehrbüchern des Deutschen als Fremdsprache für Jugendliche am Beispiel <i>Dein Deutsch-Oberschule</i> . . . . . | 323        |
| Teresa SIEK-PISKOZUB, The role of formal instruction in foreign language learning . . . . .   | 331        |
| <b>II. ANNOUNCEMENTS</b> . . . . .  | <b>347</b> |

## THE ROLE OF MEMORY IN CHILD'S VOCABULARY CONSOLIDATION AND ENRICHMENT

JOANNA ZAWODNIAK

*Higher School of Pedagogics – Zielona Góra*

Memory as a universal ability to keep facts in the mind and call them back at will is a complex, psychologically and neurologically conditioned phenomenon existing within a wider cognitive framework of human personality. This very framework also includes language and its acquisition which can be supported and reinforced by a proper use of memory potentials. Although memory was paid a lot of attention to in the past, it was not until the beginning of 20<sup>th</sup> century that it has been approached from a new, multidimensional perspective.

The following paper is an attempt to look at child's vocabulary consolidation and enrichment through the filter of psychological and neurological processes underlying memory functions, with the intention of enhancing the most effective, though sometimes unconventional, mnemonic devices and of providing a firm linguistic basis for their use within the scope of European Co-operation Programs (ECPs).

### **Childs' cognitive development**

A great influence upon the psychology of child was exerted by J. Piaget (1896–1980), an outstanding Swiss psychologist, sociologist and philosopher who highly contributed to our present knowledge of a variety of mental processes typical of child's cognitive development which, according to him, consists of two basic stages:

- *the preoperational stage* (up to the age of 7), including toddlerhood and early childhood,
- *the operational stage* (between the ages of 7 and 12), including middle childhood.

As far as preoperational children are concerned, they do not yet clearly distinguish between fantasy and reality, thus the symbolic function is of the essence here, which can be seen on the basis of imaginative or pretend play where children make a given object stand for something else.

The ideas are generated and the problems are solved by means of mental representations limited to physically present things as it is in case of here-and-now

principle (Ellis 1988:129) the inception of which, though in a less sophisticated form, can be referred to this very stage. However, not only are preoperational children engaged in the simultaneous imitation of contiguous events or objects being within their reach; it is possible for them to imitate an observed action after some time has elapsed, owing to the *mental storage of symbols* – the whole phenomenon being called deferred imitation. At this stage of development children's thinking is symbolic, abstract, egocentric, unidimensional and dominated by transduction in the sense that children focus on centration, i.e. on one situational aspect only.

Piaget's distinction between preoperational and operational stages is not sharp, meaning that all the processes mentioned above are open-ended, as they go beyond their original, preoperational stage and, having undergone some qualitative changes, develop into a new functional whole within the framework of the latter phase.

During the operational stage, followed by adolescence where formal operations begin, children start to distinguish between fantasy and reality, which means that while being still involved in all kinds of imaginative plays, they take different roles more consciously and deliberately, looking for fun elements in them. Their reasoning becomes more logical, due to gradual focusing on transformations from one state to another rather than on successive states separately. Therefore transduction and centration are being replaced with deduction and decentration (Papalia et al. 1995:215-217). Whole structures begin to dominate particulars which is in accordance with Gestalttheorie or Gestaltpsychologie. Correspondingly, Piaget believed that children perceive objects in a syncretic way, i.e. as wholes (Gestalts). He pointed out to a sentence as being prior to a word which is dependent on the collocation it occurs in or on the arrangement of two neighbouring sentences. He also claimed that it is the arrangement and collocation that lead to final coordination giving, on its part, rise to lexicalization (Piaget 1992:168-170). This syncretic capacity of perception enables children to identify and easily use formulaic speech which is included in the notional/functional syllabus proposed by ECPs (European Council for Cultural Co-operation 1992).

Moreover, at the operational stage children are able to recall related objects, classify them and categorise by gender; they can also work with numbers and deal with concepts of time and space although the process of thinking is still embedded in the „here-and-now”.

Operational children's reasoning oscillates between two contradicting and at the same time overlapping areas, namely the one of play and fun, and the one of observation, the borderline between the two being still indistinct (see: Fig. 1).

