Does language compose specific patterns of thought?

SEMANTIC TRANSFER IN SLA

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This study examines parts of the great controversy of the influence of specific languages on the way we think about concepts. Using a language acquisition task of a L2 and a L3, it tests the hypothesis that conceptual categories from a known language influences the acquisition of a new language in terms of semantic transfer. This study cannot provide comprehensive evidence for such hypothesis, and it is discussed whether the results rather supports the idea of a separate cognitive language module or whether there is still reason to believe in the existence of transfer of meaning in SLA and the influence of a specific language on our thoughts.

Introduction

The processes involved in learning a language constitute a complex and well-debated domain in the field of cognitive psychology. As neonates we can distinguish between all sounds of human languages. However, around 10-12 months of age we begin to focus on the sounds of our first language, and learn to forget the sounds, which are not relevant for our L1 (Staib, 2016). This is for instance seen in L1 speakers of Japanese who cannot distinguish between the L and R sound, simply because this discrimination is not used in the Japanese language. Hence, our first language influences more aspects of our cognitive abilities than just communication. However, the nature of this influence is a controversial topic. It has been studied in particular in the role of L1 when learning a second language. According to the Behaviourists, language acquisition is learning to associate a particular stimulus with a particular response (Watson, 1913). To follow this approach, L2 acquisition must involve learning to associate a stimulus with a new response. It is commonly agreed that L2 acquisition involves transfer from L1, in which the strategies used to process L1 is applied in the processing of L2 (e.g. Hernandez et al., 2007). This transfer can be positive, where similarity between L1 and L2 facilitate the L2 acquisition, or it can be negative, in which the strategies from L1 cannot be mapped onto L2, thus causing difficulties in the acquisition.

A great part of the controversy regarding L2 acquisition is transfer of grammar (syntactic transfer) versus transfer of meaning (semantic transfer). This controversy also involves the debate of whether language is a separate module independent of any other cognitive abilities, as suggested by Chomsky and the nativists, or whether it is interconnected with all cognitive processes in the mind, in which everything is translated into language-like

properties before it is processed into a meaningful representation. Numerous studies have provided evidence for syntactic transfer, for instance in transfer of grammatical gender. Ellis et al. (2012) found that acquisition of grammatical gender in L2 is easier for those who also use grammatical gender in their L1. Because of the greater possibility of mapping grammatical properties one-to-one from L1 to L2, acquisition of the new language becomes easier (For further examples see Inagaki, (2001); Westergaard, (2003)).

On the other hand several studies have been suggesting that transfer from L1 to L2 can also occur with regards to meaning. Human thought involves categories, which each differ semantically. Studies in transfer of meaning involve investigations of whether and how these categories differ in different languages and if such differences affect second language acquisition. Models of bilingual lexical processing have suggested that words in L1 are directly linked to conceptual meaning, while the meaning of L2 words is accessed through the form of L1 words (Gullberg, 2009). According to such models each language facilitates a certain thinking pattern, and the idea is that this pattern is transferred when acquiring a new language. The idea has its origin in the Behaviourists who believed

that language and thought is the same thing. A proposal that was later developed by Edward Sapir and Benjamin Whorf, when they presented the Sapir-Whorf hypothesis; the idea that the form of language we use influences the way we think. Thus, the different categories a language provides determine its speakers' thoughts (Whorf & Carroll, 1956). This approach has been the foundation of numerous studies in SLA as well as new theories of semantic transfer. Slobin (1996a) presented the "thinking-for-speaking" hypothesis, which states that a language trains its speakers to pay attention to certain parts of experiences, when we use the language to talk about them. Thus, when learning a new language, we must learn new thinking-patterns. This hypothesis has received much support in several studies (e.g. Cadierno, 2004; Harley and King, 1989; Kellerman and van Hoof, 2003). Cadierno (2010) argues, that the more accessible an expression for a certain domain in a language is, the more its speakers will attend to this domain. In her study of expressions of motion in L1 and L2 she found, that speakers of high-manner-salient languages (e.g. German and Russian) have an easier time learning other high-manner-salient language (e.g. Danish), than speakers of low-manner-salient languages. She argues that this is the case

