

# **Impact of PSP on Heart Rate and Heart Rate Variability: A Case Study**

## **Abstract:**

The study investigated the impact of Profound Somnambulism Protocol (PSP) on heart rate and heart rate variability (HRV). Further it was compared with a different method (progressive muscle relaxation and a stair case deepener) generally used in hypnotherapy; Induced relaxation and deepening through PSP decreased the heart rate by 11% with the other method the heart rate flocculated (both ways) during the session. HRV increased by 45% during PSP and stayed high (by 15%) after the session. HRV decreased during the other method. HRV dipped by as low as 44% during the session. The positive impact of PSP on autonomic nervous with decrease in HR and increase in HRV makes it a valuable to for preventing and managing chronic and acute illnesses caused by adverse effects of stress and lack of relaxation. Further monitoring HRV and HR during a session gives a concrete biofeedback on subjects depth and relaxation, which can be used to measure trance depth and also maintain deeper trance states by comparing effects of two different methods on the subject's nervous system.

## **Introduction:**

Nervous system is impacted by lifestyle choices such as poor sleep, adverse diet, emotional trauma or stress and so on. To address the adverse effect of stress on the nervous system, relaxation is necessary and is marked by a decreased sympathetic tone and an increase in parasympathetic activity. Imbalance in autonomic nervous system also results in increased heart rate (HR) and reduced heart rate variability

(HRV<sup>1</sup>). Many other changes also happen (e.g. increase blood pressure, triggering of stress hormones etc) and a consistent imbalance eventually results in some chronic disease<sup>(1-5)</sup>

Hypnosis is defined as bypass of critical faculty and a state of heightened awareness and focus. The day to day conscious thoughts fades away and the subject is under the influence of suggestions from hypnotist/hypnotherapist. Even though many hypnotist's has their own version of depth of trance (hypnosis), all of them would agree that a sufficient depth is necessary for suggestions to be accepted by the subconscious/unconscious mind. Even though we can work in light level of trance, Somnambulistic trance is considered as the working level for hypnosis. Somnambulistic refers to that particular depth of trance, where the subject at times resembles a sleepwalker.

Hypnotists use various methods to induce and deepen trance broadly referred to as inductions and deepeners to take the subject to the desired depth, either for therapeutic purpose or entertainment.

They rely on various indicators of trance (E.g. eye catalepsy, breathing, eye roll etc.) and tests (catalepsy, amnesia etc.) to get a measure depth. But these indicators and tests can vary from person to person and even though they give us a good indication of trance, there is always a debate between the professionals on what should be the absolute benchmark to measure depth.

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<sup>1</sup> HRV is a physiological phenomenon denoting the variation in the time interval between heartbeats (also called R-R interval). It is important to understand this concept because a low HRV, i.e., less variability in the heart beats indicates that the body is under stress due to physiological reasons, exercise, or any other external stressor and high HRV denotes better emotional regulation.

Contrary to what most of us think, relaxation is not a must for hypnotic depth. Relaxation most of the time it is a byproduct of hypnosis which is coupled with decrease in the heart rate and increase in heart rate variability, which can be monitored to get a physiological indication of depth.

Monitoring relaxation of nervous system at a physiological level (HR and HRV) is required to 1) study the impact of hypnosis on these parameters and adjust the techniques based on bio feedback completely unique to that individual 2) monitor trance progression in a therapy session, which would again enable the therapist to get a bio-feedback and choose the techniques/methods to induce, deepen or maintain the trance state.

**This study aimed to:**

1. Investigate the effects of PSP on physiology, i.e. autonomic nervous system as measured by two simple parameters HR and HRV(SDNN) and use them to evaluate trance progression and depth by comparing the parameters with exact time frames where a technique was used (Pre-induction, Induction, Deepener, Intervention, Awakening)
2. Understand how the key physiology parameters (HR, HRV) change during two different styles and its implications for hypnotherapists (a)

Note- Both the styles have their own pros and cons, but it is always desirable to maintain the somnambulistic state irrespective of what method is being used.

