emotion*Sync*®, EMDR, REM Sleep, NLP and the Horizontal Eight

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Abstract

Introduction: *Therapy methods using eye movements might be considered unusual but are becoming more and more scientifically accepted. The underlying effect mechanisms are still largely unknown.*

Objectives: *The objective of this article is to review what phenomena occur during REM sleep and how knowing this can be used to make therapies using eye movements more effective.*

Methods: *Firstly, a relatively new method using eye movements, emotionSync®, is introduced and described. Then, we provide a review of the literature about REM sleep. emotionSync® is compared to concepts from kinesiology, NLP and the well-established Eye Movement Desensitization and Reprocessing (EMDR).*

Results: *emotionSync® uses concepts that are successfully used in kinesiology and have a theoretical foundation in NLP – loop shaped movements, hence the horizontal eight – which EMDR typically does not use. Loop shaped movements are supported by studies on REM sleep. Regarding the temporal dynamics emotionSync® emphasizes high speed and acceleration while EMDR nowadays allows for much slower movements.*

Conclusions: *This study shows similarities and differences between emotionSync® and EMDR. Empirical studies are needed to compare the effectiveness and efficacy of emotionSync® and EMDR.*

Keywords: emotionSync®, EMDR, NLP, kinesiology, trauma therapy, PTSD, REM sleep, eye movements, eye accessing cues

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Introduction

Therapy methods using eye movements might be considered unusual (Hase, Leutner, Tumani & Hofmann, 2013) but are scientifically recognized and accepted by a number of international institutions (World Health Organization, 2013; National Collaborating Centre, 2005; Flatten et al., 2011; Wissenschaftlicher Beirat Psychotherapie, 2006, e.g.), especially in cases of trauma therapy, for example, the treatment of Posttraumatic Stress Disorder. Posttraumatic Stress Disorder is a psychological disorder that can develop after exposure to traumatic events, either by witnessing them or experiencing them oneself (traffic collisions, warfare, sexual assault and much more) (American Psychiatric Association, 2013).

Here, a new version of the emotion*Sync*® method, eye*Sync*, is introduced and described. A link between eye movements and memory processing is established via REM sleep which is the probable reason for the success of the use of eye movements in therapies.

emotion*Sync*® (Hanisch, 2015; Hanisch & Wilimzig, 2017; Wenger, 2017) is a group of therapeutical methods based on various perceptual channels and systems. They include concepts of scientifically accepted and established therapies such as behavioral therapy and especially cognitive behavioral therapy. emotion*Sync*® is intended to be based on neuroscientific knowledge, especially knowledge about electric processing of information in the brain, and to be further developed and continuously revised.

emotion*Sync*® is developed to treat a variety of psychological problems and disorders: traumata, Posttraumatic Stress Disorder, dysfunctional cognitive thoughts (also called "beliefs" in NLP – generalizations about how the world works), phobias, just to name a few. After describing how one of the emotion*Sync*® methods, the eye*Sync*, works, established and scientifically recognized therapies using these concepts are described and compared to emotion*Sync*®.

An emotion*Sync*® method: eyeSync

eye*Sync* is the emotion*Sync*® method that works with eye movements. One of the bases of emotion*Sync*® is working with accelerating movements. Acceleration and high speed mean more energy. Energy means more neural activity and more conscious attention as one can read in every textbook in psychology, medicines and neuroscience.

With eye*Sync*, the patient is put into a state in which he psychologically, thus virtually, feels as if he were in a stressful situation. This can be triggered by a sentence describing his stressful condition, a picture, the memory of a scent, sound etc. Part of the therapeutic process is to identify and crystalize such a trigger.

The therapist stands in front of the patient, holds his own finger (usually the index finger) before the patient's eyes and instructs him to follow the finger with his eyes. The therapist moves his finger in the shape of a horizontal eight. The radius may be large at first depending on the arm length of the therapist. The therapist makes sure that the patient really follows the finger with his eyes. If not, the patient is immediately instructed "follow my finger, always follow my finger". Intermittently the therapist can use other movements of his arm (and thus the eyes of the patient) to imitate other eye movements (e.g. horizontal, vertical, oblique ones). The basic movement is the horizontal one, though.

