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The priming effect and language learning

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Introduction

“To know the true reality of yourself, you must be aware not only of your conscious thoughts, but also of your unconscious prejudices, biases and habits.”¹

In the subsequent paper, I would like to illuminate the mechanisms of priming as an associative activation mechanism of semantically related memory contents.² Additionally, I am striving to demonstrate the enormous potential of priming for the teaching of foreign languages. Therefore, I will give an overview of the physiological and psychological processes involved and conditions required, in order to evoke a primed response. A distinction between declarative and non-declarative memory of the brain is an important prerequisite to a holistic comprehension of the priming processes occurring in the cortex. Afterwards I am also giving an account of the different types of priming and their varying effects on the participant. Finally, I will introduce the classical priming paradigm with its preconditions.

In a second part, I will present the reader with an overview on current research that has been conducted in the field of priming. On the basis of an example from the real-life context (commercials), I would like to illustrate the immense subliminal power the priming effect continually predicates on human beings. Then I will proceed with academic research that has been executed for the detection of various correlations between a specific stimulus and a primed response. The first experiment by Gollwitzer and his colleagues will take a closer look at priming and its effects on human self-regulation. As the researchers detected a positive correlation between a pro-social prime setting and a low self-regulation, I will elaborate on didactic possibilities for the teaching of languages in the heterogeneous classroom. The second experiment by Massar and Buunk will clarify the mechanisms of subliminal priming and will additionally strive to explain female rivalry in the face of an attractive opponent as an evolutionary safety mechanism to secure sexual recreation in a stable partnership.

In a concluding part, I am attempting to scaffold the findings from the experiments, in order to extract those assumptions most valuable for a potential transfer to the language classroom.

¹ Quotation taken from: http://thinkexist.com/quotation/to_know_the_true_reality_of_yourself-you_must_be/256894.html (accessed on 03/01/12). Unfortunately, the originator is unknown. Allegedly, though, the citation is authored by Carl Jung.

² Cf. Hartmut O. Häcker and Kurt-H. Stapf (eds.) (2009): *Das Psychologische Wörterbuch*. Bern: Hogrefe, 773.

Main part

2. An introduction to the priming effect

2.1 The location of priming: declarative and non-declarative memory

Our brain processes information based on experiences in two spheres. Whereas the **declarative memory** is divided into an *episodic* (personal experiences and events) and a *semantic memory section* (semantic, symbolic and iconic contents) and consciously activates and processes memories³, the **non-declarative memory** is organized via priming events.

Priming (to prime=to prepare, to instruct in advance) constitutes a cognitive phenomenon that can be predicated on the establishment of context-based associations between a stimulus and a response. Hence, priming and its modes of operation resemble the mechanisms of classical conditioning, wherein a previously presented stimulus (the *prime*) cues a response as soon as an associated prime (then called *target*) is presented to the subject at a second test run. By definition, priming originates in an associative link between two events, whereby an event A increases the probability of the occurrence of an event B.⁴

The **priming effect** describes the circumstance that the “prior exposure to a stimulus (prime) can facilitate its subsequent identification and classification (target)”⁵, as the various processing stages that were required to select that response during its first presentation are bypassed. For this reason, Karl Lashley, a Harvard neuropsychologist, who studied the formation and storage of memory, paraphrased priming as the “subthreshold activation of a system of related associations”⁶ in the human brain. In contrast, Rickheit, Sichelschmidt and Strohner emphasized the impact of a prior prime in terms of response speed on subsequent reactions.⁷ Since a context-related, timely restricted prime establishes certain mental representations in the subject’s brain, a set of associations is saved in the cortex exerting an impact on the processing of a subsequent target-stimulus. However, the associative pattern is not consciously saved in the non-declarative memory, which renders the information passive and uncontrollable for the individual. Research has illustrated that a repeated

³ Cf. Eva Breuer (2009): Effektives prozedurales Lernen: Der prädikative Wert der Sättigung früher Lerneffekte (Priming) für die prozedurale Gedächtniskonsolidierung. Dissertation: Charité Berlin, 7.

⁴ See Häcker and Stapf 2009, 772.

⁵ Allan Horner and Richard J. Henson (2008): “Priming, response learning and repetition suppression.” In: *Neuropsychologia* 46.7, 1.

⁶ Karl S. Lashley (1950): “In search of the engram.” In: James A. Anderson and Edward Rosenfeld (eds.): *Neurocomputing. Foundations of Research*. Cambridge: MIT Press, 63. Online Resource: <http://mind.cog.jhu.edu/faculty/smolensky/050.326-626/Foundations%20Readings%20PDFs/Lashley-1950-Engram.pdf> (accessed on: 15/04/2012).

⁷ Cf. Gert Rickheit; Lorenz Sichelschmidt and Hans Strohner (2002): *Psycholinguistik*. Stauffenburg, 42.

presentation of the prime (target) assists in the acceleration of the previously trained stimulus-specific reaction.⁸ Priming, such as perceptual learning, is located in the neocortex of our brain.⁹ In contrast to the declarative memory, information saved in the non-declarative section is not subject to conscious retrieval and activation. Therefore, a reaction triggered by a prime is observable exclusively and extremely inflexible and unpredictable, as the target is ultimately and closely linked to a specific context.¹⁰ Nevertheless, the fact that priming can contribute to a facilitated and more precise processing, perception and identification of a stimulus, may be of enormous value for educational purposes, as it may increase the learning speed and growth, as well as positively influence a learner's motivation on a certain task.