## **Methods:**

### **A) Session 1-PSP (with induction, deepener and guided imagery)**

The individual was asked to relax with eyes closed for five minutes (in silence) followed by induction, short progressive muscle relaxation, deepener and Positive suggestions. After the hypnosis script the individual was again asked to relax with eyes closed for five minutes (in silence).

HRV and HR before hypnosis, during hypnosis, and post hypnosis (5 minutes after the end of hypnosis) were recorded with an HRV device (Emwave Pro) and analyzed using Kubios HRV Premium software.

Exact time frames of use of induction, deepener and script were noted and HRV and HR parameters were observed during those time frames.

### **B) Session 2-( including induction, deepener and an intervention other method)**

The individual was taken through induction and deepener but was followed by intervention (healing script).

HRV and HR again before induction, during hypnosis, and post hypnosis (3 minutes after the awakening) were recorded with an HRV device (Emwave Pro) and analyzed using Kubios HRV Premium software.

## Findings:

### Session 1

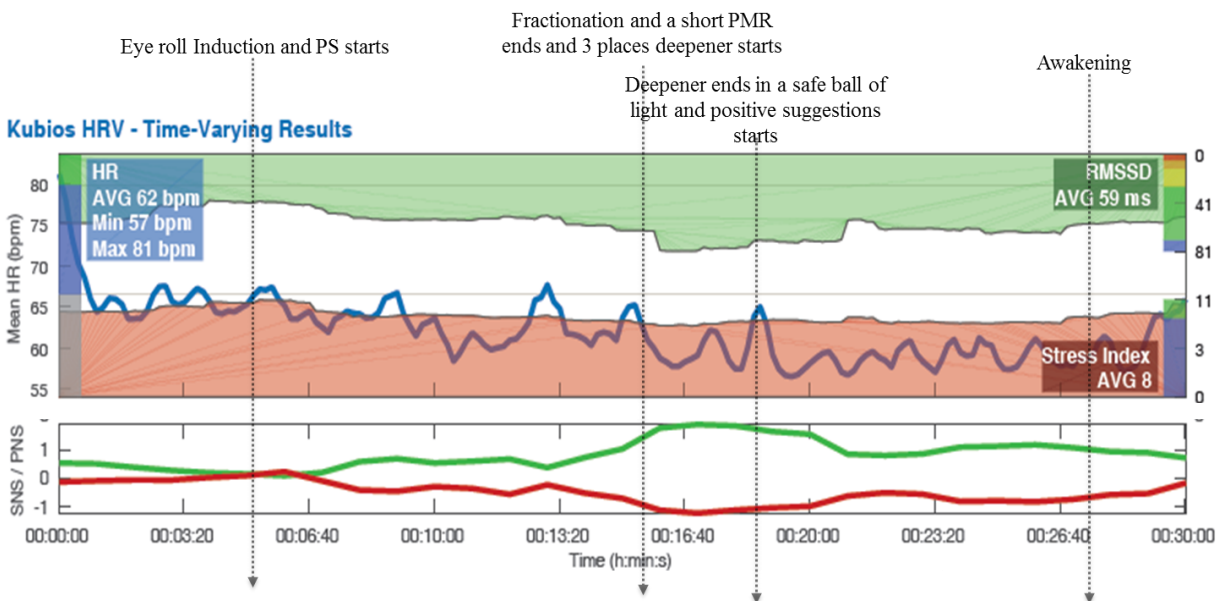
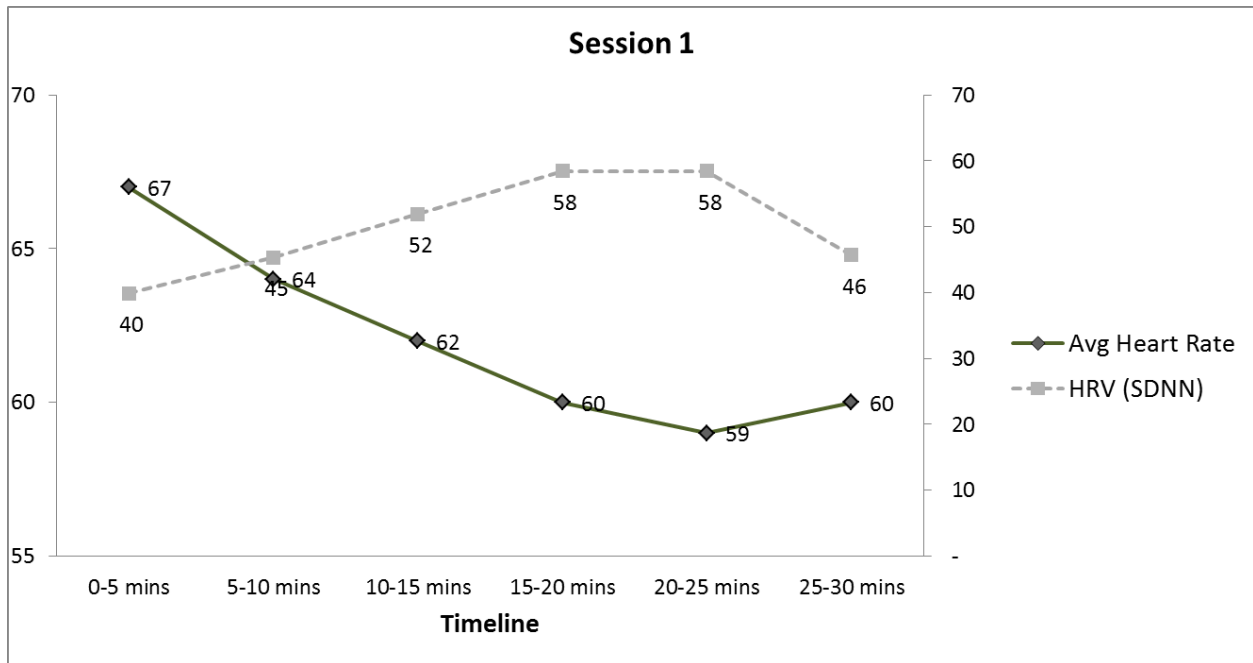