The therapist can support the work by stimulating the auditory channel – e.g. through hypnotalk or with key words used during the patient's conflict or with basic sounds (this is one reason why it is so important to find a trigger – it can be used here).

After several repetitions of the horizontal eight, the therapist increases the speed. The eight can become smaller here. The main point is that the speed increases. It is important here that the patient still follows the finger.

When the speed is at its maximum, the therapist stops abruptly and startles the patient – usually he is in a trance-like state at this point – using an impulse. Such an impulse can be for example a careful finger bump on the patient's forehead (not painfully of course!).

The intervention is finished with a virtual positive picture to replace the previous negative thoughts. E.g. if the patient has spider phobia the therapist might say in a calm, quiet voice: "And now imagine you are standing in front of the spider, you are looking at it, you are not experiencing any fear, you look at it quietly and you know it does not do you any harm..."

Those are the basics of therapy according to eye*Sync*. Hanisch & Wilimzig (2017) provide data that support evidence for the effectivity of eye*Sync*.

Neuroscientific basis: REM sleep

Using eye movements, especially in therapies of traumas and Posttraumatic Stress Disorder, is not new.

However, no approach could sufficiently explain why and how eye movements help when overcoming traumata. One hypothesis states that this is connected to the dynamics of eye movements in certain periods when sleeping. These periods are named after the eye movements occurring, i.e. rapid eye movements (REM) – REM sleep. However, it is not entirely clear

what effects REMs have. There is some empirical evidence but no explanatory models. How eye movements interact with solving traumata is unknown – except for the vague and unproven idea that there could be a connection (Stickgold (2002) proposes a complicated model of memory that has not yet been tested, although he suggests several settings for this). Here we suggest how the effectiveness of eye*Sync* may be derived from neuroscientific knowledge about eye movements.

REM sleep – basics

Some aspects about REM sleep have become in fact (almost) common knowledge. REM sleep constitutes about 20-25% of night sleep in adults, on average about 90 minutes spread out in intervals over the night. REM sleep is characterized by eye movements which gave its name, coupled with simultaneous complete muscle relaxation (paralysis) in the rest of the body.

REM sleep – function

REM sleep is – especially in common knowledge – associated with dreaming. If one wakes up subjects during REM sleep, about 80% report dreams (Solms, 1997). Dreams may also occur during non-REM sleep. During REM sleep so-called lucid dreams, dreams during which you are aware you are dreaming, are more frequent (LaBerge, 1992). They are also more convincing, i.e. more similar to states of wakefulness and contain more intuitive topics (Hobson, Pace-Schott, & Stickgold, 2000). Research on consciousness is highly interested in the topics of dreaming during REM sleep (Hobson et al., 2000). On the whole, there is disagreement about how closely dreaming and REM sleep are connected (Hobson et al., 2000, Jouvet, 1999).

One focus of research on REM sleep is the influence of REM sleep on learning, i.e. the consolidation of learning contents. There are several approaches to this and different models of memory (e.g. Schacter & Tulving, 1994; Squire, 1992). Memory can be explicit and implicit. The explicit memory is represented by knowledge and it is declarative. It is relatively rational and can be described using words. "Germany is part of Europe" is a classic example for declarative memory.

Implicit memory is the opposite. Emotional memory often is implicit. It is especially of interest when looking at fear conditioning. In episodic memory, memory for situations one has been in, emotions can be remembered consciously. Procedural memory, as opposite to declarative knowledge, is implicit as well. Procedural memory contains everything that is used automatically, without thinking and words, or that "simply works". Good examples include riding a bicycle, dancing, driving a car etc. You typically remember how you learned driving a car. It is a good example how declarative knowledge is acquired. In the beginning you word out every step ("now the traffic light turned red, I have to step on the brake pedal, decelerate slowly, stop at the right place..." – even more complicated if you are driving a stick as it is common in Germany). Over time the knowledge becomes completely implicit and procedural – nobody consciously goes through the steps, one simply "does" it.