Priming is not only a cognitive phenomenon reverberating the subconscious information processing and its effects on the brain, but is also implemented as a tool in cognitive science, psychology and psycholinguistics. In these disciplines priming functions as a methodology rendering subliminal mental processes visible and thus, enabling a thorough scientific investigation.¹¹ Hence, in the subsequent termpaper, I am not only going to introduce classical priming experiments, but also deviations from the priming archetype that may be of relevance for the educational realm. Additionally, in a second part, I am also elaborating on various implementations of priming in the classroom context.

2.2 The model priming experiment

A classical priming experiment comprises two sessions. In a first meeting, subjects are confronted with a stimulus, the so-called **prime**. In a subsequent session, the test person is offered a **target** stimulus related to the initial prime by association or resemblance. Researchers then, measure the extent to which the prime has influenced the processing of the target. The performance difference detected (processing speed, response speed, concentration span, accuracy), determines the extent of the **priming effect**.¹²

In accordance with their key function within the experimental design, a priming impulse takes on different forms. Past research has illustrated that for an investigation into semantic or lexical priming, pseudo-words are of great value, as they are able to eliminate confounding variables. Furthermore, pseudo-words are valuable for the abolition of

⁸ Cf. http://campus.ph.fhnw.ch/pub/Music/ProjektplattformJKDSPK/Priming_referat.pdf (access date: 15.02.2012).

⁹ Cf. Breuer 2009, 10.

¹⁰ Cf. Ibid., 8.

¹¹ Cf. Ingrid Scharlau; Ulrich Ansoerge and Odmar Neumann (2003). „Reaktionszeitmessung: Grundlagen und Anwendungen.“ In: G. Rickheit, T. Herrmann & W. Deutsch (ed.): Psycholinguistik. Ein internationales Handbuch. Berlin: de Gruyter, 23.

¹² Cf. Breuer 2009, 11 as well as Rickheit, Sichelschmidt und Strohner 2002, 42.

subconscious expectations in the subject or the entire experimental group. Most significantly, however, the size of the priming effect is determined by the **specificity of the prime** employed. A variation of the surface characteristics of a stimulus thus, has great impact on how the impulse is perceived, processed and stored by the participant. For instance, experimenters found evidence to conclude that in terms of language priming, the size, font and typography of a semantic chunk, significantly affects the priming impact. Therefore, scientists recommend a relatively constant prime that remains stable in appearance throughout the experimental repetition sessions.¹³

2.3 Variants of priming

So far, researchers have detected six variants of priming. As Gollwitzer postulates, **concept priming (direct priming)** "causes people to act in line with activated concepts"¹⁴ or categories, such as 'beautiful', 'rich' or 'slow'. Exposing a participant to a strong¹⁵ semantic prime, such as 'elderly', Bargh, Chen and Burrows observed that those participants in the experimental group (primed with the concept of 'elderly') significantly differed in their walking speed from those, who were not subject to prior semantic priming.¹⁶ Hence, the concept 'elderly' functioned as a semantic prime causing those subjects exposed to it reduce their pace. In another concept priming setting, subjects were exposed to a list of words required to be organized in such a way that they would coin a grammatically correct, as well as lexically and semantically meaningful unit. The test conducted in such studies is called "Scrambled Sentence Test".¹⁷ Another method would ask participants to find hyper- or hyponyms to a prime (e.g. eagle/parrot/dove-bird), in order to categorize and contextualize the prime word within a certain mental field that subsumes related words in a lexical field in our non-declarative memory of the neocortex.¹⁸

In contrast, **sequential priming** investigates into the artificial connection between two mentally stored representations. Therefore, a prime is presented to the test person, which ultimately activates certain associations in the subject. As soon as the initial prime is

¹³ Cf. *ibid.*, 13. The assumption was made by Breuer in accordance with the findings of Wiggs and Martin, 1998; Tulving and Schacter, 1990; Jacoby and Dallas, 1981; Biedermann and Cooper, 1991 and Jacoby and Hayman, 1987.

¹⁴ Gollwitzer et. al. 2011, 901.

¹⁵ I refer to a "strong" semantic prime, as I would like to clarify that a prime needs to meet various criteria, in order to trigger a desired target response. Thus, the prime needs to be carefully selected on grounds of its hierarchy and effect strength within the lexical network. Only if the prime is connected to a variety of concepts and associations in our neocortex, it will also cue the response aimed at by the researcher. For further information on the theory of activation spread see: Collins and Loftus 1975.

¹⁶ Gollwitzer here relates to a study conducted in 1996. Cf. Gollwitzer et. al. 2011, 901.

¹⁷ Cf. http://www.uni-hamburg.de/fachbereiche-einrichtungen/fb16/psych_1/Prime_referat.pdf (accessed on: 02/15/12), slide 7.

