

Detection and Enhancement of the Hypnotic State in Susceptible and Resistant Subjects

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Introduction

Conscious sedation (relative analgesia, Langa (1)) using nitrous oxide in low concentration with oxygen, by nasal inhalation, is a technique used frequently in dentistry. This technique appears to be very similar to hypnosis in its results and applications. In some situations it is difficult to assess achievements and performance in the hypnotic state and we have investigated the possibility of combining the rapid induction of relaxation by nitrous oxide with hypnosis and to investigate the value of real-time display of electro-encephalographic (EEG) activity as an aid in hypnotherapy.

Materials and methods

EEG measurement was performed using Ag/AgCl skin surface electrodes in a differential arrangement. The indifferent source was located over the zygomatic bone and the other electrodes were over the left frontal bone 20mm from the midline in the hairline and over the occipital bone 20mm to the left and 10mm above the external protuberance. A purpose-built amplifier with high common-mode rejection, low-pass filtered at 20Hz and 40Hz, passed signals to a Rockland 512S Fast Fourier Transform spectrum analyser. This provided real-time analysis for visual display and an average store. Each analysis period was 20secs, providing a response time of 10secs. A facility was available to transfer displays to a Data General Nova 4X computer for detailed analysis.

Nitrous Oxide 25-30% with oxygen was supplied from a Quantiflex MDM machine on loan from Cyprane UK. The subject inhaled the mixture via a dental nose-piece incorporating a low resistance exhaust valve. Investigations were carried out, with local Ethical Committee approval, on 20 volunteers with no previous experience of hypnosis and no relevant medical history, subjects seeking help with smoking problems, and hypnosis-resistant patients under the care of a psychiatrist. Procedures adopted were based on a standard eye-fixation and progressive relaxation method of hypnosis induction outlined in Hartland (2). EEG records were taken at the following stages:—

- Stage 1. Before induction of relaxation, eyes open.
- Stage 2. Before induction, eyes shut, in conversation with the therapist.
- Stage 3. Early stages of relaxation.
- Stage 4. Late stages of relaxation.

Nitrous oxide/oxygen was then administered for about 5mins, until the subject signalled that tingling sensations were present in the hands. From this point normal hypnotic procedures were used. The visual display was concealed from the therapist in the case of volunteers, but used as feedback when patients were under treatment. EEG records were taken at stages 3 and 4. In 8 of the volunteers, nitrous oxide/oxygen was given first, attempting to avoid hypnotic suggestions.

Results

The resting pattern of normal subjects consisted of a low frequency display 0.25 — 4Hz of about 10 μ V (Fig.1, Stage 1). The power diminished with increase in frequency in an exponential form. When the eyes were shut an additional band of frequencies of variable amplitude at about 10Hz were displayed (Fig.2, Stage 2). With nitrous oxide/oxygen all subjects showed suppression of the low frequency band and enhancement of the 10Hz band. With hypnosis alone, trained subjects very rapidly produced this response, as did a few highly suggestible first-time volunteers (Fig.3, Stage 3 & 4). In a few subjects

the 10Hz band and most of the low frequency disappeared. In each case attempts to arouse the subject indicated that they were indeed asleep (Fig.4). Studies using the right hemisphere did not reveal any noticeable difference.

The patients under psychiatric care were mostly suffering anxiety states, and tended to show additional high frequency bands of activity in the 20—30Hz range which did not disappear under nitrous oxide sedation or hypnosis. However, the low frequency to 10Hz relationship found in normal subjects was usually attained under sedation with nitrous oxide/oxygen.

Transient changes consisting of a reversion to the eyes shut/conversing (Stage 2) pattern (Fig.2) occurred when aversion suggestions were made. We also observed that even in the un-relaxed (Stage 2) state a deliberate lie made by the subject abolished totally the 10Hz band.