While moving to and fro along this magic movable borderline, children learn to form certain hypotheses and verify them with the help of observations and increasing experience. The operational stage is a kind of intermediary through which children make attempts to approach formal operations. The more hypo-

thetically and deductively they think, the smaller distance separates them from their destination which puts an end to the uncertain and undiscovered, initiating the newcomers into the world of mental maturation, where transience changes into steadiness and decisiveness.

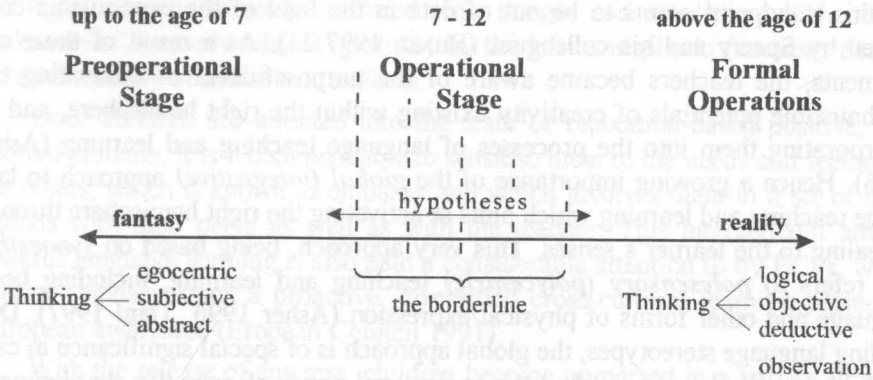


Figure 1.

In the recent decades there has arisen a tendency to fortify psycholinguistic theories, pointing to memory as the prerequisite for a successful language acquisition, with a neuro-linguistic background aiming at explaining the biological functions of language. It all started in the late 1960s and early 1970s in California where a team of neurologists and physicists led by Sperry and Ornstein tried to fathom the secrets of human brain from a completely different angle, dealing with brain waves and ascribing specific kinds of activities to its particular areas. Accordingly, Sperry and his team highlighted the dichotomic division of brain, suggesting „that the right and left hemispheres of the brain process information independently and they selectively transmit messages to each other across a neural switchboard called the corpus callosum” (Asher 1996: 3-18), by means of which they are connected. Thus the two hemispheres assume different functions, the whole process being known as lateralization

**Right Hemisphere      Left Hem.**

- |              |             |
|--------------|-------------|
| Imagination  | reality     |
| Fantasy      | reason      |
| Dreams       |             |
| Intuition    | logic       |
| Senses       |             |
| Colour       |             |
| Synthesis    | analysis    |
| Gestalt      | words       |
|              | verbal      |
|              | expressions |
|              | numbers     |
|              | linearity   |
| Creativity   |             |
| Memory       |             |
| Subjectivity | objectivity |

**Activity Types**

- |                  |            |
|------------------|------------|
| Acting           | analysing  |
| Drawing          | judging    |
| games and sports | discussing |
| gesturing        | critiquing |
| metaphor         | explaining |
| painting         | declaring  |
| singing          | telling    |
| stortelling      | talking    |

Figure 2.

(Asher 1996: 3-9)  
 (Buzan 1997: 23)  
 (Teml 1997: 33)

(one-sidedness) or brain asymmetry and taking place along with child's development. It is then that the left hemisphere becomes responsible for the logical and rational perception of the world whereas the right hemisphere enables its „owner” to perceive the world through the senses (Fromkin et al. 1978:31).

Traditionally, language used to be regarded as a left-hemisphere function, but this standpoint seems to be out of date in the light of the experiments conducted by Sperry and his colleagues (Buzan 1997:21). As a result of these experiments, the teachers became aware of the purposefulness of cultivating the inexhaustible potentials of creativity existing within the right hemisphere, and of incorporating them into the processes of language teaching and learning (Asher 1996). Hence a growing importance of the *global (integrative)* approach to language teaching and learning which aims at activating the right hemisphere through appealing to the learner's senses. This very approach, being based on *synaesthesia*, refers to *polysensory (polycentric)* teaching and learning, including body language and other forms of physical expression (Asher 1996, Teml 1997). Discarding language stereotypes, the global approach is of special significance in case of children, who having reached the operational phase of cognitive development, are moving in the land of mental contradictions, between fantasy and reality. The teacher's role is, therefore, to appeal to their senses by introducing the so-called *imaginary teaching and learning* (European Council 1992).