¹⁸ Cf. Sichelshmidt and Vorweg 2005, 47.

repeatedly presented to the participant, the response rate to the impulse significantly increases.

Subliminal priming is a sort of priming dependent on three principles. Firstly, the stimulus presented must be conceived subconsciously by the subject. Furthermore, the prime needs to be introduced for a very short period of time only. Additionally, in order to guarantee a subliminal perception of the stimulus, the prime needs to be masked by an utterly redundant and content-free impulse. Eventually, the experimenter is also required to test whether the test person has, despite the precautions taken, detected the prime. In case, the subject should have done so, the data needs to be eliminated and not taken into account in the evaluative part of the research.

In a **supraliminal priming** setting, the subjects are confronted with a prime while elaborating on a certain task that demands their full attention and draws their focus away from the prime involved. A typical priming experiment with a supraliminal stimulus might take the following form. Participants would be required to read a text while being occupied with a pseudo-activity, such as underlining all verbs. Having finished the activity, they would be demanded to do a completely unrelated task (e.g. evaluating a given scenario). In accordance with the pseudo-task, or the general tone of the text elaborated on, subjects might adapt their behavior to the semantic content of the supraliminal prime. Thus, reading a text about a socially engaged person might later influence participant's social conduct or tendency of mind (see 3.2 "Priming and its effects on human self-regulation", experiment 2). Comparing supraliminal and subliminal priming, one must state that for both, there exists a correlation between the size of primes presented and the extent of the priming effect. In general, the rule can be applied that: The more primes, the greater the effect with regard to sustainability and intensity. Although subliminal priming might often lead to less stronger outcomes than supraliminal priming, the former significantly reduces the risk of prime detection by the test person.

Semantic priming (indirect priming) potentially bears enormous significance for the educational context, as response rates to a target can be increased via prior presentation of semantically related primes. This phenomenon can be explained with regard to the spreading-activation theory by Collins and Loftus.¹⁹ According to them, a "prime word automatically activates its representation in the lexical network."²⁰ Thus, activating a lexical network via a semantic prime releases and triggers the capacities of the entire set of

¹⁹ Cf. Allan M. Collins and Elizabeth F. Loftus (1975): "A spreading activation theory of semantic processing." In. *Psychological Review* 822, 407-428.

²⁰ Mika Koivisto and Antti Revonsuo (2000): „Semantic priming by pictures and words in the cerebral hemispheres.“ In. *Cognitive Brain Research* 10, 91.

connections and their representations. Semantic priming, hence, facilitates the processing of words in the brain, as an activation of the lexical network occurs, which ultimately leads to a spread-over effect to prime-related entries.²¹ Nevertheless, one must admit that the activation impact increases or decreases respective of the strength of a connection between different semantic units. Due to particular parameters, the impact may significantly vary in its strength. As Prinz and Bridgeman suggest, a target is recognized faster and more reliably when target and prime originate from a shared category (e.g. the lexical chunk “parrot” primes a fast response for the target “dove”).²² Hence, the more unrelated prime and target, the less strong the semantic priming effect will be, as the threshold will not be reached as undisrupted and immediate. The target automatically will not be recognized that fast, in turn, reducing the impact of the initial prime on the lexical field. Therefore, a researcher needs to invest effort in the selection of an appropriate prime for the triggering of a particular target.

3. Priming in action: Current research and its didactic perspectives

3.1 The priming effect in advertisement

Commercials and their effect on food consumption

In human relations and everyday communication priming is an effective tool to generate an intimate relationship between two speakers. Performing an action yourself, but even more, observing someone performing an action activates mirror neurons in the “premotor and parietal cortices of human and monkey brains.”²³ According to Caroline Catmur and her scientific colleagues, this interrelation has enabled human beings not only to establish a society based on understanding, but also to develop an intricate language system, moral values and a complex scheme of legal regulations and restrictions.²⁴ Despite its overall positive impact on human interactions, the mirror effect entails some sort of manipulative power. Mirroring an agent’s conduct ultimately, albeit subliminally communicates sympathy on the side of the operator. Hence, the person re-enacting evolves vulnerable to the

²¹ Cf. Koivisto and Revonsuo 2000, 91.

²² Cf. Wolfgang Prinz and Bruce Bridgeman (eds.): „Wahrnehmung“. In: Niels Bierbaumer and Dieter Frey (eds.): Enzyklopädie der Psychologie. section C, 2. 1, 425.

²³ Caroline Catmur; Vincent Walsh and Cecilia Heyes (2007): “Sensorimotor Learning Configures the Human Mirror System.” In: Current Biology 17.17, 1527.

²⁴ Cf. Catmur et. al. 2007; 1527.

communication partner. The latter may read the performer like a mirror-getting an unique insight into his/her emotions, tendency of mind and attitude in a particular context.

Due to its prospective, the mirror effect has long left the orbit of social psychology and made its successful entry into different domains of real and business life. Marketing professionals have recognized the enormous potential of the phenomenon for the development of improved sales strategies and for the assessment of applicants in job interviews. What is even more worthwhile considering is the fact that we are all subconsciously subjected to primes when watching television. Advertisement functions as a “real-world prime[...]”²⁵ to the human subconscious, just as sensory stimuli influence our eating habits. Psychologists assume that media images may convey messages allegedly priming certain behaviors in the viewer.