REM and non-REM sleep appear to have opposite functions for implicit and explicit memory. This is usually tested by depriving subjects of REM sleep through waking them up every time they go into REM sleep. This is possible using electroencephalography (EEG) and electromyography (EMG). EEG records the electric brain activity, EMG records the electric muscle activity. This electricity allows to recognize REM phases and to wake up subjects accordingly.

Non-REM sleep appears to improve declarative memory (Marshall, Helgadóttir, Mölle, & Born, 2006), but not procedural, implicit memory (Tucker, Hirota, Wamsley, Lau, Chaklader, & Fishbein, 2006). REM sleep does not impair declarative memory, though, except maybe for memorizing highly complex declarative stories (Rasch & Born, 2004).

On the other side, REM sleep is important for consolidation of implicit, emotional and procedural memory (e.g. Rasch & Born, 2004). If you try to suppress certain (unpleasant) thoughts, REM sleep is contra-productive (Rasch & Born, 2004). Implicitly, emotional memory is reinforced though REM sleep. This fits with results from patients suffering from depression. Depressive patients suffer from negative thoughts. Symptoms of depression (lack of appetite, lack of interest in sexual intercourse, low levels of aggression, lack of interest in activities that provide joy ("pleasure seeking")) are alleviated through REM sleep deprivation (Ellman, Spielman, Luck, Steiner, & Halperin, 1991). In addition, patients suffering from depression have an impaired REM sleep rhythm. The so-called REM latency, the period between falling to sleep and the first REM phase, becomes shorter, REM sleep thus starts earlier (Giles, Kupfer, Rush, & Roffwarg, 1998; Palagini, Baglioni, Ciapparelli, Gemignani, & Riemann, 2013). In addition, patients suffering from depression have longer REM phase and more REMs per

phase (Palagini et al., 2013). Actually, effective antidepressants suppress REM sleep (Tribl, Wetter, & Schredl, 2013; Mikoteit & Holsboer-Trachsler, 2013).

In summary, regarding memorizing numbers, data, facts (declarative), non-REM sleep is important. Regarding consolidating emotional, implicit, usually unconscious memory, REM sleep is helpful (or painful).

Note: If and how contents of dreams and contents of learning are coupled, is not known yet.

Dynamics of REMs

REMs are called rapid – but actually the opposite is true. Usually they are *slower* then eye movements during wakefulness. The difference is considerably large – the majority of REMs have velocities of <50°/second, while during wakefulness most of the eye movements have velocities of 250-1000°/second (Steriade & McCarley, 2005; Fuchs & Ron, 1968).

Many imagine REMs as going from left to right and back. The largest amount of REM is rather loop-shaped. Actually, Steriade and McCarley (2005) claim that the largest difference between REMs and wakeful eye movements is that REMs are mostly "loops", i.e. "loop-shaped" going back to their point of origin. These looks are surprisingly regular, occur about 5-7 times per minute and last on average 2.5 seconds. During wakefulness these are rather rare or non-existent even if no object is shown (Bon, Corazza, & Inchingolo, 1980; Steriade & McCarley, 2005).

Connection between eye*Sync* and REM

What is eye*Sync* about? It is about solving traumata and finding release from unpleasant cognitions and emotions. Of course, these can be typically formulated declaratively, for example, with the sentence "I have been raped". But this therapy is not about the rational component of what has happened. It's about emotions, the implicit memory, which influences our thoughts, leading to panic and flashbacks. Here we speak about the level of REM sleep and eye movements for memory (to make this clear: in general, for non-REM sleep that supports purely declarative memory eye movements are (mostly) irrelevant. This may be a bit of an oversimplification but for the sake of the argument let's assume it is true).

eye*Sync* picks up the dynamic that is typical for REMs: loops returning to baseline. The speed is slow at first and then it is accelerated and accelerated – until the maximum is reached. At this point in time no further increase in energy is possible anymore. A good analogy is a "short-circuit" known to any electrician (see Hanisch & Wilimzig, 2017). Stimulus confrontation therapies work on the same principle. In flooding, the negative energy is increased and increased until it simply cannot become stronger – and so, it returns to baseline.