Figure 1: Changes in Heart Rate (shown with blue line), parasympathetic nervous system activity (shown with green line) and sympathetic nervous system activity (shown in red line) before, during and after hypnosis. The heart rate continues to decline from a peak of about 80 before the hypnosis remained low (around 60) even during silence after hypnosis ended.



**Chart A: Every 5 minute snapshot of Session 1 (Avg heart rate, heart rate variability parameter: SDNN)**

HR decreases during induction and further decreases during deepener (5-20 minutes) and at the same time HRV increases consistently with deepening of the trance. During the last 5 minutes, i.e. after awakening (25-30 minutes), HRV continues to remain high & HR remains low (as compared to before hypnosis but lower compared to hypnosis).

The induced relaxation and deepener through hypnosis decreased the heart rate (Fig 1 and Chart A), increased activity of parasympathetic nervous system. There was a significant decrease in HR which went to as low as 60 during hypnosis from around 80 at the beginning before hypnosis. The mean HR during hypnosis was 10% lower than mean HR before hypnosis. HRV reading (SDNN-also called standard deviation of the NN or RR interval i.e. beat to beat interval that denotes the variability) also indicated increased HRV during hypnosis when compared to pre-hypnosis. A significant decrease in sympathetic nervous system activity was also seen during hypnosis (red line in Figure 1). After the end of hypnosis there was a rise in HR and sympathetic nervous system activity but was lower than pre-

hypnosis. The parasympathetic nervous system activity after hypnosis was higher than pre-hypnosis indicating a good state was sustained even after hypnosis.