because they, due to their L1, are used to paying more attention to manner information. According to this theory acquiring a new language thus involves the acquisition of new thinking-for-speaking patterns, which means a reconstruction of meaning, redefining concepts and a change in the semantic boundaries of the established categories in L1 (Gullberg, 2009). This leads to great difficulties, for instance if a speaker have to transfer from a general single-term system in L1 to a specific multiple-term system in L2, which can lead L2 speakers to transfer the general L1 meaning to expressions in L2. This was for instance found in English learners of Spanish who showed great difficulties with the distinction between *ser* and *estar,* which are both equivalent to the English "to be". As a result the tendency was to over-generalise one of the L2 terms, in this case the word *ser* (e.g. Geeslin, 2003). This is an example of a negative transfer, in which the semantic categories from L1 are mapped onto L2 in which they are no longer appropriate and hence diminish the acquisition.

Some studies have focused on the role of L2 when acquiring a L3, regarding semantic transfer. It has been suggested that L2 actually play a greater role than L1 in L3 acquisition, and the phenomenon is referred to as the L2 status factor (Falk and Bardel, 2010). The L2 status factor was first suggested by Williams and Hammarberg (1998), and refers to the findings that L2 is preferred in transfer to L3 even when L1 and L3 are closely related and the typological structures of the languages are similar (Bardel and Falk, 2007). Falk and Bardel (2010) argues that the cognitive differences between first and second languages, which causes the difficulties of positive transfer, are eliminated between L2 and L3, which have greater cognitive similarity, hence L2 becomes the preferred source of transfer. The cognitive differences between L1 and L2 are assumed to regard age of onset, outcome, learning situation, metalinguistic knowledge, learning strategies and degree of awareness in the language learning process (Falk and Bardel, 2010). As these have already been acquired once learning a L2, greater similarities are found between L2 and L3, than L1 and L3.

Though there seem to be much evidence for a transfer of meaning in L2 acquisition, it is still a controversial topic. Grammar and meaning in languages are strongly related, and whenever we change the meaning, we also somehow change the grammar. Thus, we cannot be completely sure, if the transfer observed in the above mentioned studies, are

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purely semantic or if they are caused by changes in the syntax. Therefore this study will examine the transfer of meaning in L2 and L3 acquisition using arbitrary languages, which enables full control of the participants' knowledge of the language and makes sure the grammatical structure is kept exactly the same in both languages, so that only the semantic categories differ. Participants are taught an arbitrary L2, where after one half of the participants are taught $L3^1$ and the other half are taught $L3^2$. $L3^1$ differ from L2 only in the words used. Both grammatical structure and the conceptual semantic category the words refer to will be completely the same. Thus positive semantic transfer is possible. $L3^2$ also differ from L2 in the particular words, but here the conceptual categories referred to will also change. The grammatical structure is still kept the same. Thus, semantic transfer is not possible. The words in $L3^1$ and $L3^2$ are exactly the same, which ensures that differences in the errors made in the two groups of participants are not due to the structure of the word, and that they can be compared directly. If transfer of meaning exists, $L3^1$ should be considerably easier to learn than $L3^2$. It is hypothesized that participants learning $L3^1$ will both have a higher accuracy and a shorter reaction time in

L3 acquisition tasks, than participants learning $L3^2$.

Materials and Methods

Participants

The experiment was conducted on 15 participants (6 females) with an average age of 26.8 (SE=3.98). All participants were native Danish speakers, to ensure the highest linguistic similarity in the foundation for acquiring the two arbitrary languages used in the task. A record was kept of the number of languages each participant speaks.

