MENTAL IMAGERY IN INTERPRETING – A NEUROCOGNITIVE PERSPECTIVE

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Abstract

The paper discusses mental imagery as an important part of information processing performed during interpreting. Mental imagery is examined to see if visual processing used to remember the source text or to facilitate its understanding helps to 'off-load' other cognitive (mainly linguistic) resources in interpreting. The discussion is based on a neurocognitively-oriented depictivist model by Kosslyn (1994). The overview of mental imagery processes and systems is followed by the discussion of imagery used in interpreting. First, imagery development in student interpreters is described on the basis of a note-taking course for would-be consecutive interpreters organized by the author at AMU. The initial part of the course devoted to imagery involves visualizations of geographical, descriptive and narrative texts. The description abounds in authentic examples and presents conclusions for interpreting trainers. Later, imagery as employed by professional interpreters is discussed on the basis of a qualitative survey. General implications of the use of mental imagery for cognitive processing limitations in interpreting are presented in the concluding section.

Key words: Mental Imagery, Interpreting, Visualization, Cognitive Processing, Memory.

Mental imagery is an important part of information processing performed during interpreting since its basic function is to support memory. This is especially true in consecutive interpreting. Mental imagery as used by interpreters is examined below to see if visual processing used to remember the source text or to facilitate its understanding helps to 'off-load' other cognitive (mainly linguistic) resources. A general description of mental imagery processes and systems from the neurocognitive perspective will be followed by the discussion of the nature of imagery used in interpreting.

Mental imagery is considered to be a higher brain function (Kosslyn – Smith 2000: 961), i.e. not involved in early perception and motor control but in reasoning and problem solving. Higher functions are obviously more complex than basic functions and it frequently happens that the latter constitute a basis for the former. The nature of mental imagery has sparked a wide debate involving the proponents of the propositional (language-like) format and the advocates of the depictive (picture-like) format (Farah 2000, Kosslyn 1994, Maruszewski 2001). Depictivists carried out a series of experiments to show that rotation and scanning of mental images does not involve propositional elements, but pictorial elements such as space (reviewed by Kosslyn 1995). It turned out that that the time of attention shift (e.g. from the trunk to the tail of an imagined elephant) was directly proportional to the distance and that the time of an object's rotation was directly proportional to the angle. Such explanations did not convince propositionalists who postulated propositional representations of images as networks with branching nodes. Since the node representing the elephant's trunk is not directly related to the same node as the node representing the tail, it causes an increase in the shifting time. In this way, the results of the experiments to support the descriptive approach could also be explained on the basis of the propositional theory.

The arguments of propositionalists could be definitely refuted thanks to the results of neurocognitive studies. Studies of brain-damaged patients showed that mental imagery activates cortical visual representations because patients with impairments of visual perception manifest impairments in mental imagery (Farah 2000: 966). For example, a patient with bilateral occipital damage displayed both color perception impairments and color imagery impairments. Thus, at least some structures responsible for visual perception participate in mental imagery tasks. Studies of normal subjects corroborated the thesis because visual cortices in the parietal and temporal lobes of those subjects were activated in a visual imagery task (Farah 2000: 969). Farah, unlike Maruszewski (2001) claims that in the light of neurocognitive evidence the imagery debate has been solved in favor of depictivists. Damage to specific cortical areas responsible for processing such visual elements as color, location and shape entails parallel impairments in mental imagery functions (Farah 2000: 970).

In fact, as Kosslyn puts it: “imagery is not merely a parasite, piggybacking on perception” (1994: 21). Mental imagery shares certain structures used in perception but it also involves some distinct mechanisms that will be described below. According to Farah (2000: 972):

> *Mental imagery is believed to be the efferent, or top-down, activation of some subset of the brain’s visual areas. In other words, at least some of our cortical visual areas are used both for imagery and perception. Furthermore, these areas subserve the same types of representational functions in both cases, carrying information specifically about color, shape, spatial location, and so on.*

Kosslyn analyzes visual perception and mental imagery in detail. He distinguishes the following components of the visual perception architecture (1994: 69-74):