## Session 2

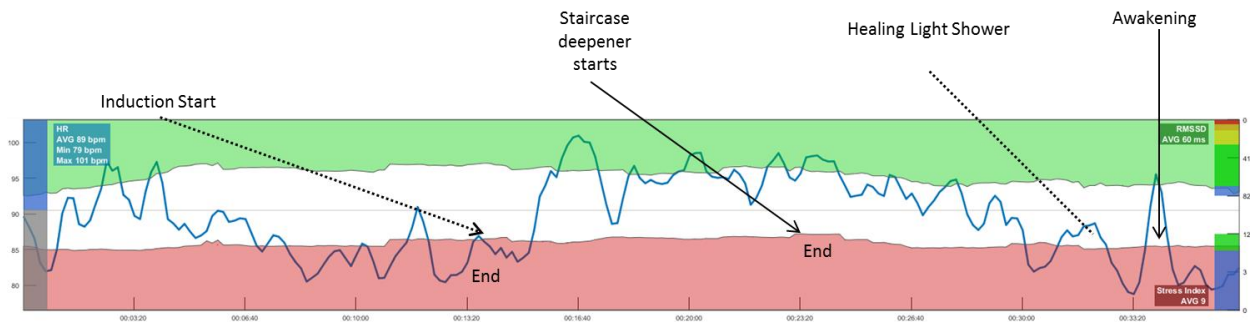
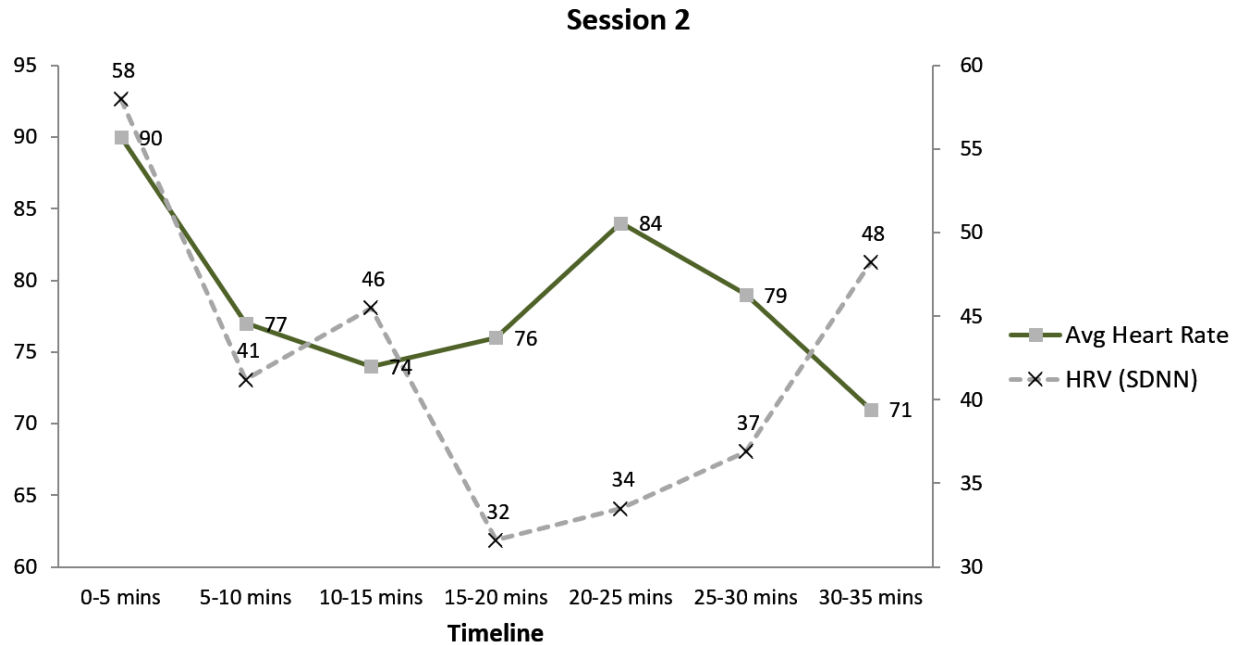


Figure 2: Changes in Heart Rate (shown with blue line), parasympathetic nervous system activity (shown with red line) and sympathetic nervous system activity (shown in green line) before, during and after awakening. The heart rate continues to decline from a peak of about 97 before induction and deepener upto 81.



