Control over different language systems

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PROBLEM

One of the most interesting questions in connection with bi-or multilingualism is how bilingual speakers exercise control over their different languages. Ordinarily, they can separate them well by consciously activating the one or the other system. Even unconsciously they can separate them quite well, if the verbal input and the speaker's output occur in only one language. There will also be no problem encoding new items, if the new words are of the native language, or are consciously addressed to a specific language system – the way we learn new words at school or from dictionaries. – But what will happen with mixed bilingual input? Will such information still be properly stored into the respective systems? – Former experiments by the author (Brosig 1996) had shown that reaction times as well as the number of mistakes increase significantly in this case.

In the present project the author wanted to investigate whether mixed lexical elements of two language systems would be stored into their proper language system, even when the subjects' attention was not specifically directed to this task, as in uncontrolled input. For this purpose the following experiment was devised:

METHOLOGY

Three wordlists were constructed with 12 concrete nouns each, one in German (L1 for most subjects), one in English, and one mixed (36 words altogether). 16 items belonged to two semantic categories : 8 animals (4 in English), and 8 fruit (3 in English).The words were chosen from the basic vocabulary and had been compared as to frequency. These wordlists were orally presented to 56 subjects (all university students) with the instruction to remember all words, in order to be able to recognize them when shown pictures. They were not explicitly told to remember the language of the words. The idea was that the subjects should not exercise too much control in storing the items, but do it more or less automatically.

– Subsequently, subjects were shown 27 picture cards with items from the three lists – but in a different order – and had to recall the items in the *proper* language. To avoid primacy and recency effects, the first and the last two items of each list were not included in the pictures. As a control, one of the pictures showed an item that had not been in the lists.

RESULTS

The most astonishing result was the high rate of items that were correctly recalled by the subjects (85%; 23 out of 27 items). This is far beyond the capacity of short-term memory.

However, this phenonemon cannot be merely explained by picture priming or picture naming, because most subjects startled at the unknown control item, and 40% of them stated explicitly that this item had not been in this lists.

The number of mistakes was smallest with items from the first (German) list (7,1%), somewhat higher with those from the English list (9,6%) and highest with words from the mixed list (10.5%). This would substantiate the hypothesis that simultaneous activation of different language systems causes more interferences in most people (unless they are trained simultaneous interpreters). There were no primacy or recency effects found, nor any semantic cluster effects.

But even when the subjects could not name an item, yet 90% of them recalled in what language this item had been, or replied with a semantically related word in the correct language, for instance «watch» instead of «clock»; (i.e. they recalled the language tag but not the name).

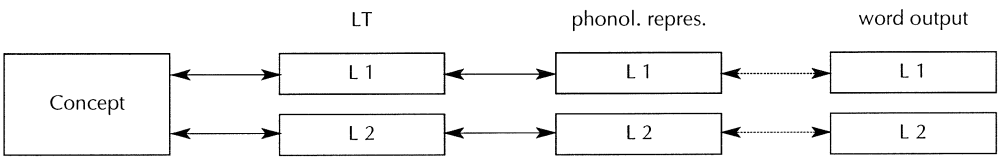
In a small long-term memory study with 9 of the subjects, the language tags lasted for 4 days without a loss, but were gone after 17 days.

CONCLUSIONS

These results suggest that the language tag (LT) is a feature of a word which seems to be independent from semantic and syntactic features, but is in close connection to phonological and visual features: we can identify an English or German word when we hear or read it, even when we do not know the meaning. (It would be interesting to investigate what kind of phonological or orthographic patterns we have stored to identify a language.)

This modular property of the language tag made me develop a bilingual processing model in which the language tag is acting as a switch between a concept and its phonological (or visual) representation in a chosen language. (See Figure 1.)

Fig.1 – Bilingual processing model



We have a concept that we want to communicate , and,as a first step, we choose the language in which we want to express it. After that the phonological representation of the word becomes activated (if we know that particular word in that language) which will consequently lead to the actual word output. (The dotted lines indicate that there are some processing steps in-between which were left out to facilitate the model.) When we want to utter a whole sentence, the chosen word will further activate the grammatical structure pertinent to that language.