- Visual Buffer (topographically organized visual areas in the occipital lobe, areas 17 and 18, used in figure-ground segregation);
- Attention Window (selects the region for further processing, located in the occipital lobe);
- Ventral System (a set of brain areas from the occipital lobe to the inferior temporal lobe, responsive to shapes, colors, textures; the ‘what’ system);
- Dorsal System (a set of brain areas from the occipital lobe to the parietal lobe, processes location and size; the ‘where’ system);
- Associative Memory (located in the posterior superior temporal cortex, temporal-occipital-parietal junction). The object properties (from the Ventral System) and the spatial properties (from the Dorsal System) are matched here to stored information.
- Information Lookup (activated information is used for further top-down processing if there is no match with a specific object);
- Attention Shifting (attention is shifted to a location of an informative characteristic to facilitate the match).

The major difference between mental imagery and perception is the source of stimuli. In perception, the stimuli come from the outside world; in imagery visual images are generated from memory. How are images generated? First, the representation of a particular object is accessed and its code is activated. The activation is sent via the appropriate pattern activation subsystem which sends feedback to other areas to activate a specific pattern in the visual buffer, which is the image proper (Kosslyn 1994: 287).

Kosslyn and Thompson suggest three distinct types established on the basis of neuroscientific data (2000: 982):

- *spatial images* – (also referred to as attention-based imagery in Kosslyn 1994) based on spatial relations; they do not involve representations of color, shape, texture, etc. Processing of these images does not activate the Ventral System but does activate other structures located in the posterior parietal lobes, left dorsolateral prefrontal cortex, Area 19 and other areas responsible for attention.
- *figural images* – (also referred to as visual-memory-based imagery in Kosslyn 1994) low-resolution topographic images that require activation of object properties representations in the Ventral System. Processing of these images does not activate the MOC area (medial occipital cortex, includes Area 17 and 18) responsible for high-resolution processing but does activate the Ventral System (posterior portion of inferior temporal cortex), Area 19, left dorsolateral prefrontal cortex and areas responsible for attention.
- *depictive images* – rely on high-resolution representations. Processing of these images activates the medial occipital cortex. Such imagery is used to compare or reorganize shapes and this imagery "corresponds to what most people seem to mean when they say they are *seeing with the mind's eye*" (Kosslyn – Thompson 2000: 983).

Frequently the type of imagery generated by a person will be a combination of two or of all the above described types. As we shall see below when we analyze possible uses of imagery in interpreting, it will also be possible to assume that interpreters use various types of images in processing various types of texts.

Kosslyn points out various types of further processing of generated images. First, he claims that chunking may be performed during visual-memory-based imagery (1994: 324). Chunking is a well known process of organization of material to be remembered. People tend to chunk, or group similar items together. The memory storage capacities depend not so much on the number of digits or letters or visual items to remember, but rather on the number of chunks (Baddeley 1999: 24). For example, it will be difficult to remember all the following letters: I E N I L T L E T N G. However, if we group them (into, let's say: I N T E L L I G E N T), we will arrive at one chunk only, which will not tax our memory capacity in any way. The same chunking technique may be used in imagery; grouping similar items together will enhance memorization. Apart from chunking, Kosslyn also focuses on image maintenance. He claims that visual-memory-based images are maintained by "repeatedly activating a compressed image representation or set of such representations in a pattern activation subsystem" (1994: 387). Of course, the more effective the organization into chunks, the more material may be maintained. Attention-based images, or spatial images, are maintained by continuous engagement of attention at the same loci in the Visual Buffer (Kosslyn 1994: 325). Regardless of the source of the image (imagery or perception), the images are processed by the same mechanisms. As Kosslyn puts it: "once a configuration of activity exists in the Visual Buffer, input is sent to the Ventral and Dorsal Systems and is processed in the usual ways – regardless of whether the activity arose from immediate input from the eyes or from information stored in memory" (1994: 336).

Having reviewed the basic types of images and ways to process them, let us proceed to discuss the employment of imagery in interpreting. The following section presents visualization as a technique deliberately developed in students interpreters. Later, experiences of practicing professionals are described.