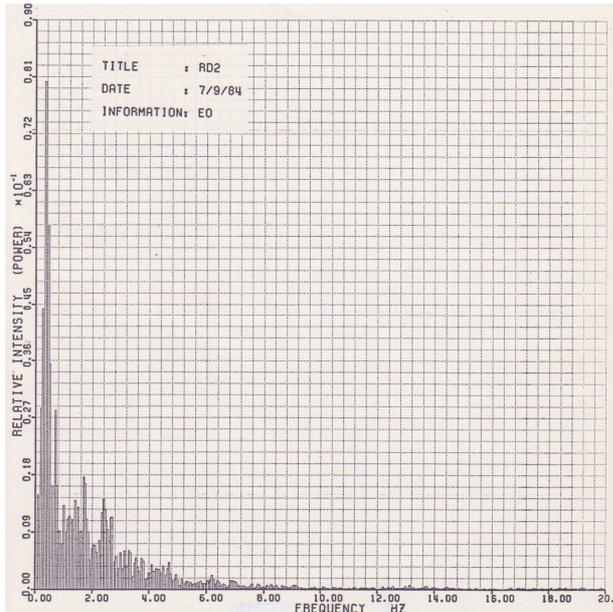


Fig. 1, Stage 1

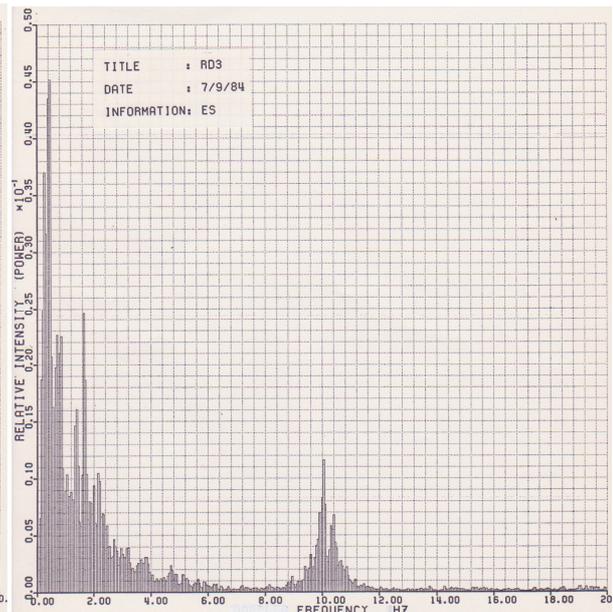


Fig. 2, Stage2

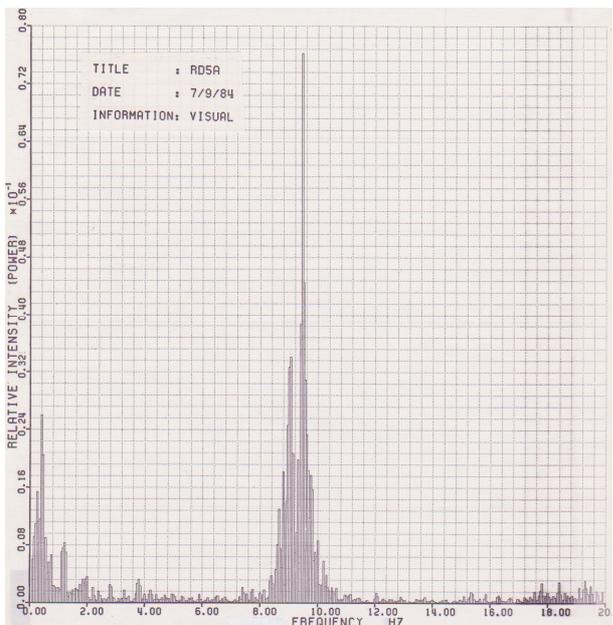


Fig. 3, Stage 3&4

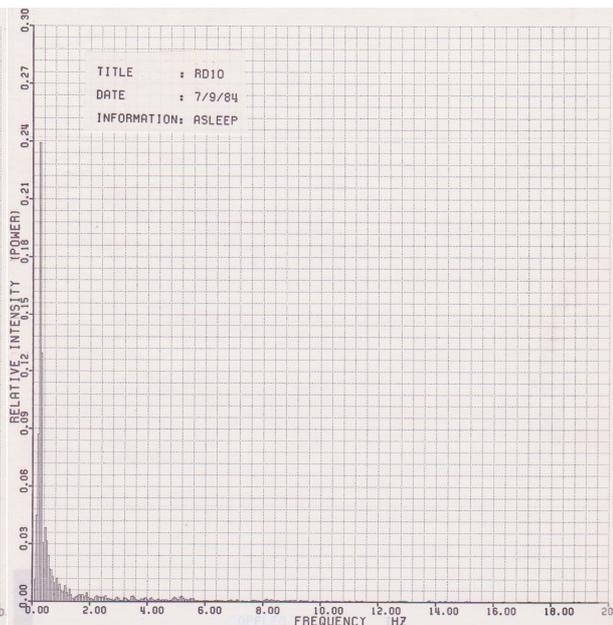


Fig. 4, Sleep

Conclusions

Hypnosis and conscious sedation by means of nitrous oxide/oxygen both produce comparable changes in the relative content of low frequency and 10Hz activity in the EEG patterns of subjects. This relatively simple and easy to interpret EEG display correlated well with the degree of relaxation achieved. Apprehensive or resistant subjects responded well to the use of nitrous oxide 25—30% with oxygen, and the visual feedback of EEG information to the therapist was of immense value in regulating the conduct of hypnotherapy.

References

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