Note: in the beginning, it was mentioned that movements other than the horizontal eight can be used as well. That is correct and not a contradiction to the concepts here. But movements that are specific to REM sleep help to establish links to processes of implicit memory. These are basically triggered through slow REM-like eye movements and then through the acceleration deleted or at least decoupled from the strong emotional component.

In summary: slow REMs strengthen implicit, emotional, subconscious memory, while increasing their speed helps deleting this type of memory.

To make this clear: the declarative memory is not deleted. The patient still knows what has happened to him. That will stay this way unless amnesia occurs. But the links to the excruciating emotions and other implicit contents of memory don't work anymore.

To get a complete picture and provide further support: REM sleep supports creativity. Directly after REM sleep or wakening from REM sleep subjects perform better in tasks that require creative thinking (Rasch & Born, 2013). Sleep in general is helpful for creativity (Wagner, Gais, Haider, Verleger, & Born 2004), but the effect is stronger for REM sleep than for non-REM sleep (Cai, Mednick, Harrison, Kanady, & Mednick, 2009). Directly after an intervention with eye*Sync* the opposite is true. Usually patients are in a trance-like state and cannot think constructively or creatively. This is a further indication that eye*Sync* triggers processes opposite to the implicit memory and creativity supporting REM sleep as the effects of the intervention are the opposite.

Comparison with other therapy methods

NLP and kinesiology

The horizontal eight that eye*Sync* likes to use is known in various contexts reaching from scientific to symbolic and esoteric:

- In Mathematics the symbol means infinity.
- The symbol marks an infinitely distant point in space (e.g. in the distance setting of a camera).
- Further, figurative and esoteric meanings:
    - wholeness (in Tarot) (Reményi, 2013);
    - long stability (in this meaning the

symbol is used in the flag of the Métis. The Métis are an ethnic group in Canada, whose ancestors were European fur traders and women of Indian lineage) (Andersen, 2014);

- a logical paradox or a vicious circle (Doniger O'Flaherty, 1986).

The horizontal eight is also used in kinesiology. Kinesiology assumes that, through the horizontal eight, both hemispheres are activated and synchronized. As a result, this leads to relaxation of the eyes and aids seeing, writing and comprehension of reading and symbols.

The horizontal eight (as an eye or arm movement) is used in the therapy of dyslexia and reading and writing disability as well as Attention-Deficit Hyperactivity Disorder (ADHD) (e.g. Dennison & Dennison, 2010). Dyslexic children often have difficulties with cross-over movements and involve primarily one half of the brain – one hemisphere – respectively in reading and writing. In normal development handiness develops and the child starts crossing over movements (e.g. grasping with the right hand into the left half of the visual field). Training with the horizontal eight through eye movements, arm movements and drawing supports crossing over movements in dyslexic children and contributes to alleviation of their symptoms.

At the level of eye movements that are important for the horizontal eight, neural processing of visual input actually crosses physiology to a certain degree. The left half of the input (of the visual field) is processed in the right hemisphere or the brain and vice versa. Since both eyes perceive part of the other half of the visual field respectively, part of the neural processing crosses into the other hemisphere while part of it stays in the same (e.g. Birbaumer & Schmidt, 2006). This complexity shows that the matter of crossing hemispheres is a rather complicated process the brain has to learn how to deal with.

Neuro-linguistic programming (NLP) also picks up the concept of the horizontal eight and assigns different perceptual channels and different memory processes to different eye movement directions of the horizontal eight.

This theory of eye movements (eye accessing cues) is one of the most famous formats within NLP – and it is also one of the most rejected formats (Heap, 1989; Keller & Revenstorf, 1996; Thomason, Arbuckle, & Cady, 1980; Francesconi & Francesconi, 1984; Coe & Scharcoff, 1985; Wiseman, Watt, ten Brinke, Porter, Couper, & Rankin, 2012). Despite being so rejected by a broad community, there actually is a lot of empirical evidence supporting at least part of the claims (Kinsbourne, 1972, Kocel, Galin, Ornstein & Merrin, 1972; Galin & Ornstein, 1974).