In line with this stipulation, Harris, Bargh and Brownell hypothesized that “exposure to food advertisement during TV viewing may [...] contribute to obesity by triggering automatic snacking of available food.”²⁶ Obesity is a major issue not only in the US, where the study took place, but also in other industrialized countries worldwide. Based on this observation, Harris and his colleagues assumed a partial correlation between the obesity crisis in the US and media images promoting unhealthy food, irregular eating habits and displaying nutrition as fun.²⁷ In order to investigate into this potential link, the researchers conducted two experiments to demonstrate the power of food advertising on elementary school children and adults likewise. In a first study, 118 school-aged children (56 girls and 62 boys randomly assigned to a group) watched a cartoon that either contained food advertisement (experimental group), or other types of advertisement (control group). The participants also received a snack (large bowl of crackers) and were told that they could have a snack while watching the cartoon. The experimenter left the child alone and returned when the screening was finished. The participant was asked when he had last eaten something prior to snacking. Afterwards the remaining crackers were weighed by the experimenter and the amount was neatly recorded. In sum, the study verified Harris’, Bargh’s and Brownell’s initial postulation that food advertisement promoting a fun image of unhealthy nutrition, increases food consumption in young viewers. Indeed, those children, who watched the cartoon with food commercials “ate considerably more (45%)”²⁸ than those in the control group regardless of their individual properties such as weight status, gender, age, ethnicity or social background.

²⁵ Jennifer L. Harris; John A. Bargh and Kelly D. Brownell (2009): “Priming effects of television food advertisement on eating behavior.” In: *Health Psychology* 28.4, 405.

²⁶ Harris et. al. 2009, 404.

²⁷ Cf. *ibid.*, 404.

²⁸ Cf. *ibid.*, 407.

In a second study, the researchers not only assumed an equivalent priming effect of food advertisement on adults, but further speculated that the type of food commercial determines the size of the priming effect. Therefore, they distinguished two types of food commercials. Whereby advertisement emphasizing the fun factor of unhealthy food was speculated to have a negative effect on the viewer's evaluation and consumption of food, commercials promoting "nutrition benefits"²⁹ were considered to prime responsible food treatment in participants. Additionally, the research team assumed that the negative priming effect would be particularly marked for so-called "restrained eaters"³⁰ - consumers continually dieting and monitoring their weight. For an investigation, 98 university students ranging in age from 18 to 24 years (of which 39 were restrained and 53 unrestrained eaters) participated in the study. The subjects were then exposed to a comedy TV program (16 minutes in length), which included eleven food commercials in total. Harris and his colleagues randomly assigned the students to three groups with varying types of food commercials. The first version with four commercials promoted a "snacking message"³¹, whereas a second advocated for a "nutrition message"³², and the control group did comprise four "additional nonfood commercials"³³. All groups contained seven nonfood commercials. In order to assess their hunger without drawing attention to the fact that the study circled around that issue, hunger and thirst questions were included in a "PANAS"³⁴ current mood rating. Having watched the TV program, the participants were located to another room, in which they were to rate food (i.e. 1. vegetables, 2. calorie-dense and nutrient-poor items such as cookies and chocolate, 3. items with a healthy image such as multigrain tortilla chips) according to its perceived healthiness. Additionally, they were told that they could test the food and eat as much they wanted. In line with initial expectation, participants exposed to commercials with a 'snacking message' "consumed significantly more than those, who viewed the nutrition ads"³⁵, whereas the difference between the 'nutrition message' commercial and the control group was not statistically relevant. Furthermore, it could be evidenced that restrained eaters and men ate more after a screening with fun food commercials.

²⁹ Ibid., 407.

³⁰ Ibid., 408.

³¹ Ibid..

³² Ibid..

³³ Ibid..

³⁴ PANAS-scales attempt to determine the affect situation of an individual person in a given context. Subjects are asked to respond questions on their current mood, whereby a positive and a negative affectivity is indicated by certain adjectives representative of that particular mood. The test persons are to rate their current mood on a five-level scale.

³⁵ Ibid., 409.

3.1.2 The mirror effect and Cognitive Apprenticeship as didactic perspectives of priming

The experiments conducted by Harris, Bargh and Brownell served to confirm an assumed correlation between exposure to food advertisements that promote positive images of snacking and consumption behavior. Further, it could be displayed that a subconscious exposure to visual primes does massively blur our perception and evaluation of food on an analytic level and directly influences our food consumption habits. Despite this expected, albeit sobering outcome, I would like to approach some ways how one could turn the priming and mirror effect into something positive in the context of teaching a foreign language. For instance, the mirror effect could be utilized by pedagogues to actively motivate their students. Furthermore, language teachers could model learning processes for their pupils, whereby the mirror effect automatically assists in the activation of cognitive structures to promote foreign language acquisition. *Cognitive Apprenticeship*, a subtype of situated learning³⁶, is a didactic methodology that directly implements the ideas and underlying mechanisms of priming and the mirror effect. In this model the teacher functions as the initiator of an action, performing a certain behavior or articulating a particular mental scheme (e.g. teacher gives an account on his thinking during a narrative technique analysis). In detail, what the instructor does is to externalize those cognitions (e.g. the thoughts involved in the process of solving a task or strategies for coping with obstacles etc.) usually remaining unarticulated. While the pedagogue performs the action, the learners are required to carefully observe the action, which ultimately fires their mirror system and activates behavioral mechanisms of imitation and mimicry.³⁷ One could also make an attempt by extending this mainly verbally oriented technique by a kinesthetic dimension.