Stimuli

The experiment used three arbitrary languages; L2, $L3^1$ and $L3^2$. The languages each consisted of four words, naming four different images of a monster. Each word in all languages was a two-part word, thus the grammar was kept exactly the same across languages. The only thing that changed was the meaning of the words. In L2 the first part of the word referred to whether the monster's arms were up (ma) or down (mi), and the second part of the word referred to whether the colour of the monster was blue (lu) or green (la). In $L3^1$ the first part of the word similarly referred to whether the arms were up (su) or down (si), and the second part of the

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word to whether the colour of the monster was blue (bo) or green (be). Thus the language was new, but the grammar and the semantic categories were kept the same as L2, making semantic transfer possible. $L3^2$ used the same words as $L3^1$ to ensure the possibility of direct comparison. The grammar was again kept the same, but now the semantic categories changed. The first part of the word referred to whether the monster had small eyes (si) or big eyes (su), whereas the second part referred to whether the monster had dots (bo) or not (be) (see figure 1). As the grammar does not change, any transfer that happened from L2 to $L3^2$ which did not happen from L2 to $L3^1$ is due to transfer of meaning.

Figure 1

L2

| MILU | MALU | MILA | MALA |

$L3^1$

| SIBO | SUBO | SIBE | SUBE |

$L3^2$

| SIBO | SUBO | SUBE | SIBE |

Procedure

The experiment had two conditions. In the first condition participants were first trained in L2 and then in $L3^1$. In the second condition different participants were first trained in L2 and then in $L3^2$. Thus all participants were trained in the same L2, where after half participated in condition 1 and the other half in condition 2.

The participants were seated in front of a computer, and instructed in the procedure of the language training. In the beginning of each training session, they were presented with an overview of the four words together with the four respective monsters (figure 1). They could look at the presentation for as long as they needed. Next the training started, in which participants did a matching test. An image of a monster was presented along with two possible names, and the participant had to choose the correct name for the monster by pressing the left or right arrow key (see figure 2). After each choice the participant received feedback on their answer, either "Your answer is correct!" or "Your answer is wrong." The training continued like this until the participant reached an accuracy of 80 %, however every participant went through a minimum of 10 trials.

Figure 2

milu   malu

When an accuracy of 80 % was reached, participants had a short break. Then training of L3 started, following the exact same procedure. In L3 training all participants went through 30 trials.

Accuracy of L3 trials was measured along with reaction time of each response.

Analysis

Two methods of analysis were conducted on the data. To analyse the difference in accuracy between the two conditions ($L3^1$ and $L3^2$), a repeated measures logistic regression model was used with accuracy as dependent variable, condition as predictor and ID as random intercept.

An independent t-test was used to analyse the differences in reaction time between the two conditions, with reaction time as dependent variable and condition as predictor.

The number of languages spoken by the participants was not included in the analysis due to irrelevance, as all participants entered 2 spoken languages.

Results

The condition, whether participants were presented with $L3^1$ (M=0.67, SE=0.06) or $L3^2$ (M=0.92, SE=0.02), did not significantly predict the accuracy in L3 test: $X^2(1) = 0.54$, p = .46, R2 = .03. Additionally there was no significant difference in reaction time between participants presented with $L3^1$ (M=4.23, SE=0.60) and participants presented with $L3^2$ (M=3.98, SE=0.19), t(35)=0.4, p=.69, r=.07.

Thus, there was no significant difference between the accuracy nor the reaction time, for cases where participants acquired $L3^1$ and cases in which participants acquired $L3^2$.