Imagery development in student interpreters

As proven by Paivio (1971), imagining an object results in better memory. Hence, visualization as a mnemonic technique seems a useful technique for interpreters. The use of imagery in interpreting, or even in reading any texts (both fiction and newspaper articles) will depend on a personal cognitive makeup, including the development of visuo-spatial intelligence (Gardner 1983). However, as a skill to be employed to facilitate memorization in interpreting, it can and should be learned. In my own course for student interpreters at the School of English, Adam Mickiewicz University, Poznan, participants are exposed to visualization techniques. Initial classes of the note-taking course are deliberately carried out in a paperless environment. Students are asked not to use any notes but to use their memory instead while trying to remember an utterance chunk to be interpreted consecutively. This is deliberate because beginning interpreters usually have problems with the allocation of attention resources and they focus too much on their notes, do not concentrate on the text macrostructure and, as a result, produce very poor renditions. Thus, students have to learn to use their memory first, to analyze and process the input and only later to apply notes as a prop.

With such an approach in mind, the course is designed to include a short introduction to mnemonics. Students are presented with some mnemonic techniques (the Roman room, the peg system, story making) (Buzan 1999). Special attention is paid to mental imagery, the basis of most mnemonics that can be used to a certain extent in consecutive interpreting. Students are encouraged to perform synesthetic visualizations by combining as many sensory elements as possible (not only visual images, but also movement, colors, smells and sounds). The first visualization task is performed together. Students devise an exemplary shopping list and are later asked to propose their own images to involve the items in an absurd story (one story made up by students two years ago was in fact about a beer can that had a toothpaste and cornflake shower and then met its friend shampoo to go on a trip in a chocolate car).

Visualizations are later practiced on the basis of three main types of texts: geographical, descriptive and narrative. Students are asked to look for authentic texts that would be easy to visualize and group them according to the above criterion. This task makes students more sensitive to visualization possibilities in various texts they read in newspapers or are asked to interpret. As it turns out, press cuttings include a plethora of opportunities for geographical visualizations since numerous locations are given. Narrative and description visualizations may be applied to descriptions of accidents, processes and machine functionalities.

If we return for a moment to the types of imagery classified by Kosslyn and Thompson (2000) (spatial, figural and depictive), we will see that they correspond to the types of texts used in student exercises. Spatial imagery is a candidate for the processing employed in visualizations of geographical texts (maps, locations, spatial relations of various items with little or no reference to their object properties). We may predict that in such texts, the Dorsal System will be activated. Descriptions of complex devices or machinery will certainly be better understood and remembered if high-resolution depictive representations are used (they would presumably demand the involvement of Area 17 and/or Area 18). Obviously, just as there are numerous texts that combine characteristics of various genres, there are also numerous texts that would require mixed types of imagery. As Kosslyn and Thompson put it (2000: 982): “pure forms of these three types of processing (i.e. spatial, figural and depictive) may be relatively rare.” Professional interpreters who frequently apply visualizations to facilitate remembering will effortlessly combine various types of imagery in their practice.

It is also possible to apply certain techniques of imagery to encode some general meaning of the visualized message. These techniques are based on submodalities used in Neuro-Linguistic Processing. They include: color vs. black and white images (might encode levels of attractiveness), two-dimensional vs. three-dimensional images, localization (left, right, center – may encode political affiliation in case of texts related to politics), brightness, speed of movement, size, etc. (O’Connor – Seymour 1996). For instance, a message in which the author criticizes the right-wing party for being very carefree about fast unemployment growth may be visualized as a chart with a line moving quickly upwards. The whole picture may be black and white (to encode criticism) and located to the right (to encode the right-wing party). Development of such visualization techniques may be very helpful for future interpreters in their consecutive interpreting practice. The mind will be used to such an encoding, which will facilitate data retrieval for the purpose of rendering it in a target language. If student interpreters are made aware of the importance and usefulness of imagery in interpreting from the very beginning of their training, they will try to apply the technique as often as possible in their practice.

Imagery employed by professionals

How are images employed by professional and practicing interpreters? In fact, when asked to subjectively assess their use of memory, professional interpreters do confirm the use of images to boost their memory. Presented below are the results of a short questionnaire completed by 13 practicing interpreters. All of them are members of A.I.I.C. – the International Association of Conference Interpreters which associates the best simultaneous and consecutive interpreters. The questionnaire included, among other things, a set of closed questions on visualizations used in simultaneous interpreting (SI) and consecutive interpreting (CI) (Q2-Q6). Following was an open question (Q7) and the respondents were asked to give examples of other types of visualizations employed in the course of their practice. The table below gives the results for the five closed questions.

