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Prof. Dr. Hero Janßen  
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# **Conceptual Storage in Bilinguals and its Effects on Creativity**

Ronny Bläß

*ZZZ*

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## 1. Introduction

The effects of bilingualism on intelligence and, more generally, cognitive abilities in bilinguals have always attracted the attention of scholars. After most people had considered bilingualism an obstacle in cognitive processing, a ‘neutral period’ followed in which bilingualism lost some of its negative connotations. Since the 1960s, however, scholars have been accumulating a vast amount of evidence speaking in favour of bilingualism.

While studies concentrating on Intelligence Quotient are still inconclusive and fail to show a direct correlation between multilingualism and intelligence, another important aspect of intelligence clearly relates to bilingualism. Creative thinking, also termed divergent thinking, appears to be better developed in bilinguals, who usually outstrip monolinguals in solving problems that call for divergent solutions.

Although linguists as well as psychologists rarely fail to inform us about the existence of a relation between bilingualism and creativity, none of them has – to my knowledge – given a satisfactory explanation of this phenomenon. So far, the tenor has been that bilingualism is linked to divergent thinking because bilinguals are better able to separate content and form, and generally achieve metalinguistic abilities earlier than their monolingual counterparts.

In this article, I would like to introduce a model that explains the influence of bilingualism on creativity in more detail. The main argument shall be the assumption of a non-lexical, semantic memory in which bilingual thought takes place. Pre-linguistic and extra-linguistic perception and both (or more) language systems contribute to the formation of this concept memory, thus enabling a more flexible view of the world and allowing for unusual – creative – associations. This approach makes it necessary to thoroughly look into conceptual storage in bilinguals.

First, I shall discuss some terms and, if necessary, define them for the sake of argument. In chapter two, I will focus on studies that show a correlation between bilingualism and divergent thinking. Since the amount of available

surveys is vast, I will concentrate on a few that vary in choice of subjects, method and obtained results. I will also give an overview of their respective conclusions. Subsequently, I shall deal with lexico-semantic storage in bilinguals, commencing with the distinction proposed by Weinreich and concluding with an enhanced version of the model that is receiving wide support today. In chapter five, the focus will be on the question of how bilinguals think and I will propose several hypotheses that can explain enhanced creative capabilities.

## **2. Definition of Terms**

Both expressions that I used in my title are ambiguous and can, depending on the definition, include a smaller or wider array of features. I will not try, however, to give a referential definition of either term, but set a framework suitable for this paper. As this work is concerned with cognitive processes and conceptual memory, other terms that need clarification are semantic features theory and prototype theory. Especially the latter, although of considerable help in understanding conceptual memory, has not been given its due acknowledgement by linguists.

### **2.1 Bilingualism**

Researchers have applied the label bilingualism to a number of phenomena. In its widest sense, people would be bilingual who are capable of producing utterances in more than one language. In its narrowest, a person would need to have native-like competence in more than one language and would not be recognized by either language community as an alien. It would be plainly delusional (and not in the scope of this article) if I tried to make a generalizing statement embracing all the varieties and degrees of bilingualism.

Therefore, in this paper, I shall focus on nearly balanced bilinguals for two reasons. First, it is important to acknowledge that bilinguals do not differ in their cognitive processes from monolinguals. Virtually every phenomenon,

which at first glance might appear to be particular to bilingualism, is also employed by monolinguals. Interesting in this context is a statement by Paradis, who proposes that:

unilinguals are in fact at one end of the continuum, with multilinguals who speak genetically unrelated languages at the other end. No function is available to the bilingual speaker that is not already available to the unilingual, unidialectal speaker. The only difference seems to be the degree of use the speaker makes of each of the relevant cerebral systems.

Thus, if we want to study differences in cognitive style, we must necessarily look further into the continuum. It is only there that those differences become apparent and observable.

Second, practically all studies that are concerned with showing greater divergent thinking qualities in bilinguals made a point of carefully selecting balanced bilinguals. This is in line with the argument mentioned above. Hardly would an imbalanced bilingual draw a major amount of positive effects from her weaker, possibly even subordinate, language.

At this point, I would like to dispel the suggestion that this practice is of no value as more than half of the world's population is bilingual, but only a minority of them truly balanced. It is not the aim of this essay to give a descriptive account of the status quo, but rather to show what effects bilingualism *can* have.