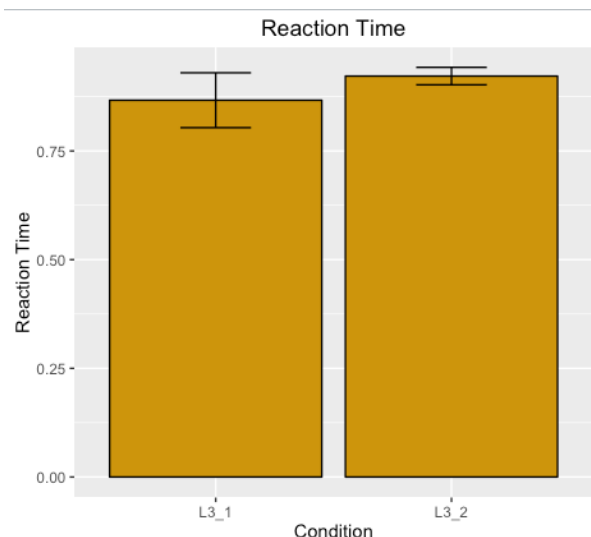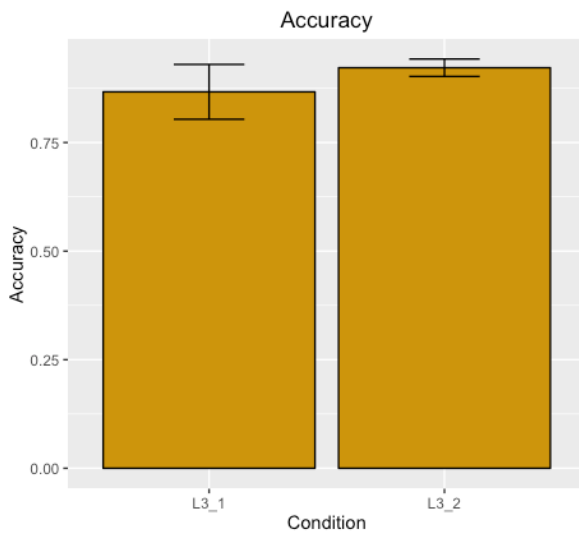*Figure 3: Condition as predictor of reaction time in L3 tasks.*

Figure 4: Condition as predictor of accuracy in L3 tasks.

Discussion

In theory this task and the design of the two conditions should be highly convenient for studying any transfer of meaning and influence of possible thinking-for-speaking patterns in second language acquisition. The arbitrary languages allows one to fully control the grammar, which is not obtainable with any existing language, as grammar and meaning in all languages almost inevitably are so greatly related, that you can not change one, without changing the other. Furthermore, the use of arbitrary languages reduces any similarity from a known language, which could cause unmeasured transfer or interference. It creates a ground zero, so to speak, in which no words have a higher activation level than others or a higher

imageability than others. Factors, which all could influence the performance in acquisition of a new language. Last, an accuracy of 80 % in L2 was required in order to continue with L3 training, to ensure a certain proficiency in L2. Such proficiency is needed to enable the knowledge of L2 to be the foundation of transfer in L3 acquisition. Thus, the design ought to be a good foundation for detecting any semantic transfer if it occurred.

However, this study presented no significant results. This could either be evidence that semantic transfer does not occur in second language acquisition, or it could be a result of an inadequate design. The basic idea of the experiment might be useful, but the design used in this study could be improved in several ways. First of all the monster figures used in the stimuli might not have provided the amount of control of the associations participants made between the words and the figures, as was intended. For this design to have full effect, participants should, without exception, associate the first part of the words in L2 with the position of the monsters' arms and the second part of the word with the colour of the monster. However, because of the many additional features in the monsters, participants might as well have associated some parts of the word with, for instance,

whether they saw the monster as male or female, or whether it was fat or skinny. If this was the case, some of these associations might still have applied to the figures used in L3, notwithstanding the condition. This would eliminate the difference between the two conditions, hence making transfer immeasurable. Another improvement could be done on the way in which participants were taught the two languages. In this design they were taught explicitly as they were given the correct names for the four monsters before training started. This could have the simple effect that the task was too easy, resulting in high performance no matter the condition. The high means seen in L3 training in both conditions indicate performances very close to a ceiling effect, and suggest that a too easy task could have been the case. This could be improved for instance by using implicit teaching or by increasing the number of words in each language. Additionally, the explicit instruction could have the effect, that rather than being trained to attend to particular domains for the specific language, participants might as well have relied on their working memory for the instructed "rules". Hence this might have been a test on their short-term memory rather than the semantic patterns created in the acquisition of the two languages. Having to change thinking-for-