The language tag can be activated consciously, as is often the case in a second or third language, or it can operate unconsciously – when we use our first language.

Also when we learn new words in different languages, we encode them into their proper system via the LT, either consciously, in language learning situations, or unconsciously, in unilingual language acquisition. – The question is, whether one word alone with its LT will be

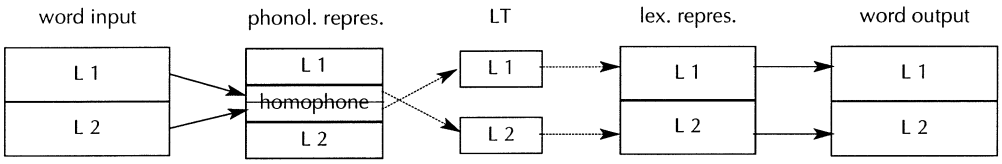
sufficient to activate the whole language system. At any rate, more than one stimulus (i.e. a sentence , or a discourse) will be more efficient.

If a word is not known, the particular sound sequence will nevertheless be encoded as a meaningless word. But if this word is not consciously encoded into memory, it will quickly fade out, as other meaningless information. – If the word is known but not current, i.e. the meaning is known but the phonological representation only vaguely, the concept will nevertheless activate the LT, so that on recall the LT can be identified, even when the phonological representation cannot be recalled. – It was exactly this phenonemon

that the author encountered in her above-mentioned experiment, when subjects remembered the correct language, but not the phonological representation of items.

The highest number of mistakes in my experiment occurred with three items, two of which were near cognates in German and English (Tomate – tomato; banana – Banane), and the homophone «heart», which can be understood as «hart» (hard) in German. In this case, the acoustic stimulus is ambiguous and can be attributed to the other language. As a consequence, a wrong lexical representation will be activated, and finally result in a wrong output. (See Figure 2; the broken lines indicating false processes, the dotted lines some steps in-between that were left out to facilitate the model.)

Fig. 2 – Faulty processing of homophones



Again, it is the LT that functions as a mediating switch leading an ambiguous acoustic stimulus, in this case, to the wrong language.

These results seem to be in keeping with Michel Paradis' (1997) findings that «multiple languages in one brain are neurofunctionally independent, as evidenced by various nonparallel recovery patterns of bilingual aphasic patients». Paradis (1987a) further argues for a modularity theory in bilingual processing, whereby however, modular and interactionist processes can interact, in that the output of one module may serve as the input of another; but that two modules may also act in parallel processing different aspects of the same stimulus.

Both these processes are operating in my above-presented models. The language tag seems to be a particularly strong and autonomous module: strong in that the LT of one word can possibly activate the whole language system of that language; autonomous, in so far, as the LT seems to be independent from other lexical properties, as manifested by my results of an LT as the only feature of a word that was remembered.

This leads to the conclusion that each language has ist own LT system which is being part of each lexical entry of that language. Only cognates and homophones seem to be tied to both LT systems resulting sometimes in interferences. Impairment of one LT system would result in the described cases of non-parallel recovery of bilingual aphasics. But how these language tag systems are neuro-anatomically represented in the brain remains to be investigated.

REFERENCES

Brosig, E. 1996. Empirical studies on bilingual lexical memory. In *Proceedings of the 4th ISAPL Congress,* Vol.II, Bologna, ed. by S. Contento, 322-324.

Paradis, M.1987a. Neurofunctional modularity: Evidence from bilingual aphasia and Japanese dyslexia. In E. Keller , M. Gopnik eds. *Motor and sensory processes of language,* Hillsdale, Lawrence Erlbaum, 277-289.

Paradis, M. 1997. The cognitive Neuropsychology of bilingualism. In A. de Groot, J. F. Kroll eds. *Tutorials in Bilingualism – Psycholinguistic Perspectives ,* Mahwah, N. J. Lawrence Erlbaum, 331-354.