## **2.2 Creativity**

Creativity is the ability to solve divergent tasks, i.e. problems that do not necessarily have a single, correct solution but allow for various possible answers. Psychologists say that in creative problem-solving “gedanklich weit voneinander entfernt liegende Elemente so verknüpft werden, daß das Ergebnis als subjektiv neu empfunden wird.“

Lambert gave a comprehensive definition in 1977 by characterizing divergent thinking as a “distinctive cognitive style reflecting a rich imagination and an ability to scan rapidly a host of possible solutions.”

In this paper, I want to focus on elements from both definitions, i.e. firstly imaginative, metaphorical and context-free thinking, and, secondly, the ability to join elements that have not been previously joined, thus creating new conceptual relations.

### **2.3 Semantic Features / Classical Theory**

Up to now, linguists have committed one crucial mistake: they have used the Classical Theory found in psychology and philosophy to account for semantic features of both lexemes and concepts. The Classical Theory argues that a concept consists of a certain number of features. An object or process belongs to this concept if it displays all of the defining features. Schmid sums up the main idea behind this theory as follows:

- Die Definition von Kategorien geschieht ausschließlich intern durch notwendige und hinreichende Bedingungen der Kategorienzugehörigkeit.
- Die Kategoriengrenzen sind klar definiert, starr und unveränderbar.
- Die Kategorienmitglieder sind alle gleichwertig, da sie alle dieselben gemeinsamen Merkmale haben.

The problems are obvious. To use a simple example: When is a cup a cup? According to the theory in use, a cup would be defined by a number of features such as +handle, +used as a container for drinks, +made of porcelain, etc. We can, however, easily imagine an object, made of glass, without any handle – a Chinese tea cup for instance – that we would still refer to as a cup rather than a glass. Sometimes, we are not even sure whether the object before us is a cup, a bowl, or a glass. Apparently, some objects seem to be better instances of a category than others – while these others still belong to the category. At this point, the Prototype Theory comes to our attention.

### **2.4 Prototypes / Prototype Theory**

This theory suggests that there are some objects, ideas, etc. that are especially good examples of a concept. Thus, a sparrow is prototypical for the category birds, whereas a penguin is not. Schmid calls the prototypes of a category “kognitive Bezugspunkte”. In addition, not all members of a category

are of equal status, i.e. we accept a sparrow more readily as a member of the category of birds than a penguin. Moreover, category boundaries are not clear-cut; some objects – borderline cases – might be considered as belonging to a category or not.

All of these properties of prototypicality contradict the defining features of the Classical Theory. Lamb enhances this theory by applying it to his own model of a cognitive network. For him an object is identified as belonging to a category when *enough* of the defining features are activated, be it through visual, tactile, auditory or linguistic input. He further states that

[his] network model provides a straightforward explanation of prototypicality: Prototypical exemplars of a category (like sparrow for the category bird) are those which strongly satisfy its threshold [the minimum of energy necessary to activate a neuron cluster], while peripheral ones (like ostrich or penguin) satisfy the threshold only weakly.

Apparently, this theory is by far more useful when describing **actual** conceptualisation in the brain. In contrast to the Classical Theory, it is also better able to account for semantic storage in bilinguals, as we shall see later.

### 3. Studies on Creativity in Bilinguals

#### 3.1 Relevant Studies

Before I introduce individual studies, I would like to quote a recent publication by Baker/Prys Jones on the amount and outcomes of studies related to creativity in bilinguals:

Research on bilingualism and divergent thinking has occurred in a truly international arena: Canada, Ireland, Mexico, Singapore and the United States, for example. Most research findings show that bilinguals are superior to monolinguals on their creative or divergent thinking. Such superiority is found particularly among bilinguals whose two languages are both reasonably well developed.

Peel and Lambert conducted the first study that clearly showed positive effects of bilingualism on intelligence. In 1962, they chose two equally sized groups of monolinguals and French-English balanced bilinguals. They controlled for previously neglected variables such as social background (all

subjects were from middle class French schools in Montreal) and sex (the test was done with a gender ratio of 6 boys : 4 girls). Eighteen variables measured IQ; in 15 of these variables – containing both verbal and non-verbal aspects of IQ – bilinguals scored significantly higher. Peal and Lambert concluded that:

Intellectually [the bilingual's experience SR] with two language systems seems to have left him with a mental flexibility, a superiority in concept formation, and a more diversified set of mental abilities, in the sense that the pattern of abilities developed by bilinguals was more heterogeneous. It is not possible to state from the present study whether the more intelligent child became bilingual or whether bilingualism aided his intellectual development, but there is no question about the fact that he is superior intellectually.