speaking patterns require the language learned to train its speakers to attend to specific semantic categories. A more demanding implicit learning process might enhance the process of creating thinking-patterns in association with the words in the language, as it would demand a more deliberate effort and reflection upon the acquired material. It is possible that the influence of the different semantic categories between the L2 and L3 would be greater, which could result in a more accurate measuring of transfer. Additionally, further studies of this design should be conducted on a greater number of participants, in order to detect and analyse a valid pattern. Last, it would be interesting to use participants who vary greatly in the number of languages they speak, to test the impact of this factor on transfer from one language to another.

The non-significant results of this study could as well be an indication that semantic transfer does not occur. Whether the semantic categories in L2 and L3 are identical or different does not influence the performance in acquisition. Thus any transfer found in previous studies might be due to other parameters, such as syntactical changes. Instead of being trained to attend to specific categories, participants might just detect the syntactic pattern, which repeat itself in all the

languages used. Once they during L2 training figured out that the first part of the word refers to one feature of the monster, and the second part to another feature, the L3 training is already sufficiently facilitated and not influenced by any semantic changes. The lack of semantic transfer is consistent with the nativist Chomsky's view that language is a separate module, similar to any other cognitive modules of the mind. (Harley, 2010). According to this approach, language doesn't depend on, nor influence, any other cognitive development, but is instead build on a language acquisition device, LAD, in which children are born with a foundation of universal grammar. Williams Syndrome indicates some evidence for this viewpoint, as it clearly demonstrates how severe mental cognitive disabilities can occur without impairment of the language. In such amodal approach second language acquisition does not involve changing semantic boundaries or redefining concepts, as suggested by Gullberg (2009). Instead it involves only syntactic parameters of the language acquisition device to add an appropriate value for the new language, which would explain why no difference is seen between condition 1 and condition 2 in this experiment as the syntactic structure was identical, and provided

sufficient information to successful acquisition of both L3s.

However, there are several reasons to believe that semantic changes should influence transfer in second language acquisition, and that the results of this study is due to inadequate design of the experiment. Take a look at the connectionist modelling of semantic networks. According to this approach we have semantic features at lower levels, which are all connected in an enormous mental network with connections both to words and to sensory representations. These connections activate each other by spreading activation that travels along the different links (Collins and Quillian, 1969). The idea is, that the semantic network is created by experience of co-occurrence between words, a process of neural learning in which the responsiveness of a neuron increases as a function of experience with past stimuli, described as the power law of learning (Newell & Rosenbloom, 1981). Hence, as a result of experience with the language, the association between two nodes in the network becomes stronger and the activation travelling on the link in between becomes faster. If this is true, it is reasonable to believe, that different languages will create different semantic networks and different spreading activation processes, depending on

which words often occur together and which semantic features are more often attended to (thus more activated) than others, determined by the language used. Thus, speakers of the L2 used in this task, should in theory create links between the first part of every word and the position of the arms of a stimulus, and the second part of every word with one of the two colours of the stimulus. In such case this established mini-semantic network, should influence the acquisition of L3 such that participants learning L3[1] would have an advantages because of the already established links between the appropriate word and conceptual category, resulting in a greater and faster activation. Contrary participants learning L3[2] should have a disadvantage as the link from the first part of the word would have to be connected to a new node, the new stimulus. Thus activation would be slower, resulting in a higher reaction time. Such results were not found, and thus demand further studies, however the semantic network and connections models are good indicators that languages form a semantic network, which can be thought of as specific thinking-for-speaking patterns, and that in order to acquire a new language we must reshape or add to our semantic network, and that the previously established links in the network will result in positive or negative semantic

transfer. If the above-mentioned premises are true, acquiring a new langue would mean we have to acquire a new thinking-for-speaking pattern. However the development of such thinking patterns might require a more extensive exposure to a language than provided in this task, which could possibly be the reason why no such results were found. The associations from L2 might not have been strong enough to influence the acquisition of L3, and the short training sessions could have been relying only on short-term memory, and thus the expected results were not found.