Another argument against the underestimating of the right domain of human brain is the fact that it is the seat of memory which, being crucial to the whole language learning process can be in no way excluded from it.

The polysensory approach acknowledges children's need to relieve the negative stress as well as to evoke or sustain the eustress which arouses harmonious tension and creative competitiveness as a deterrent to boredom; hence children's willingness to participate in all kinds of game-dominated activities. This state of creative concentration and activity can be achieved through the state of total relaxation and immersion in positive thoughts. Incidentally, it is important to establish and keep a proper balance between the two states, the whole process being called eutony (Teml 1997).

The importance of stimulating children's positive thinking is taken into account by ECPs which focuses on child-centred, child-friendly and need-based syllabuses being settled at the motivationally and attitudinally stress-free background (European Council 1992).

As for relaxation, it is understood holistically, i.e. it is considered on two interdependent planes – the mental one and the physical one, thus it involves relatively short mind-calming music sessions as well as muscle-relaxing physical exercises accompanied by the teacher's instructions and usually taking place during the lesson. These mini-sessions help children to work off the stress by penetrating their own feelings, which, in turn, provides them with a kind of intrinsic experi-

ence contributing to the coherence of a learning process. Children's gift for visualised thinking which is, for the time being, better developed than verbal capacities, can therefore serve the teacher as a pretext for exploring imagery by means of a storytelling technique.

Having reached the state of relaxation, children no longer move at random in the right-hemispheric world suffused with images and emotions which can be „taken over” as ready wholes (gestalts) by the left-hemispheric functions and expressed verbally or in the written form.

Once children are initiated into the state of relaxation-based positive, self-centred thinking, it is recommendable to sensitise them to the needs and feelings of the others, which is known as empathy and which involves them in a set of interactions with their peers as well as with the teacher. This interactional attitude towards language learning is also paid a considerable attention to by ECPs, with a special emphasis upon a proactive, diversified cross-cultural learning promoting European awareness (European Council 1991).

With the release of eustress, children become immersed in a variety of interactional activities (e.g. role-plays, pair work, guessing games) stimulating creativity, a feature which is inherent in the pre-adolescence age. Thus *learning by doing* takes place, which is highly evaluated by ECPs as it is likely to succeed and accelerate language acquisition, due to the fact that children's reactions are spontaneous and devoid of psychological inhibition.

One of the world-famous methods based on the polysensory approach is *Total Physical Response*. It was created in 1960s by J. Asher and since then it has been successfully applied to second language acquisition (SLA). TPR proponents believe that the stages of SLA are identical with those of first language acquisition (FLA), in the sense that in either case speaking lags far behind child's understanding. This is why they point to the utmost importance of the listening-and-comprehension phase in SLA, which activates the right hemisphere and, being absolutely stress-free, gradually prepares children for speaking, reading and writing. Thus children receive comprehensible input from the teacher who utters different commands which are fortified with suitable facial expressions, gestures and body movements. In response to those commands children perform various right-brain tasks, such as pointing to the mentioned objects, drawing, singing, dancing, gesturing etc. TPR introduces three new vocabulary items at a time, which are being constantly used and recombined until they are thoroughly processed and consolidated. Once the first verbs are internalised, the commands can be expanded by various noun phrases. Children do not speak until they feel at ease and are ready to brainswitch to the left hemisphere; it is then that role reversal can take place (Asher 1996).

## Memory paradigms

The most traditional memory paradigm was introduced towards the end of 19th century by W. James who distinguished between primary memory and secondary memory which were later called: short-term memory (STM) and long-term memory (LTM). In 1968 Atkinson and Shiffrin added sensory memory (see fig. 3).