In 1970, Landry found superior creative abilities in bilinguals who had become so by learning a second language. While at first and fourth grade levels differences between single language learners and second language learners were not significant, at the sixth grade the second language learners performed better on figural fluency, figural flexibility, figural originality, verbal fluency, verbal flexibility and verbal originality.

Sheridan Scott (1973) studied mono- and polyglots in Montreal. She studied her subjects, who were matched for IQ-levels and social class, over a period of seven years. They had to answer questions like 'Think of a paper clip. What can you do with it?' Monolinguals tended to give straightforward answers probably according to their experience with paper clips. Bilinguals gave many more and unusual solutions. She, also, argued that bilinguals were better than monolinguals in performing divergent tasks.

Carringer (1974) tested Spanish-English bilinguals in Mexico. Using various tests, he chose 24 monolinguals and 24 bilinguals (equal numbers of males and females). He then administered the Torrance Tests of Creative Thinking, a standard testing set, which others, e.g. Landry, had used before. His findings do not deviate from the other studies concerned with creativity. The bilingual group scored higher on all measured variables.

Doyle, Champagne, Segalovitz (1978) compared 22 bilinguals and 22 monolinguals. Their task was story telling and the bilingual group showed greater verbal fluency and expressed **more concepts** per story.

### **3.2 Linguists' Explanations for Enhanced Creativity**

It is interesting why, although many studies have tried to show a relationship between bilingualism and creativity, nobody has ever given a satisfactory explanation of the relation between these two. In addition to some comments mentioned in the previous chapter, here I would like to present a cross-sectional overview of explanations that scholars gave to account for the phenomenon of greater creative abilities in bilinguals. In order to show how similar and how vague these explanations are, I will have to use some rather extended quotations.

As early as 1949, Leopold acknowledged a favourable influence of bilingualism on the thinking process. In the case of his daughter Hildegard he assumed that “[c]onstantly hearing the same thing referred to by different words from two languages, she had her attention drawn to essentials, to content instead of form.” In my opinion, Leopold’s statement is close to a precise explanation. He does not, however, offer any model that would make this separation of content and form plausible. All the following ones have been more or less variations of that idea.

Carringer also based his study on the assumption that:

The theoretical rationale for the position that bilinguals have superior ability in cognitive reorganization or flexibility is that the child learns to separate the sound from the thing itself. Therefore, the bilingual is more concerned with meaning than symbol. Also, the bilingual is able to switch from one language system to another. Thus, he may be attempting to solve a problem in one language, fail, then switch to another hypothesis or concept in another language. [...] Skill with two languages also affects the concepts used for problem solving. A concept in one language may be richer and have more varied meanings than the same concept in a second language.

After having successfully concluded his study, he was content to repeat these notions:

bilingualism does promote creative thinking abilities and at least in part serves to free the mind from the tyranny of words. Since the bilingual has two terms

for one referent, his attention is focused on ideas and not words, on content rather than form, on meaning rather than symbol, and this is very important in the intellectual process as it permits greater cognitive flexibility.

Baker / Prys Jones slightly extend these ideas and include associations and connotations in their explanation:

With each language go different [...] ideas and beliefs, ways of thinking [...] Sometimes corresponding words in different languages have different connotations. For example, having two (or more) words for folk dancing, one in English the other one in, for example, Portuguese or Punjabi, will extend the range of meanings, associations and images. When slightly different associations are attached to each word, the bilingual may be able to think more flexibly and creatively than a monolingual.

Possibly because of their processing of two languages, bilinguals may have a slightly higher probability of fruitful divergent thinking. How does this occur? Bilinguals will have two or more words for a single object or idea. They will have two or more ways of referring to the same content area, concept, idea or information. The central notion is that having two or more words for the same object or idea allows bilinguals more freedom and richness in their thinking.