An important parallel can be made between language acquisition in children and SLA regarding the understanding and rationale of semantic transfer. When children start using nouns, they tend to either use them too specifically or too generally, which is the most common error when children begin to speak. (Clark, 1973). For instance they might learn the noun "Dog" and then use it for all four-legged animals. As found in the study of English learners of Spanish by Geeslin (2003), the same pattern occurs in second language acquisition in adults. Clark argues that these over-extensions in children's language acquisition are not just random mistakes, but occur because of an incomplete semantic development. This approach could be mapped onto SLA, in which the

appropriate semantic representations are not yet fully developed, thus speakers use the representations they already have from their L1 and map them onto the L2 to fill out the missing parts. The earlier presented models of bilingual lexical processing suggested, that only L1 words are directly linked to conceptual meaning, and that the meaning of L2 words is accessed through the form of L1 words. This could explain the over-generalisation of particular words in SLA found in Geeslin's study. Native English speakers for instance, have one conceptual meaning of the term "to be". Contrary Spanish has two distinct conceptual meanings of the same term ("ser" and "estar"). If the meaning of the L2 words (in this case Spanish) is accessed through the L1 word forms (in this case English), it would predict Geeslin's results. Native English speakers would have to change the semantic boundary of this conceptual category, reconstructing the meaning from one unit of meaning into two. The over-extension of one of the terms indicate how English speakers suffer great difficulties, with distinguishing between two conceptual forms of "to have", which most probably is because they are not trained to attend to the difference between the situations in which they are used, as native Spanish speakers are. Thus, these over-extensions

indicate a thinking-for-speaking pattern, which influences SLA and has to be changed or developed in order to use a new language appropriately.

The investigation of the influence of specific thinking-for-speaking patterns in different languages are highly relevant, not just in understanding SLA but for general use in society. Already in the great novel "Nineteen Eighty-Four" written by George Orwell in 1948, the important and very influential role of thinking-for-speaking patterns was presented with his fictional language, Newspeak. Newspeak is a language created by the government with the intention of controlling the thoughts of its speakers, which is based on ideas very similar to that of early Behaviourists. The rationale for Newspeak is that the word dictates the thought. Hence, if you remove the word, you inhibit the thought. This is an extreme approach of thinking-for-speaking patterns, a fictional one too, however it does provide a good insight of the implications of such phenomenon. If thinking-patterns determined by language exist it enables great control of the speaker's thoughts. Today's "real life" newspeak has already been proposed in the Danish article "Vi bør leje – ikke eje (We should rent – not own, ed.)" (Bennike, 2013) in which author Tor Nørretranders suggests that the word

"trash" should be abolished from the Danish vocabulary. Replacing it with words as "resource" or "recycle" should instead change the way we think about trash and what we do with it. The idea seems optimistic, however if thinking-for-speaking patterns exist this could be a possible implication in society. Last, studies have provided evidence that bilinguals not only perform better on language tasks, but also on other cognitive tasks such as attention, environmental changes and less cognitive decline (Marian and Shook, 2012). This is due to the trained ability to inhibit one language while using another, however it also indicates that language most likely influences all of our cognitive systems, and that you cannot separate into an independent module.

The rationale for specific thinking-for-speaking patterns in different languages, resulting in a semantic transfer interfering in second language acquisition is too important to be ignored, however this study could not provide comprehensive evidence, which could indicate that the specific language does not influence our thinking-patterns, but is a separate module in cognition and that SLA is only influenced by grammatical structures, or it could be a result of an inadequate experimental design. The possible implications of Slobin's thinking-for-speaking

hypothesis are highly relevant, both in SLA and in society in general, for instance in terms of media propaganda, learning methods etc., and a more extensive version of this study is needed to investigate this matter.

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