According to didactic theory, this would then be called “visuomotor learning”³⁸ and describes a phenomenon also valuable for an implementation into the foreign language classroom. This methodology is based on the thesis that “observing other people perform an action can facilitate our execution of the same action.”³⁹ Consequently, teachers should ensure that group and partner settings are heterogeneous with regard to the learner types and their individual skills, prior knowledge and most especially with view to the cognitive level. Coupling a perceptive and quickly learning pupil with a weaker one might activate the mirror system in the latter and contribute to a learning growth in the disadvantaged learner.

³⁶ Cf. Franz E. Weinert (ed.) (1996). *Psychologie des Lernens und der Instruktion*. In: Bierbaumer, Nils; Frey, Dieter u.a. (eds.): *Enzyklopädie der Psychologie*. section D, 1.2. Göttingen: Hogrefe, 306.

³⁷ Cf. Franz E. Weinert and Heinz Mandl (eds.) (1997). *Psychologie der Erwachsenenbildung*. In: Bierbaumer, Nils; Frey, Dieter u.a. (eds.): *Enzyklopädie der Psychologie*. section S, 1.4. Göttingen: Hogrefe, 323.

³⁸ Cf. Alison J. Wiggert; Matt Hudson; Steve P. Tipper and Paul E. Downing (2011): “Learning associations between action and perception. Effects of incompatible training in body part and special priming.” In: *Brain and Cognition* 76, 88.

³⁹ Wiggert et. al. 2011, 88.

Additionally, as a pedagogue one could consider teaching vocabularies accompanied by body movements or music.

Prior to an actual realization, though, the instructor needs to ensure that the acoustic primes are positively stored in the mental map of his/her learners. Furthermore, the pedagogue has to decide on whether to present the prime prior to the actual task, in order to replicate authentic conditions of a priming experiment, or whether the stimulus is to set positive emotions in the students. Furthermore, it is recommended to select visual and acoustic impulses that are compatible with the vocabulary that is to be learned, otherwise there will be a risk that the priming effect is going to be diminished. Most significantly, what research on the mirror effect and priming suggests is that students need language teachers that are role models not only in terms of language proficiency, but also with regard to motivation and enthusiasm for their subject. A language teacher should not neglect the immense power of praise on students irrespective their age and maturity level. Positive enhancement can be an effective tool to trigger a desired behavior in the students, whereby acknowledgement functions as a subliminal prime to an increased learning effort and motivation.

3.2 Priming and its effects on human self-regulation

In an experimental design by Gollwitzer and his fellow researchers, priming was used to evoke low self-regulation in their subjects. The scientists were striving to investigate into the degree to which their concept of the *if-then plan* is an effective tool for the enhancement of inhibition control. In sum, Gollwitzer and his colleagues tested “whether people can protect their ongoing goal pursuits from antagonistic priming effects by using if-then plans”⁴⁰, such as implementation intentions. Eventually, they postulated that implementation intentions, indeed, pose an instrument to support people in shielding off disruptive forces, which were represented by either concept-, or goal-priming effects.

For the collection of their data, the research team conducted three experiments of which I am going to take two into closer consideration, as they bear relevance for the educational context. In a first session, the subjects were required to read and study a fictitious scientific article, whose content emphasized the genetic similarity between humans and animals. The researchers additionally referred to animals, which are known for their extreme slowness (e.g. slug, tortoise, hedgehog, caterpillar, and turtle). These animals functioned as primes for a desired fast response on a target stimulus. For reasons of

⁴⁰Gollwitzer et. al 2011: “Self-regulation of priming effects on behavior.” In. Psychological Science 22.7, 902.

comparison, another group of subjects read a text fore-grounding animal exemplars of extreme speed, such as puma, cheetah, hare, horse and greyhound. Having studied the texts, the participants had to identify ('yes' or 'no' responses on a computer pad), whether the presented stimuli constituted words or not. The classification tasks included 50 words and 50 non-words. Specifically interesting about the tasks design, however, was that an implementation intention masked by a non-word ('avenda') was integrated six times in the testing session giving the participants the following instruction: "And if the nonword 'avenda' appears, then I respond especially quick!".

In line with their initial expectation, "participants in the fast prime condition responded more quickly (M=951 ms) than did participants in the slow prime condition (M=1,171 ms)".⁴¹ More significantly, though, the increased response speed did not have an impact on the correctness during the classification of words and non-words. Furthermore, it could be concluded that if-then plans positively influence reaction speed, despite a negative concept priming during and prior to the task.