**Chart B: Every 5 minute snapshot of Session 1 (Avg heart rate, heart rate variability parameter:SDNN)**

HR decreases during induction (0-15 minutes). Before deepener (15-25 minutes) HR increases & HRV decreases. Towards the end after the intervention (25 minutes and beyond) the HR decreases and HRV increases.

There was a decrease in HR which went to 79 during the session from around 90 at the beginning (Fig 2). The mean HR during hypnosis was 89 which is not much lower than mean HR before hypnosis. HRV reading also indicated fluctuation in parasympathetic and sympathetic nervous system activity during the whole session (green and red lines in Figure 2). HR decreased and HRV increased until the deepener but started to move in the opposite direction as soon as the intervention and verbal interaction started.



Figure 1&2 two clearly indicates a positive impact of hypnosis on nervous system and a clear biofeedback of higher impact of PSP as compared to the other.

When the subject must analyze, experience negative emotions and talk with the therapist, there is a clear indication of decrease in relaxation response and a negative influence on the depth of trance. Inversely subject who just has to experience the process (without analysis and talk) clearly maintained the relaxed state and depth. This could indicate an opportunity to increase the usage of methods which avoid the use of frequent speech (on the part of client). One such example of the method is ideomotor signaling. But PSP is known to have a good depth and maintain it, so future investigation is needed to compare dialogue during the trance using various methods and compare them.

The case study also shows an increase in HR and decrease in HRV during the second method when the subject has to visualize a staircase during hypnotic trance which indicates that the deep relaxation is slightly disturbed. At the same time, during post intervention stage even while experiencing positive changes the HRV increases (while HR decreases) unlike PSP, indicating the advantage of using PSP.

Hypnosis is known and believed to have positive impact on individuals mind, body and emotions but it still cannot easily find its place in daily medical procedures. Studies like these are required to demonstrate its effectiveness (rather than just having a subjective measure propagated by the therapist) in order to gain an entry in medical and scientific community. Just a simple demonstration of a physiological change similar to the one in the study can have a significant impact on how people perceive various hypnotic modalities.

## **Conclusion and future possibilities:**

The case study indicates that both HRV and HR provide good insights of the hypnotherapy intervention. During the induction and deepener, the heart rate tends to decline and HRV increases (indicating parasympathetic activation). These changes are consistent and predictable during simple hypnosis script and hypnotherapy intervention as well. Monitoring these parameters live during the session would not only allow the therapist to gain insights in internal environment of the subject but also would help them to adjust their methods and techniques based on the biofeedback.

Further to maintain the relaxed trance state it preferable use methods that maintain the depth of trance. There are various techniques which would require the subject to speak out but other methods like ideomotor signaling can be implemented wherever applicable to maintain the depth but future studies should be aimed to study and compare methods like PSP to ideomotor signaling as they can potentially provide and maintain the depth even with verbal dialogue and thus can be of great advantage.

This is consistent with the practical belief and experience of hypnotherapists to induce and maintain deeper trance to facilitate more effective intervention as compared to light trance state.

## **Future possibilities:**

Future possibilities include better articulation of changes in body (physiology), energy (biofield) and mind (emotions) due to hypnosis interventions. The author would like to encourage hypnotherapist community to pursue more rigorous studies (e.g. identify trend in resting heart rate after 21 days of hypnosis induced relaxation) and document the results. There is an opportunity to leverage existing

surveys to measure the impact on the mind and demonstrate it to the client and eventually via consolidated evidence to the therapist and medical community.

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