Romaine gives one more interesting, albeit vague, hypothesis. She observes correctly that the networks in which words in each language are connected are different in each language. Thus, a bilingual may be able to make a connection between a **word** in L1 and an association connected with its **translation equivalent** in L2. As an example, she says

the word for 'school' in Welsh (*ysgol*) also means 'ladder' [...], while the English word has no such associations. Welsh bilinguals may have mental imagery connecting the concepts of 'school' and 'ladder', which allows them to create metaphorical links, e.g. the school is a ladder to knowledge.

This is an interesting and challenging approach. It would definitely account for greater divergent strategies in bilinguals if it were correct. However, semantic priming studies and recent findings seem to contradict the idea of additional associations due to **direct lexical** connections.

In summary, the following ideas have been proposed (but not explained):

- Bilinguals seem to focus on meaning, not on form.
- They might also be able to make use of two distinct cognitive styles as they are able to think in two languages.

- The different languages provide the bilingual with a host of additional associations and connotations.

I will have a very detailed look at all these possibilities in chapter five. At the centre of all these hypotheses is the bilingual's lexico-semantic system. For that reason I shall now examine conceptual representation and the linguistic systems of bilinguals, both of which constitute the basis for thought.

## 4. Semantic Organization in the Brain

### 4.1 Compound versus Coordinate Bilinguals

Ever since Weinreich suggested the model of compound versus coordinate and subordinate bilinguals, researchers have been eager to either prove his findings or to find evidence against it. Even though Weinreich himself admitted that:

it would appear offhand that a person's or group's bilingualism need not be entirely of type A [coordinate] or B [compound], since some signs of the language may be compounded while others are not,

linguists took his dichotomy as a basis for their research. De Groot recognizes the same problem and ascertains:

Nevertheless, many a paper on bilingual word representation starts by posing the question in strict *either or* terms and concludes by opting in favour of one or the other structural possibility

#### 4.1.1 Exclusively Compound?

Weinreich's distinction is obviously of a theoretical nature. An exclusively compounding system is not practicable, as most words do not have exact translation equivalents in the other language and vice versa. Any bilingual dictionary shows that assumption to be true for we rarely find *one* translation for an item; more so, if we look up one of the offered translations in the other language, we are likely to find new translations in L1 that have quite a different meaning from our original word. De Groot puts it even more generally by saying "that formal translation equivalents seldom, if ever, share all aspects of their meaning."

I can easily demonstrate the problem by means of a small diagram. One can easily notice that rather concrete objects, such as tree, share virtually all of their features. A reason for this lies in the fact that those objects share extra-linguistic, e.g. visual, auditory or tactile, qualities. As soon as abstract ideas come into play, however, the semantic value of lexemes and to some extent concepts themselves can be quite different and include more or less features in comparison with the assumed ‘translation equivalent’.

tree – Baum                      mind        –        Geist

A bilingual with a fully compounded conceptual system would have to make generous concessions to her language systems up to the point when communication becomes impaired.

A more general problem of Weinreich’s (and other linguists’) understanding of the connection between concept and lexeme is that they define lexemes as linguistic manifestations of a concept. They are not! A concept is a much more rich entity incorporating various sensory, motory and cognitive elements. Each concept connects to a variety of lexemes that have the function of evoking a similar concept in the cognitive network of an interlocutor.

#### ***4.1.2 Exclusively Coordinate?***

Neither could there be a solely coordinate bilingual. Having a complete conceptual system for each language does not agree with the principle of *kognitive Ökonomie*. The human brain rather generalizes and makes abstractions in order to save capacity. Generalization and categorization are processes that start at pre-linguistic age and that work in bilinguals just like in monolinguals. Thus, our brain does not allow a strict separation of concepts nor would this separation be reasonable in terms of cognitive economy. There are

various studies in support of this common sense notion; I will speak of them later.

## 4.2 The Dual Coding Model

A new, more workable theory needed to be developed. From the seventies on, researchers have been pondering the possibility of a (at least partially) unified conceptual system, with several language specific linguistic systems. Scholars developed the idea because an abundant number of studies showed that bilinguals process their languages on one semantic basis.