This theory is based on observations by one of the founding fathers of psychology, William James, and one of the founding fathers of hypnotherapy, Milton Erickson. Bandler and Grinder (e.g. 1979; Grinder, DeLozier and Bandler, 1977) refined these observations and assigned the following direction to the respective processes:

> Eyes Up and Left: Non-dominant hemisphere visualization - i.e., remembered imagery.
>
> Eyes Up and Right: Dominant hemisphere visualization - i.e., constructed imagery and visual fantasy.
>
> Eyes Lateral Left: Non-dominant hemisphere auditory processing - i.e., remembered sounds, words, and "tape loops" and tonal discrimination.
>
> Eyes Lateral Right: Dominant hemisphere auditory processing - i.e., constructed sounds and words.
>
> Eyes Down and Left: Internal dialogue, or inner self-talk.
>
> Eyes Down and Right: Feelings, both tactile and visceral (Dilts, 2017, no page number).

Wilimzig and Nielsen (2017) analyzed this assignment of eye positions to representational systems from a neuroscientific point of view. They found a rough though not perfect analogy between NLP's claims and the location of neural processing of the different representational systems in the brain. They concluded that further research is needed to strengthen this connection. If evidence confirms these connections, eye*Sync* stimulation would go through all representational channels and all their neural representations during moving the eyes which would stimulate all representations of the problem in the brain in all representational channels. It would be an interesting aspect for NLP that its theory of representational channel and eye accessing cues plays a practical role in healing psychological traumas and other psychological disorders.

The twelve positions of the eyes considered in NLP are also important when considering which muscles realize eye movements on a physiological level and when studying which muscles are involved in achieving each position of the eye. According to

Listing's law all these positions (strongly simplified) can be achieved through rotations of the eye within one plane (e.g. Steffen & Kaufmann, 2012).

eye*Sync* versus EMDR

Eye movement desensitization and reprocessing (EMDR) is basically the "mother" of all therapies involving eye movements and developed by Francine Shapiro. She discovered the principle during a "walk in the park" when she noticed that her eyes were making spontaneous saccadic bursts to the upper right when she was thinking of disturbing thoughts (Shapiro, 1989). She reproduced these saccades in her patients instructing them to shift their gaze back and forth across the midline or contralaterally with the guide of fingers (Stickgold, 2002). Nowadays the effectiveness of EMDR is supported by a lot of studies (e.g. Schnyder & Cloitre, 2015; Greenwald, 1993, 1999; Greyber, Dulmus, & Cristalli, 2012; Power, McGoldrick, Brown, Buchanan, Sharp, Swanson, & Karatzias, 2002) on a psychological as well as physiological level (Sack, Hofmann, Wizelman, & Lempa, 2008) and considered as effective as exposure therapy (Van Etten & Taylor, 1998; Bradley, Greene, Russ, Dutra, & Westen, 2005; Seidler & Wagner, 2006). While some still criticize EMDR studies and consider them controversial due to the quality of evidence (Lee & Cuijpers, 2013; Bisson, Roberts, Andrew, Cooper, & Lewis, 2013), contradictory findings (Devilly, 2002), researcher bias (Bisson et al., 2013), and dropout rates (Bisson et al., 2013), different international guidelines recommend its use in PTSD (World Health Organization, 2013; National Collaborating Centre, 1015; Flatten et al., 2011; Wissenschaftlicher Beirat Psychotherapie, 2006, e. g).

The first difference between eye*Sync* and EMDR is that eye*Sync* emphasizes the role of the horizontal eight. As we have seen, the horizontal eight is of interest for different fields including NLP and kinesiology. Most importantly, loops are the basic movements of REM sleep, eye*Sync* thus picks up the spatial dynamics of typical REM sleep. It has long been suggested that the success of eye movement related psychotherapies has to do with processes typically occurring during REM sleep although there is no evidence for a detailed model of this (for an attempt of a model see Stickgold (2002) who proposes a detailed model of cortical integration of traumatic memories into general networks). It could be that the more similar the therapy related eye movements to REM movements, the easier it is to stimulate the memory processes responsible for memory consolidation during REM sleep.