Table 1. Questionnaire results – closed questions

	Q2 a	**Q2 b**	**Q3 a**	**Q3 b**	**Q4 a**	**Q4 b**	**Q5 a**	**Q5 b**	**Q6 a**	**Q6 b**
Subject 1	3	3	0	0	3	0	3	0	2	0
S2	0	0	0	0	0	0	0	0	0	0
S3	4	4	4	4	4	4	4	4	4	4
S4	4	4	4	4	4	4	4	4	4	4
S5	2	2	2	2	2	2	2	2	2	2
S6	2	1	0	0	4	4	1	1	3	3
S7	2	0	2	2	2	2	0	0	2	2
S8	3	3	3	3	3	3	3	3	3	3
S9	1	2	0	1	2	2	3	3	3	3
S10	0	2	0	0	4	4	0	0	4	4
S11	4	4	3	3	4	4	4	4	4	4
S12	3	2	0	0	4	4	3	3	3	3
S13	4	4	1	1	2	2	2	2	3	3
Average	2.5	2	1.5	1.5	3	2.7	2	2	2.8	2.7

Answer possibilities:

4 – very often;

3 – often;

2 – sometimes;

1 – rarely;

0 – never;

N/A – not applicable (if the interpreter practices one type of interpreting only)

Q2a – Do you use visualization to boost your memory in SI?

Q2b – Do you use visualization to boost your memory in CI?

Q3a – Do you visualize well-known people the text refers to in SI?

Q3b – Do you visualize well-known people the text refers to in CI?

Q4a – Do you try to imagine processes/devices that are being described in SI?
Q4b – Do you try to imagine processes/devices that are being described in CI?
Q5a – Do you try to imagine places/countries (locate them on an imaginary map) in SI?
Q5b – Do you try to imagine places/countries (locate them on an imaginary map) in CI?
Q6a – Do you visualize stories that are told in texts of a more narrative nature in SI?
Q6b – Do you visualize stories that are told in texts of a more narrative nature in CI?

As shown in the table, practitioners claim that processes/devices described in source texts are most frequently imagined in SI (average 3) and in CI (average 2.7). Interpreters also try to imagine stories (2.8 and 2.7 in SI and CI respectively). Visualizations of well-known people are the least frequently used types of imagery. What is probably more interesting than these average quantitative data are the individual differences among the subjects. S2 claims that he does not use any visualizations whereas S3, S4 and S11 apply various types of visualizations as often as possible. S6 and S10 use some types very often and some not at all. This shows clearly that the amount of imagery used by interpreters depends on their cognitive makeup. Kosslyn also underlines the issue of individual differences in the type and the frequency of generated images. Of course, his analysis pertains not only to interpreters. Kosslyn (1994: 400-401) lists three factors related to imagery idiosyncrasies:

> *First, the difference in the efficacy of individual subsystems is clearly important. Second, people develop preferred strategies for a number of reasons, not all of which are based on how useful the strategy is. If one hits upon a way to solve a specific type of problem, one may stick with this method in the future simply because it is familiar. (…) And third, people also differ in a number of parameters that are likely to cut across the operation of individual subsystems and to place constraints on which strategies they are likely to adopt. For*

example, people vary in their overall speed of processing capacity of short-term memory[1].

Such differences may explain the varied results obtained by individual interpreters. Due to such individual factors, quantitative results of the questionnaire are not as important as qualitative ones, i.e. the answer to the open question (Q7 – Do you use other types of visualizations? Please specify.) According to Setton (personal communication, 2002), the survey questions “rely on a very general kind of introspection”. However, this technique has been applied deliberately to obtain mainly qualitative data from practicing interpreters. If the interpreters are able to give examples of consciously applied visualizations, we may obtain insight into how imagery may be, but does not have to be, used to facilitate processing in consecutive and simultaneous interpreting. The aim of the questionnaire was not so much to see what percentage of interpreters use specific kinds of imagery, but whether the technique is applied consciously in this job at all and how, in fact, it facilitates processing. Moreover, the selection of a small sample group shows that quantitative results were much less important that qualitative ones.