In a second experiment, participants were to solve "simple but tedious arithmetic problems"⁴² on a computer screen. Before actually starting with the task, subjects had to write down a goal intention ('I will try to find as many correct solutions as possible!') and an implementation intention ('If I get distracted, then I will concentrate on the test even more!'). Then, the arithmetic task was interrupted by a "biographical memory task"⁴³. Therefore, the entire group was divided into a control and an experimental group. The control group was endowed with a text about Mother Teresa's life full of charity (pro-social goal prime condition) and the other studied the life of Margaret Thatcher (neutral goal prime condition=control group). In a modified version of the biographies they had researched, the participants then had to highlight the differences between the texts. Logically, the next step was that the subjects returned to the arithmetic concentration task, but were interrupted by an intruder, politely asking the participants to guide her/him the way to the office of the experimenter, who had just left the subjects a couple of minutes ago.

The research team indeed, detected a correlation between the pro-social goal prime condition (Mother Teresa) and the time subjects allowed distractions. Thus, priming an individual with a "pro-social goal increased disruption time"⁴⁴, but only if subjects had not yet formed an implementation intention. Consequently, Gollwitzer detected a positive

⁴¹Ibid., 903.

⁴²Ibid., 903.

⁴³Ibid..

⁴⁴Ibid., 904.

connection between having formed an implementation intention and reduction of disruption time. Thus, one can state that implementation intentions are an effective means to reduce the disruption time, despite prior pro-social priming. This finding might bear significance for students globally.

As I have stated beforehand, not only children, but also juveniles and adolescents find it increasingly hard to shield off distractions. Recent and current technical inventions that respond to our desire to communicate with other humans, as well as an increased global networking are not only competing, but also impending factors in our striving for life-long learning, intellectual development and progress. An academic book certainly appears less appealing than having a chat with a friend on *Twitter* about the latest trends in music or media. However, Gollwitzer's detection might assist in the reduction of concentration deficits and may contribute to the cementation of self-control.

3.2.1 Didactic implications of priming on goal achievement

Gollwitzer's findings might have repercussions upon the educational realm, as priming achievement goals might improve student's performance in tasks, as well as enhance their "persistence in the face of obstacles, [and promote their] resumption rates after interruptions".⁴⁵ Considering the growing number of children with self-regulative deficiencies⁴⁶ accompanied by symptoms, such as an attention deficit, hyperactivity and impulsiveness, deploying priming as a means to strengthen goal striving, could be an effective instrument against a low self-control in classrooms worldwide. Furthermore, one must regard the relatively modest costs involved, rendering an employment of the method in the classroom quite unproblematic. For instance, teachers could prepare material themselves and distribute it prior to a demanding task. The material could comprise acoustic and visual stimuli, but also subliminal semantic primes, integrated into a text the students are required to read and to compare with another text. The material should be close to a real situation describing a context in which a person faces an obstacle and manages to overcome it by using implementation intentions. The same could be conducted with visual impulses, presenting to the students pictures (e.g. a comic strip) of a character that applies an 'if-then' paradigm in the face of a disruptive force. The idea behind it is that either the story described in the text, or the comic function as a model how to cope with obstacles. As the prime needs to be masked, it shouldn't become overt that the students have to focus on

⁴⁵Ibid., 901.

⁴⁶Gawrilow and his colleagues argue that approximately 2-7 per cent of all students suffer from some sort of self-regulative deficit. This would make a total number of at least one problematic student in every class. Cf. Gawrilow et.al. 2011, 41f..

a certain moral content. Therefore, a masking prime requires integration. Masking might potentially occur through a supplemental task asking the students to get the story into the correct order or putting the comic strip into a chronological order. Thus, the attention would divert from the prime, although the subjects would still need to focus on the content.

Thinking of a real-life implementation of the findings from the second experiment, a teacher might select textual material on the basis of the prevalent mood within the classroom. In fact, a pedagogue might reflect upon his students critically. One could possibly pose questions like these: Are my students focused today? Did they just have a sports lesson and might they be exhausted? Do they need additional motivation or relaxation? In accordance with the analysis of the class, the teacher then does have the option to select textual material that corresponds with the demands of his/her pupils. An unmotivated learner group requires different input than a highly excited class. The former might get a text that focuses on a student-related topic or is especially exciting, as it touches on a theme that is usually distant from the child's reality. It would probably be also a good idea to present them with a text that invites the learner to conduct body movements. For instance, certain key words in the text might be associated with different exercises the students are to perform as soon as they scan the key word. This instruction would then also meet Gollwitzer's demand for an implementation intention as a means to regulate self-control. The latter, in contrast, might rather receive a text that emphasizes a balanced and quite atmosphere. Nevertheless, one should take care that the students are not studying the text by themselves but actually engage an internalization of the concept addressed by it. Likewise in the other setting, certain lexical chunks might be loaded with a particular action or exercise that might help the students to calm down and focus on what is happening in the classroom.

Although I can relate to Gollwitzer's research design, I do have a slight recommendation for an alteration. Instead of presenting a completed implementation intention to the subjects during the arithmetic concentration task, I would rather ask my students to coin their own formulations. This would add authenticity to the situation and would also promote student's self-determinacy and add to their overall confidence. Besides that, an individual has to train skills to reflect upon a situation with regard to its potential difficulties and obstacles. A critical view upon a task almost exclusively demands not only a diagnosis of obstacles, but also the development of strategies how to cope with them. The skill to predict and solve problems even before they actually occurred is a crucial human competence in today's world.