As for sensory memory, it has an unlimited capacity, but a very brief duration (from 1/4 to a few seconds) and it can not be controlled voluntarily. It can group single elements.

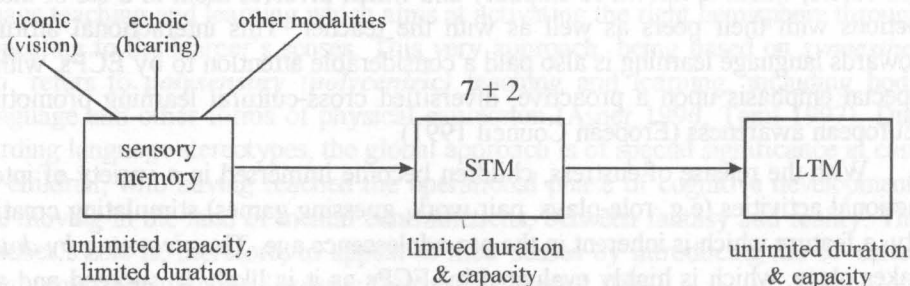


Figure 3.

(Materska et al. 1992: 126-127)

STM has a limited duration and capacity, the latter going up to  $7 \pm 2$  items. Since children's memory span, especially if they are untrained in mnemonic techniques, is limited, it is reasonable to expose their memory to short words at the beginning – the shorter they are, the more they can grow in number. However, with a gradual growth of children's awareness of metamemory, it is possible to go beyond mere words for the sake of complete phrases and formulaic statements that can be treated as single items then.

STM is followed by LTM which has an unlimited capacity and stores information as a result of its being transferred from STM by longer attention-related process that is thought to be typical of adults. Nevertheless, metamemory knowledge is likely to help children to encode information and consciously place it in the long-term storage. Besides, the more they are exposed to right brain input, the better they are at long-term retention (Asher 1996: 3-62-3-63). STM and LTM are mutually dependent, thus they can exist only as a continuum, though in case of children, its proportions are different, namely the distance between the two-fold memory storage is longer, due to numerous cognitively conditioned hesitations (see: Fig. 4).

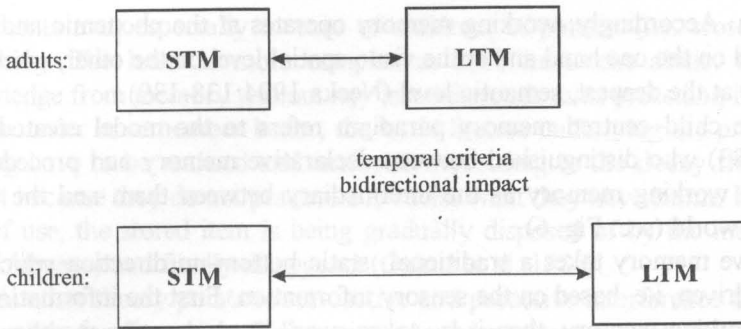


Figure 4.

In either case, STM performs a double task:

- it passes the selected information on to LTM,
- it retrieves from LTM the previously stored information so as to provide a suitable context for the new item.

The above presented paradigm is storage-based and time-determined.

Another paradigm, which is more up-to date, focuses on the functional, processing criteria. It replaces STM with working (operating) memory (see: Fig. 5).

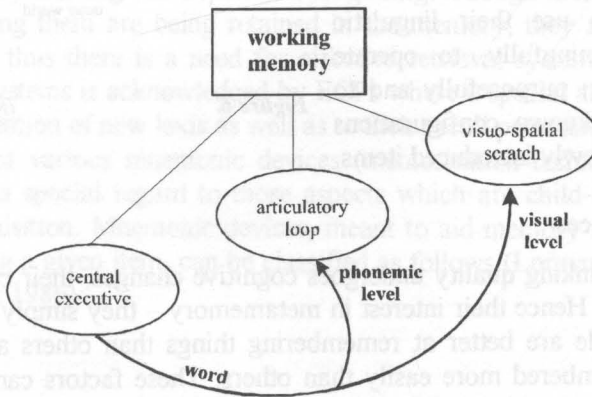


Figure 5.