One good example is semantic priming. A word takes a certain time to be recognized and processed. This time decreases if the word is preceded by a semantically related word. Experiments with bilinguals have shown that semantic priming also works cross-linguistically. A Japanese-English bilingual, for instance, processes the English word *monk* faster if it is preceded by the Japanese word *tera* (temple). Another example is Stroop-testing. Here, subjects are shown words representing colours, such as *blue*, which are written in ink of a colour not matching the colour word, e.g. *red*. When required to name the colour of the ink, not paying attention to the word, measurable interference occurs, either in the form of extended time it takes to process the word or even in actually making mistakes. Bilinguals exhibit the same kind of interference when presented with words in  $L_Y$  although the whole test is conducted in  $L_X$ .

Albert and Obler, still somewhat unsure of their findings, expressed their hypotheses thus:

then we must assume that all the subjects had a compound linguistic system and/or that they had a single prelinguistic cognitive system that would express itself through either of the two languages.

In the multilinguals, as a rule, the frequent language switching involved true chaining of association. This would imply a unified cognition system with output in any language possible [...]

On the basis of this evidence and additional results showing dual processing as far as language specific levels, i.e. sounds, syntax, lexemes, etc.) are concerned, the dual coding model has gained ground.

Scholars, for example Kroll and de Groot, have suggested that a unified conceptual system might only exist for concrete terms, which usually incorporate the same semantic features across languages; abstract concepts, however, will still be stored as language specific ones. De Groot objects:

if corresponding but non-equivalent L1 and L2 words were acquired simultaneously and only the overlapping parts of their meanings stored in a compound conceptual representation, the unique parts of their meanings would be lost.

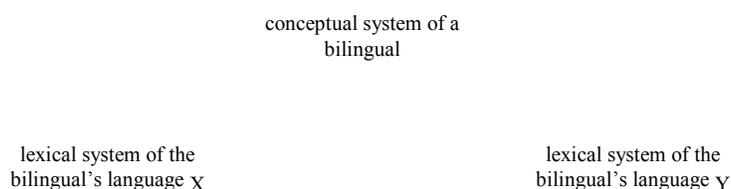
Yes, if one applies the Classical Theory to the conceptual memory of a person, then this objection and others are reasonable. If a bilingual just left out ‘semantic features’ unique to one language, she would certainly overextend the possible range of meaning for this concept. If she, alternatively, encloses all the features of all her languages, then the concept would be narrowed down, excluding phenomena of both languages. There must be a better way to describe a human’s conceptual system.

### **4.3 A Single, Enhanced, Lexico-Semantic System**

#### ***4.3.1 The Conceptual System of Bilinguals***

At this point, I would like to suggest a variation of the dual coding model. Linguists have often overestimated the role of language in the conceptual system. As mentioned above, a concept is actually much more than the cognitive representation of a lexeme: it consists of visual, auditory, tactile and kinaesthetic elements, all of which are acquired pre- or extra-linguistically. Language, however, does serve as an important means of categorizing and concept formation in the form of linguistic input. In addition, most of our concepts have one or more lexemes assigned to them, which we chose according to context and intention.

As far as bilinguals are concerned, they will have roughly the same conceptual systems as monolinguals do. Like monoglots, they perceive and categorize the world according to visual, auditory, tactile and kinaesthetic aspects. Nevertheless, they do differ in two aspects. Firstly, due to historical and cultural reasons, **concepts** might be differently organized in two languages. A good example is that of Arabic, which does not have a word for camel, but a much finer distinction at a lower level. Similarly, the Aborigines of Australia have no common term for sand (but many, lower level terms), the Inuit do not know snow, etc. The examples are plenty and from both the area of concrete objects and abstract concepts. A bilingual does not lose any of these concepts but rather has a wider range of concepts available. The following diagram should make this clear:



We can see that the two languages conceptualise a category differently. Language X even leaves out one level and has a direct connection from a hyper-ordinate concept to the base level. In the bilingual's conceptual system, however, all the distinctions are present.

The second difference is a possible fuzziness of categories (actually quite the opposite of the first one, but nevertheless present.) Although the concepts of two languages are the same in respect to prototypical instances, they might show slight variation in category boundaries – a notion perfectly in line with the Prototype Theory. In the words of Rosch, the founder of this theory:

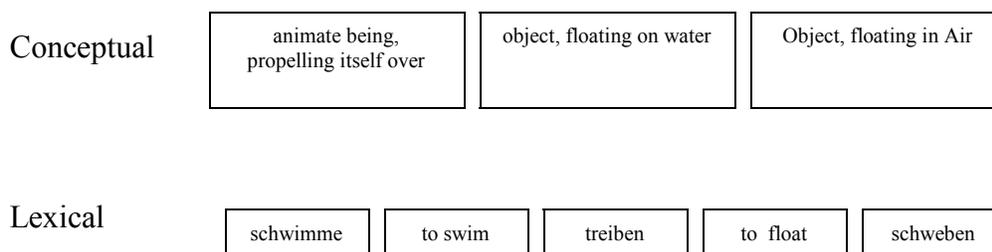
Because the prototypes are probably physiologically determined, for such categories the content as well as the form of categories should be universal, and only the category boundaries are expected to vary with culture.