Below are selected answers to Question 7.

1.

In consecutive without notes, I will sometimes visualize the structure of the speech, using a mental image of Point 1: xxxxxxx, BUT Point 2: xxxxxxxx, THEREFORE Point 3: xxxxxxx.

2.

Yes - e.g. I have a linear representation of time.

3.

In my mind, I often find myself driving around the streets of the country the speaker is referring to.

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[1] It is for this reason precisely that we stressed the importance of developing imagery techniques at an early stage of interpreter training. When the trainees ‘hit’ upon the solution to the problem of memory overload or processing limitations, i.e. if they start using visualizations to facilitate processing from the very beginning, they will continue with the technique in their further practice. If they are not made aware of the benefits of visualizations at the beginning of the interpreting course it may be difficult to convince them to use the technique later if they have already worked out some individual (and probably less efficient) techniques to go around the problem.

4.

In very technical subjects I use COLOR.

5.

Yes, at least in consecutive. It can be very useful for remembering delegates' names, which is notoriously difficult. For instance, 'Kwasniewski' or 'Zielinski' can be associated with 'acidity' [kwasowosc] or 'greenery'[zielen].

6.

I sometimes visualize particularly difficult or unpleasant speakers in a home situation i.e. in their pyjamas. It tends to de-dramatize things.

7.

It is difficult to explain, but I can illustrate: once, at a Vuitton meeting, the CEO announced that they had just purchased an American company that produced, as he said, "des bagages américains très laids en tapisserie". I knew exactly what he was describing, and also knew the right word was NOT 'tapestry'. For some reason, "Gone with the Wind" came to my mind, and with it, the image of the northern businessmen, called 'carpetbaggers'. Bingo, the right word was 'carpet bags'. It took about a millisecond of brain time, and amazed me, as I was witnessing this as it were from the inside as well as the outside.

These examples are quite telling. For some of them, it is relatively easy to determine which type of imagery was used. In examples 1 and 2 spatial images are applied. The time line, or the structure of the text are more related to spatial relations between specific elements (events on the time line or points of the text) rather than specific object properties. Example 3 might involve both spatial imagery and figural imagery, depending on how visual the images of the streets really are (specific landmarks or just the location of the streets in relation to one another). As far as example 4 is concerned, it is difficult to tell since we do not know exactly how the color is used. It might be a mixed type of imagery, involving both the Visual Buffer and the Dorsal or Ventral System. Example 5 might actually qualify as a translation tag (Molska 2001). It does not necessarily have to involve visualizations, but only associations between the name and the concepts of acidity or greenery. However, it might include novel images (e.g. an image of Mr. Zielinski with green body or green clothes) and thus generate the 'mind's eye', or the depictive imagery. Creative imagery is also exemplified by the interpreter depicting unpleasant speakers in their pyjamas (example 6). The last example is particularly interesting since it involves not only imagery, but specific images from the interpreter's declarative memory. It might actually involve episodic memory because the subject might have remembered not just the movie but the event of his watching the movie. The interpreter's meta-remark is also worth underscoring. The interpreter was in fact aware of the mental effort his brain accomplished within "a millisecond" and was amazed at the speed and accuracy of processing.

A similar use of declarative memory when trying to remember information while interpreting occurred to two of interpreting students participating in the above described note-taking course. The students were asked to visualize and remember a text about various types of original CVs people send to a British producer of cards in order to get a job. The text was taken from the Polish edition of Newsweek (October 15, 2001). One sentence was the following: "Kandydaci wysyłaja wiec do Carlton okrety w butelce z wiadomoscia SOS: Mam nudna prace, ratujcie." (*Thus, the candidates would send boats in the bottles to Carlton. The bottles would include Mayday messages that read: My job is boring, help me*.) Most students simply visualized a piece of paper in a bottle floating on the water surface. One student non-deliberately used her declarative memory and associated the image with the song entitled "Message in a Bottle" performed by The Police. Yet another student associated the image with the movie entitled "A Message in the Bottle" featuring Kevin Costner! We do not know how visible these associations were (the former student could have seen Sting with the mind's eye or heard a piece of the song with the 'mind's ear'; the latter student could have seen Kevin Costner, a poster or a specific scene from the movie). What we do know is that the interpreter's brain sometimes uses quite unexpected associations and images to help memorize specific source text elements.