It is important to notice, however, that eye*Sync* is not restricted to the horizontal eight but may use other movements as well. EMDR does not emphasize the complete horizontal eight but focusses on crossing the midline. No study so far has directly compared the horizontal eight with other directions of movements. Empirical studies are needed to compare different types of movements. In this context, it is important to realize that EMDR has shown that not even *eye* movements are needed but EMDR processes work with bilateral tones and bilateral tapping as well (Shapiro, 1995, 1999). While there are plausible suggestions for explanations (via REM sleep) for eye movements, the effect for other perceptual channels opens up a whole new bunch of questions. This would suggest that a more basic concept of bilateral processing independent of the perceptual channels is involved in generating the effectiveness of these types of therapy (and possibly in guiding REM sleep movements). The shape of REM movement could then be a consequence of these processes.

The second difference is speed or rather acceleration. eye*Sync*, or rather emotion*Sync*® in general, emphasizes the importance of energy – in this case, speed and acceleration (although slow movements are possible and used as well) (see also Wenger, 2017). This is consistent with exposure therapy – the energy is increased until the maximum is reached and it breaks down during exposure, especially flooding (in vitro) and implosion (in vivo), the panic can only increase up to a certain level; see Neudeck & Wittchen (2005)). It should be noted, however, that a number of current theories postulate that the processes involved in eye movement therapies are different from those involved in exposure therapy (Lee & Cuijpers, 2013). One interesting line of explanations suggests an orienting response (Barrowcliff, Gray, MacCulloch, Freeman, & MacCulloch, 2003; Sack, Lempa, Steinmetz, Lamprecht, & Hoffmann, 2008; Schubert, Lee, & Drummond, 2011). Although some physiological changes through eye movements are not consistent with an orienting response such as an increase in respiration (Schubert et al., 2011), others are, namely skin conductance and heart rate (Sack et al., 2008; Schubert et al., 2011). Please note that orienting responses would also be triggered and reinforced by fast moving stimuli!

EMDR on the other hand initially instructed rather fast movements – four sweeps per second (Welch, 1996). Nowadays, such probably saccadic movements are replaced with slow, smooth, pursuit movements (e.g. Marcus, Marquis, & Sakai, 1997; Rothbaum, 1997;

Scheck, Schaeffer, & Gillette, 1998). Sack, Zehl, Otti, Lahmann, Henningsen, Kruse, & Stingl (2016) went one step further and contrasted eye movements with mere fixation on a non-moving hand. They were not able to find a significant advantage of eye movements. Again, here more empirical evidence is needed to investigates the role of speed for the effectiveness of eye movement therapy.

Discussion

eye*Sync* is a new version of therapies supported by eye movements. It emphasizes the role of speed and it uses a horizontal eight as basic spatial dynamics. The horizontal eight is common in kinesiology. It's complexity in neural processing and the results in kinesiologic trainings show the importance of these cross-over movements. It seems to stimulate coordination of movement and thought as well as brain processes. Coordination and "the right perspective" are important in successful trauma processing as well.

The usage of the horizontal eight is further justified by NLP concepts. According to NLP, a horizontal eight stimulates all representational and memory systems. Traumas are often if not always stored multidimensionally involving different modalities. For overcoming and defeating trauma, it is important to work with all modalities even if one is the dominant one.

eye*Sync* is compared to EMDR. EMDR has similar yet also different concepts and other emphases. The basic movement is not the horizontal eight but midline crossings. Speed plays a different role and might even be reduced to zero (since this result is based on a non-significance one should be careful in interpreting it and not take it for granted). There still is a lot of controversy regarding the explanation of efficacy for therapies like eye*Sync* and EMDR.

Conclusion

Since EMDR has a longer history, in terms of an evidence-based method, much more data exist for EMDR than for eye*Sync*. Although initial data (Hanisch & Wilimzig, 2017) provide evidence for the effectiveness and efficacy of eye*Sync*, more data and systematic comparisons with other therapies such as EMDR are needed from empirical studies.

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