In proof of that, Romaine cites some studies that showed a semantic shift (colour categories in this case) in bilinguals. They indicated that “bilinguals differed systematically from monolingual norms” and that “the boundaries of color areas mapped by bilinguals were less stable than those mapped by monolinguals. The total areas mapped by bilinguals were also larger.”

We actually have to accept the fact that bilinguals have both a more refined and a fuzzier network of concepts. Nevertheless, we must also be aware that these discrepancies are not of an overwhelming importance and in actual communication usually go unnoticed. They play a crucial role in flexible thinking, however. In line with Paradis’ idea of a continuum, we can assume that the variations increase with differences in language family, typology and cultural background.

#### ***4.3.2 Connections between Concepts and Languages***

Now that we have found out that bilinguals have one conceptual memory in many ways similar to that of monolinguals, the question arises how they can use two or more languages that are differently mapped to concepts. I will base the answer on the network system introduced by Lamb, which, even though he designed it for monolingual speech processing, is readily applicable to all bilingual phenomena as well. As an example, I will use the English lexemes *swim* and *float* and the German ones *schwimmen*, *treiben* and *schweben*. They all refer to the same conceptual area, but are differently connected to them.



This diagram easily demonstrates that the connection between lexemes and concepts in bilinguals works in the same fashion as the connection of synonyms to a concept does in monolinguals.

Whenever a bilingual ‘chooses’ a language, an impulse is sent that blocks the connection from the conceptual level to lexemes of the other language. Because of imperfect timing, insufficient level of the pulse, etc., interference might occur.

## **5. What Makes Bilinguals More Creative?**

Now, that I have tried to clarify how concepts and languages are stored in the bilingual brain and how lexical, semantic and conceptual representations interact with each other, we can turn to the question of bilingual thinking. For them to be more creative, they must be able to make unusual connections possibly drawing on a wider array of concepts, metaphors and language- or culture-specific connotations and associations. Even though I structured this part into different subchapters, it must be understood that all of the following mechanisms cooperate in the bilingual collectively enhancing her divergent abilities. Likewise, I want to highlight again that all these devices are present in the monolingual, too – only to a lesser extent.

### **5.1 Dominance of Conceptual Thinking**

I would like to suggest that thinking processes work on at least two levels. One of these is a linguistic one. We can employ what Lamb refers to as the “inner speech loop”; contemplating thoughts by *speaking inner sentences*, *listening to them*, *rephrasing them*, etc. Most people are not even aware of the existence of any other means of thought and freely express that by asking often-heard questions such as ‘In what language do you think?’ The single most important disadvantage of this method is that it forces us to think in the structures of our language. This approach is likely to be patterned and, as it is a conscious process, slow.

The other, non-linguistic one is a subconscious, conceptual approach. Without major interference from language, the human brain connects concepts – even if this connection were an unusual one – not paying attention to standards, restrictions or sense. Conceptual thinking plays an important role in the creative process as described by psychologists. Edelman suggests:

Dabei [the so-called *incubation*, part of the creative process] vollzieht sich eine nicht in Sprache übersetzte, sondern anschauliche oder symbolhafte Neuorganisation [sic] von Erfahrungen und Versuchen.

I would like to argue that in bilinguals this mode of cognitive activity is better developed than in monolinguals. This is so because polyglots need to ‘switch to conceptual mode’ much more often than monoglots. Whenever they acquire a translation equivalent, whenever they translate more than single words, whenever they code-switch, they employ their conceptual storage system. Of course, monolinguals do this as well, e.g. when using synonyms or metaphors; but, again, bilinguals do it much more often.