Central executive is responsible for *encoding*, i.e. the act of attending to new (verbal and visual) information, analysing and manipulating (processing) it before sending the result to the articulatory loop and visuo-spatial scratch for realisation and temporary storing. The functions of articulatory loop and visuo-spatial scratch are almost simultaneous, i.e. visual information is realised phonemically

and vice versa. Accordingly, working memory operates at the phonemic and articulatory level on the one hand and at the visuo-spatial level on the other, whereas LTM operates at the deepest, semantic level (Nęcka 1994:138-139).

One more child-centred memory paradigm refers to the model created by Anderson (1983) who distinguished between declarative memory and procedural memory, with working memory as the intermediary between them and the link with the outer world (see: Fig. 6).

Declarative memory takes a traditional, static bottom-up direction which is conceptually-driven, i.e. based on the sensory information. First the information is encoded by working memory, then it is „taken over” by declarative memory for storage.

Procedural memory operates within a creative, dynamic top-down model which is data-driven, i.e. based on specific expectations and attitudes leading, as a result, to the hypothesis formation. It receives the information from working memory and adjusts it to a particular situational context. While learning to think logically and hypothetically, operational children approach the top-down model which allows them to use their linguistic knowledge meaningfully, to operate their imagination purposefully and to reorganise well-known configurations for the sake of newly introduced items.

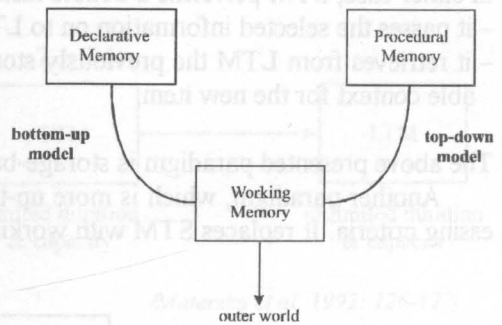


Figure 6.

(Kurcz 1987:89)

### Mnemonic devices

As children's thinking quality undergoes cognitive changes, their curiosity of the world increases. Hence their interest in metamemory – they simply want to know why some people are better at remembering things than others and why some things are remembered more easily than others. These factors can be taken advantage of when teaching children how to improve their memory, which is the subject of considerations presented below.

Memory improvement depends on successful **encoding**, **storage** and **retrieval** which are the three stages of **information-processing theory** (Papalia et al. 1995). Storage refers to retention of a given item whereas retrieval is connected with calling that item back from memory, which involves both **recognition** and **recall**. The former deals with matching a given stimulus with what one has in memory and it is practised in Yes/No or multiple-choice questions, in True/False

statements and, especially in case of children, in pattern (i.e. word or picture) matching. The latter is more complex as it refers to the ability to reproduce knowledge from memory without any immediate stimulus preceding it.

In order to remember better, the basic factors underlying the process of forgetting have to be realised and analysed. According to the **decay theory**, people forget because they do not practise and revise what they have learnt. Having fallen out of use, the stored item is being gradually disposed of by the memory, i.e. it fades (decays) and finally disappears (Gairns et al. 1986).

Another theory points to retroactive and proactive interference as the factors responsible for forgetting. Retroactive interference occurs when new information acts backward and disrupts old information, whereas proactive interference takes place when previously learnt item acts forward and disrupts the new one (Plotnik et al. 1986).

However, the range of this two-sided interference could be considerably lowered if the new input were encoded as a part of the wider context (cues) which would prevent that input from being erased from memory. The dependence of the new item on the accompanying cues was noticed by Tulving, the author of Encoding Specificity Principle (1974). As the new item passes through the succeeding stages of processing, the accompanying cues change from encoding cues to retrieval cues. In other words, if the learner can not recall a given item, it may be due to his inability to retrieve the cues with which it was encoded. This phenomenon was called by Tulving *cue-dependent forgetting*. Though the new items and cues strengthening them are being retained in the memory, they are not always easily retrieved, thus there is a need for effective retrieval systems. The significance of these systems is acknowledged by ECPs where a special attention is paid to children's retention of new lexis as well as to their recall potentials.