We may distinguish two other types of visualizations. This distinction is not based on the location of activated systems in the brain. It is based on the amount of details and the type of input given to the interpreter. Top-down (deductive) visualizations are generated when the interpreter listens to a text describing some machine, or process, or geographical area he knows. In such a situation, he does not have to wait for all the details to be presented to him; his image will include many cognitive complements retrieved from his memory. The other type of visualizations, bottom-up (inductive) visualizations are generated when a description of a machine, or a topographical area not known to the interpreter is given. In this case the interpreter would build up the image ‘as he goes’. It is of course possible to use some cognitive complements to create assumptions in the picture and later verify those as more details are presented in the input. This type of processing would be similar to macroprocessing and macrostructure detection. As Stillings et al. claim (1991: 77): “a rather abstract verbal description of an object can easily be encoded propositionally and remembered. However, when the object is imagined, it seems that a number of properties must be added to the description. Yet these properties fall far short of all those that would be present in an actual visual scene.”

The human mind has the urge to clarify things, to introduce dichotomies, to order elements in certain structures (which may not be genuine, but still facilitate processing). In the case of visualizations, the mind uses its built-in structures and procedures to serve as a basis for processing. These structures include visual traces from semantic or episodic memory (e.g. the above-mentioned message in a bottle), chunking, and ordering. This support from visualization and related techniques proves the plausibility of interpreting. It is possible to process sometimes complex technical descriptions and interpret them consecutively or simultaneously because the brain uses imagery as a device that is very helpful in comprehending and then remembering input.

Studies have been carried out to show that using imagery in visual tasks proves more effective as a processing mode than phonological recording. Kosslyn (1994: 337) describes a study of Brandimonte and co-workers. Their subjects were asked to memorize pictures and then perform some subtraction tasks on the basis of their visual memory. When subjects were prevented from subvocally naming and rehearsing the names of specific items (i.e. they were prevented from using the phonological loop to record them) their results were better than in the condition which did not involve the suppression of the subvocal rehearsal. In another study by Brandimonte and Gerbino (1993) subjects were again proven to be better at processing images without the use of verbal encoding. A group of subjects was asked to either remain silent (no suppression of subvocal rehearsal) or to repeat a nonsense syllable (suppression of subvocal rehearsal) while trying to reverse the duck/rabbit (Figure 1) or young girl/old woman (Figure 2) images.

Figure 1. The duck's beak is the rabbit's ears. (Source: www.curiouser.co.uk)

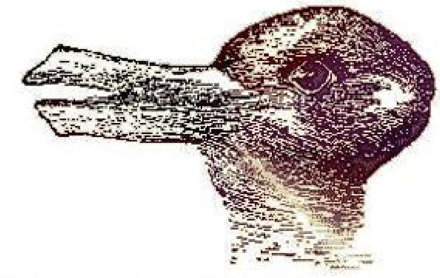

Figure 2. The young woman's chin is the old woman's nose, while the young woman's ear is the old woman's eye. (Source: www.curiouser.co.uk)

Phonological encoding hampered image processing because the silent group was less efficient at image reversal. Thus, it may be concluded that image processing is more effective without phonological encoding.

What are the consequences of the above conclusions for interpreters? Interpreters are not usually asked to reverse duck/rabbit images, but they do process images during their practice. The first conclusion is that they are more efficient in processing if they use imagery, rather than verbal encoding and memory. The second, even more important conclusion is that the simultaneous interpreter’s output (which is parallel in time with imagery processing) serves as the suppression of phonological encoding of visual images (as the nonsense syllable repeated in the Brandimonte-Gerbino experiment) and in this sense makes the imagery processing more efficient since no verbal encoding interferes. This might mean that the fact that the interpreter's cognitive resources are so much employed in his difficult and taxing task is beneficial because it 'directs' his mental resources to be used in the most efficient way.

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