3.3 Explaining female jealousy after subliminal priming with attractive and unattractive faces

Priming has also been employed as an explanatory tool for human behavior grounded in evolutionary processes. Furthermore, social cognition suggests that human person judgment is easily manipulated through prior priming. Thus, subliminal activation may be implemented to reduce preoccupations in the heterogeneous classroom, for a promotion of communicative exchange and a training of cultural and social competencies in learners. Later on, I would like to return to this issue, in order to assess the possibilities and perspectives of subliminal priming for the teaching of foreign languages. Firstly, though, I would like to introduce Massar's and Buunk's research based on the stipulation that female jealousy is an intrinsically human trait ensuring "genetic survival"⁴⁷ of the race. According to them, facial attractiveness of a rival automatically and thus, subconsciously triggers female aggression. Hence, intersexual envy functions to ward off external threats and to guard an existing relationship, whose stability and maintenance is an ultimate prerequisite for sexual reproduction. This, in turn, can be related to the fact that heterosexual males tend to select a partner on grounds of facial appearance, since female attractiveness is considered an indicator of reproductive fitness, health, as well as "intelligence, performance and adjustment in children".⁴⁸ For an investigation into an alleged correlation between attractiveness and intersexual envy, the researchers employed a **subliminal priming paradigm**.

In the experiment, non-single female participants⁴⁹ only were confronted with "pre-rated photographs of attractive and unattractive female[s]"⁵⁰. For reasons of masking the actual prime the subjects received an attention-distracting, but utterly redundant task. They were instructed to identify the location of a fixation point on a computer screen (pressing a left/right key). The priming stimuli (unattractive/attractive face) were presented only 15 times of a total of 60 experimental trials. The remaining 45 stimuli were supplemented by geometrical shapes (circles, triangles and squares), so that the participants could by no means identify the actual prime. A masking picture consisting of an unrecognizable version of the authentic prime additionally prevented confounding variables. Additionally, intervals

⁴⁷Massar and Buunk 2010, 634.

⁴⁸Massar and Buunk are referring to a study by Langlois et. al. in 2000, Cf. Massar and Buunk 2010, 635.

⁴⁹In line with results from research stating that "facial attractiveness is of less importance to male intrasexual competition" than to female intrasexual competition, Massar and Buunk selected female subjects exclusively. Non-singles were selected for reasons of empathy and relatedness towards the given context. See Massar and Buunk 2010, 635.

⁵⁰Massar and Buunk 2010, 635.

between the stimuli altered randomly from two to seven seconds, in order to eliminate subject's speculation on the organization of the primes.

Having been subliminally primed with the attractive and unattractive faces, participants were asked to read an envy-evoking scenario (scenario=couple at a party, a foreign woman approaching the partner and flirting with him). They were also instructed to visualize the scene and make an attempt to take on the perspective of the female protagonist. Then they were asked how jealous they would be if this situation had occurred to them personally. Their envy level was rated on a scale ranging from 'not jealous at all' (0) to 'extremely jealous' (100). The jealousy slider was supplemented by a "multiple adjective rating scale"⁵¹ that comprised words to describe the tendency of the emotion evoked through the scenario. On a five-point-scale (from 0=not at all to =very strong) the subjects had to "rate how suspicious, betrayed, worried, distrustful, jealous, rejected, [...]" they would feel.

Indeed, in line with Massar's and Bruunk's initial expectation, women reported significantly more jealousy after exposure to an attractive rival. This could not only be evidenced by the jealousy slider rating, but also with regard to the rated adjectives indicating that participants felt comparatively more suspicious, jealous or worried than those, who were not exposed to an attractive female rival beforehand. Hence, Massar and Buunk found statistically relevant evidence for their thesis that "facial attractiveness [is not only] an important mate selection criterion for men"⁵², but also a feature women subconsciously process and react upon with rivalry and sexual envy.

3.3.1 Didactic perspectives of subliminal priming

For the teaching of foreign languages Massar's and Buunk's findings might be utilized to train pupil's cultural competence, which is an important precondition for an individual's success in an increasingly intricate globalized world. Further, it might increase their awareness for the values of a democratic and tolerant and liberal-minded global society. The ability to change perspective is a crucial requirement addressed in the *Berlin framework curriculum for English*.⁵³ The reading of literature therein is rendered an instrument to enhance student's empathy and the ability to comprehend a protagonist. However, subliminal priming can actively improve student's skill to better relate to and reflect on

⁵¹ Ibid..

⁵² Ibid., 636.