At this point various mnemonic devices (memorisation techniques) will be discussed, with a special regard to those aspects which are child-friendly in L2 vocabulary acquisition. Mnemonic devices, meant to aid memory in both encoding and retrieving a given item, can be classified as follows (Lorayne 1995, Papalia 1995, Plotnik 1986):

- Chunking
- Rehearsal
- Organisation
- Naming
- External memory aids
- Elaboration
- Pegword system

*Chunking* can be defined as a grouping of items into a unit that is then processed as a whole. At the initial stage of language learning, individual letters are chunked

into a word which stands for a separate unit; then, with children's memory span being gradually enlarged, individual words are chunked into a meaningful phrase with one chunk as its core which is retrieved with the help of all the accompanying chunks (cues). If the whole group of chunks is processed as a single unit, there is still room for at least a few phrases more to enter STM, up to  $7 \pm 2$ . Of course, the number of words constituting a given unit can constantly grow.

*Rehearsal* is a conscious, usually loud repetition and it starts between 3 and 6 years of age. It can be useful when practising songs and light verses where rhymes occur. It is sometimes called maintenance as it helps the new lexis to be maintained (retained) in the memory. This technique proves to be the most successful when it is group-oriented, with the stimulating interactional and competitive factors involved. In certain cases rehearsal can activate children's creativity potentials, i.e. they can be asked to change some words in the song or light verses.

*Organisation* refers to the grouping of items into categories. It becomes an almost automatic activity for children reaching adolescence (above 12), whereas for operational learners (7-12) it is more difficult at the beginning. Nevertheless, it is possible for them to categorise, provided that they are instructed how to do it and that a fun element accompanies it.

ECPs stresses the importance of the ability to categorise in the process of vocabulary enrichment. They propose open-endedness in this respect agreeing that a choice of particular subcategories should be culture-specific and should meet the learner's communicative needs, as it is stated in the functional/notional syllabus.

*Naming* is used to encode verbal information by means of previously stored visual data. It can be applicable at a lower level (pattern matching) as well as in a combination variant with categorising. For example, children can be asked to look and try to remember a group of objects belonging to different categories and displayed before them for a few minutes. Then the objects are covered with a cloth and children are asked to enumerate as many as possible and to ascribe them to particular categories. Such games can, in a simple way, consolidate children's vocabulary (especially nouns with attributes) while developing their sense of observation. Accordingly, verbal activities are evoked by visual stimuli. Therefore the right-hemispheric function completes the left one.

*External memory aids* can be used even by kindergarteners. Their role is to prompt memory by something outside the person, for example:

- asking someone else to remind of something at the appropriate moment (in the case of adults),
- tying a string round one's finger, which can be sometimes helpful and effective in the case of younger children, as it includes a fun element.

Although this kind of memory aid is of least importance here, it can act as a retrieval cue, especially if children previously attached it to a given lexical item by means of a vivid visual association.

The two remaining mnemonic techniques, i.e. 6 – elaboration and 7 – peg-word system, play a special role in the process of children's vocabulary acquisition, retention and retrieval as they draw on the link between imagination and associations.

If used properly, associations can serve as a kind of memory prompter or retrieval cues which are based on adjacency (order) and improbability, i.e. the more unusual, shocking or illogical a given association is, the better the item or phrase it „sticks“ to will be remembered. Visualised associations are to be emotionally coloured so as to evoke children's surprise, amusement, indignation or curiosity. The profound influence of exaggerated associations upon memory improvement was first noticed by von Restorff, thus the whole phenomenon is known as von Restorff's effect (Buzan 1997).

*Elaboration* consists in linking given items together in an imagined scene or story. The older children are able to make elaborations themselves while the younger ones need some instructions that would help them to visualise certain situations.

Elaborations may prove useful when children learn verbs which, by the way, play a crucial role in forming associations. Verbs, as central parts of given activities can be embedded in an imagined sequence of scenes serving both as a pretext for using these verbs in context-determined collocations and as retrieval cues afterwards. Correspondingly, once the scenes are visualised in a fixed order (for instance in case of everyday activities – see: Fig. 7), it should not be difficult for children to „look through“ them in search of the word they need at a given moment.