An exemplary study that impressively shows the dominance of conceptual processing in bilinguals was conducted in South Africa where Afrikaans-English bilinguals had to judge whether, for example, **cap** was more like **can** or **hat**. The researchers matched every bilingual with a one monolingual of each of the respective languages. The outcome was surprising: the majority of bilinguals chose a semantic approach, i.e. they chose hat in the example, whereas only one of the monolinguals did so to a significant extent.

Apparently, this conceptual thinking is what Leopold and others meant when they suggested that a bilingual’s attention was “drawn to essentials, to content rather than form.”

## 5.2 Context-Free Thinking

If the hypothesis of the previous chapter is correct, then we can draw another conclusion at this point. As I showed in chapter four, conceptual representations, whatever form they might take, have connections to lexical

labels, but are independent from them otherwise. Thus, we can neglect linguistic context, including connotations, when referring solely to concepts.

This way we can explain the outcomes of studies that asked subjects to think of all possible uses for an object. More concretely: we usually encounter a **lexeme** such as *paper clip* in a linguistic context, i.e. we associate it with other lexemes like *fix*, *attach*, *office* or *paperwork*. Its conceptual representation on the other hand might represent the **object** as what it actually is: a length of wire, bent into a particular shape, commonly used to attach sheets of paper to each other, etc.

From here, conceptual thinking can extend the possible range of uses for this object by far. The paper clip, so specialized in use, has now all the qualities of a piece of wire and could be used as a lock pick, it is made of metal and can become a conductor of electricity, etc. This cognitive flexibility is perfectly in line with our definition of creativity. Of course, creative monolinguals do nothing else; it is only that a bilingual has much more ‘practice’ in focusing on the conceptual qualities of an object.

### **5.3 Code-Switching in Inner Speech**

Language is an important means of categorizing our view of the world. Carringer proposed that a bilingual might try to solve a problem in one language and – if she fails – in the other one afterwards. In my opinion, it is not very likely that a bilingual consciously does so. Given the abundance of code switching in actual speech of polyglots, however, there is no reason to assume that bilinguals do not code-switch in their inner speech loop. On the contrary, as there are no socio-linguistic restrictions of any kind in inner speech, plentiful code switching in inner speech seems highly plausible.

Thus, a bilingual has the unique opportunity to draw on two registers of connotations, metaphors, linguistic structure, etc. Consequently, the polyglot can make full use of her enhanced linguistic and conceptual system introduced in chapter 4.3.1. This process of inner code-switching can well account for phenomena such as better story telling which I described in chapter 3.1.

## 6. Conclusion

Undoubtedly, bilinguals command creative abilities that are superior to those of monolinguals. Hesitatingly and vaguely, scholars have been explaining this by the tendency in polyglots to focus on content rather than meaning. Although bilinguals have not a single cognitive device that is not available to monolinguals, some of their cognitive abilities seem better developed, furthering their cognitive flexibility in tasks calling for divergent solutions.

I have proposed a model of bilingual lexico-semantic storage that contains one multi-modal (i.e. visual, tactile, auditory, cognitive and kinaesthetic) conceptual system. This system is based on prototypes which allow for fuzzy edges, extension of meaning and constant change. Apart from being fuzzy in comparison to monolinguals due to some generalization, their conceptual system is also more finely structured – combining conceptual distinctions of all languages. The conceptual memory is connected to the lexical system of the polyglot in a fashion comparable to that of monoglots, who have various synonyms connected to their concepts.

On this basis, I argued that bilinguals use their conceptual system more often than monolinguals do, because various bilingual functions, such as translation, acquisition of new translation equivalents, etc., require a switch to the conceptual level. On the conceptual level, however, thinking works subconsciously, faster, and in a less restricted manner than it does in inner-speech mode. Likewise, bilinguals can shed off a lexeme with all its contextual connections, connotations and associations, etc. and work with the raw concept instead. This non-lexical concept is more apt to be used abstractly and in unusual, i.e. creative, ways.

I have also shown that inner code switching in bilinguals, a very plausible concept, enables them to make use of two or more language systems with all

their various associations, connotations, lexical interconnections and metaphorical uses.

Finally, I should like to refer back to the hypotheses of chapter 3.2. Yes, a bilingual seems to concentrate on meaning rather than context. Yes, the bilingual has more associations and connotations available. In addition, the conceptual system of bilinguals might be more detailed and at the same time not as fossilized as that of monolinguals.

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