⁵³ Cf. Senatsverwaltung für Bildung, Jugend und Sport Berlin (Hrsg.): Der Berliner Rahmenlehrplan für Englisch in der Sekundarstufe II. http://www.berlin.de/imperia/md/content/sen-bildung/unterricht/lehrplaene/sek2_englisch.pdf?start&ts=1283429333&file=sek2_englisch.pdf (accessed on 04/15/2012).

fictional characters and settings. Additionally, strengthening this feature is of major importance in a multi-ethnic and highly heterogeneous classroom. Approaching people of unfamiliar ethnic, linguistic and cultural backgrounds without preoccupation and distrust thus, may not only create a healthier society, but may also alleviate tensions in the classroom. Also cyber mobbing, an issue that has gained broad interest throughout recent years and which has also caused researchers of the FU Berlin to initiate a program that trains adolescent's skill to take on the perspective of someone else, in order to not only abolish, but even prevent bullying from developing, can possibly be tackled by subliminal priming with positive visuals on alterity, variety of the human race and ethnic treasures. For instance, in teaching "Landeskunde" topics, one can familiarize learners with a foreign country-its cultural diversity and historical richness.

4. Conclusion

In accordance with my initial stipulation that priming might be an appropriate means to support the acquisition of foreign languages, I introduced three experiments in total to illustrate the versatility and wide range of applications of priming not only from a theoretical angle, but also from a practical point of view.

Firstly, I have shown that every human being is influenced and even deliberately manipulated by primed commercials. In line with these findings, I have attempted to emphasize the didactic potential the priming effect might exert on learners. Therein, I particularly advocated for situated learning (Cognitive Apprenticeship) as a methodology to benefit from the priming effect in the foreign language classroom. Cognitive Apprenticeship additionally is regarded as a training tool for meta-cognitive strategies, eventually leading to an increased self-control and stable inhibition rate.⁵⁴ Furthermore, based on research's findings, I would like to address the issue that language instructors necessarily need to exert a positive attitude towards the language taught. This has to do with the fact that the teacher may function as a subliminal prime to his/her student's motivation (e.g. via the use of voice, intonation, attitude etc.). Thus, a pedagogue bears enormous responsibility in terms of the establishment of a sustained attitude towards that particular language and even more fatally languages in general. Despite the manipulative connotation priming takes due to its deployment in advertisement, the fact that priming may influence the direction of someone's perception can be positively utilized in the classroom. Having activated mental schemes, lexical fields, ideas or context expectations, one might not only promote to the comprehension process, but also add to the creation of a more stimulating work environment. Secondly, I have outlined experiments that were conducted by Gollwitzer and his colleagues on priming and its ultimate effects on human self-regulation. Thereby, it could be illustrated that social skills and cultural competencies could become subject to training in class. This would eventually lead to a more autonomous and self-determined teacher, as pedagogues would be enabled to develop strategies for the enhancement of their student's self-control and endurance, as well as for the abolition of attention deficits themselves. On account of, this might even prevent shortages from arising, as the teacher's support would be immediate, context- and learner-oriented, as well as universal. Eventually, I reiterated studies seeking to explain female jealousy after subliminal priming with attractive and unattractive faces. Referring from the studies conducted by Buunk and Massar, I stated that

⁵⁴ Cf. Weinert 2007, 323.

cultural awareness and competence may be supported in the foreign language classroom via subliminal priming.

In sum, evidence from priming research confirms that an associative activation (e.g. pre-reading/watching/listening activities, such as reading a text's headline prior to reading the text and coining expectations and assumptions with regard to the content of the ensuing text) is not only a motivational instrument in the classroom, but also a fundamental necessity, as it warms up the student's knowledge about certain "conceptual links."⁵⁵ Furthermore, contextual priming might be a useful tool for text interpretations. Hermeneutic tasks on literary texts often pose a challenge to many students lacking the imaginative power and willingness to fill the gaps of a text with their own thoughts, experiences and beliefs. Thus, conducting a contextual activation prior to an interpretation task might increase student's participation and enrich the discussion with a variety of opinions. Also with regard to the training of skim and scan reading techniques, priming might open up new possibilities on the basis of an accelerated word recognition process. Exposing students to a semantically or associated lexical item prior to reading a text might help learners to not only increase their skim and scan reading speed (e.g. enhanced identification of key words), but also to diminish the overall error rate. Additionally, Manfred Spitzer summarizes that the color red actually supports the memory capacity, increases acquisition speed and significantly diminishes the error rate.⁵⁶ The differentiation between red and blue also displayed the enormous motivational significance of colors. Whereas red primed avoidance, blue was found to activate some sort of approximation to an activity, task or object. In turn, Spitzer could find evidence that blue was responsible for fostering participant's creativity. For the future of teaching these findings might be of great significance, as they could evolve a trigger for an increasingly intelligent and reasonable design and treatment of teaching materials and examination instructions.

However, as far as I am concerned, my assumptions on the practical value of priming for the teaching of English as a foreign language still require an academic foundation and data to prove an alleged relation between priming and an enhanced acquisition process. Conducting empirical studies on the didactic implications of priming, one might face the challenge of masking the prime, in order to reduce and eliminate confounding variables. Further, one might struggle with terminological boundaries, such as between priming, classical conditioning, model learning and the mirror effect, as the transition between these phenomena is quite fluid.

⁵⁵ Günter Clauß (ed.) (1995): *Fachlexikon ABC Psychologie. Das Wörterbuch der Psychologie.* Frankfurt am Main: Verlag Harry Deutsch Thun, 358. Translation C.K..

⁵⁶ Cf. Manfred Spitzer (2009): „Die Farben des Denkens.“ In: *Nervenheilkunde* 28.5, 321.

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