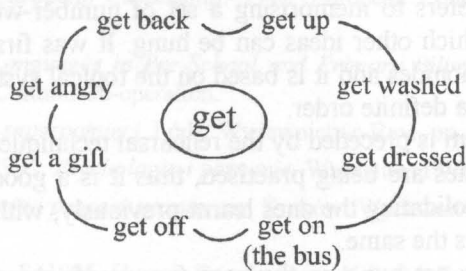


Figure 7.

This kind of elaborations reminds of film frames linked together by the occurrence of the same characters from the beginning till the end (like in tales) as well as by event-determined consequences. It is, therefore, a good mnemonic device for older operational children who get more and more accustomed to hypothetical thinking.

Another kind of elaborations, known as *the method of loci* (Lat. – places) can be successfully used by younger children as a noun-learning technique. And so this method allows to make up a chain of vivid mental images put in a definite order established by some exaggerated details usually being the new lexical items. However, each image is dominated by a character that does not appear in the scenes that follow, hence their resemblance to photos rather than to film frames. It is therefore essential to attach to all the adjacent items some exceptionally striking features constituting the retrieval cues (see: Fig. 8).

The method of loci can be also category-based, i.e. the adjacent details can refer to the members of a particular category. Once they are visualised and stored, it is possible to transfer their use to the method of naming where children's visual capacities can be settled at the competitive background.

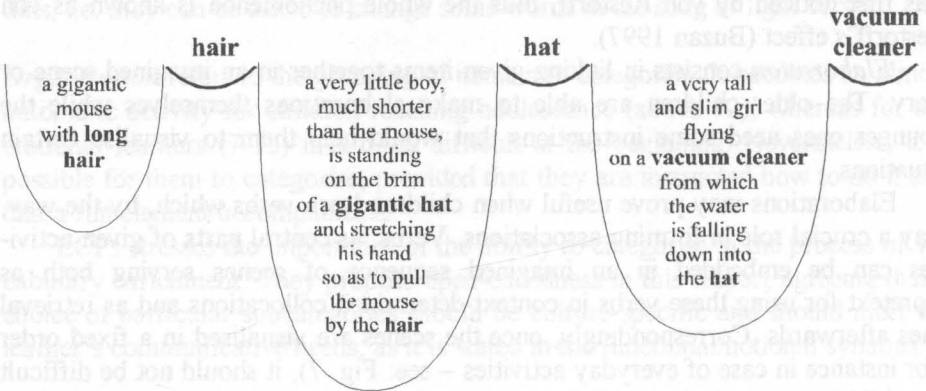


Figure 8.

*Pegword system* refers to memorising a set of number-word rhymes acting like pegs (hooks) on which other ideas can be hung. It was first used in 500 B.C. by a Greek poet – Simonides and it is based on the topical system, i.e. it relies, as the method of loci, on a definite order.

Pegword system is preceded by the rehearsal technique in the course of which number-word rhymes are being practised, thus it is a good way of learning new items through consolidating the ones learnt previously, within the rhyme structure that always remains the same.

The new items are hung on the pegs (i.e. words rhyming with numbers) by means of untypical, extraordinary associations which are easier to retrieve than in the method of loci, owing to the fact that rhymes are used rather automatically, *without any mental effort*.

Pegs can bring about the so-called snowball effect (Buzan 1997), meaning that each of them is likely to be associated with more than one item. Moreover, pegs have reproductive properties, i.e. they can retrieve all the items hung on them.

## Conclusions

It seems reasonable to suggest that all the above mentioned mnemonic techniques are child-centred, in the sense that they reinforce SLA by playing to the right-hemispheric power of visualisation, so typical of pre-adolescent learners and more important in the process of memory improvement than sound. These devices stimulate children's self-activity as well as appeal to their sense of competition and creativity. At the same time they sort of balance the influence of imagination with certain elements of a top-down model of thinking which becomes more and more conspicuous as children approach the stage of formal operations. Thus in order to make a proper choice of a child-friendly syllabus for SLA, it seems necessary for the teacher to take into account child's memory capacities as viewed from the standpoint of its cognitive development.

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