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**INVESTGATING THE PSYCHOLOGICAL  
EFFECT OF TECNO AO ANTENNAE ON  
VDU USERS.**

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## ABSTRACT

The aim of this experiment was to determine whether the use of Tecno AO Antennae would affect people's moods in terms of the arousal and distress felt when using a VDU. It has already been shown that the antennae have physiological benefits, but their psychological effects have not been extensively studied. The independent variable in this experiment on 100 VDU users was exposure to a VDU equipped or not by Antennae, whilst the dependent variables were arousal and distress as measured by scales on the mood test. The results were analysed using independent t-tests and showed that:

H<sub>1</sub>: There will be a difference in arousal between those who use VDUs with a Tecno AO Antenna and those who use a VDU without an antenna. ( $t = 2.16$ ,  $p < 0.033$ , 2 Tailed)

And

H<sub>2</sub>: There will be a difference in distress between those who use VDUs with a Tecno AO Antenna and those who use a VDU without an antenna ( $t = 2.102$ ,  $p < 0.03$ , 2 Tailed).

The implications of this experiment are plentiful; this device may not only reduce physiological strain in VDU users but may also affect their psychological states.

## INTRODUCTION

The rapid increase in the number of computers being used by people at home and in the office has made many of us familiar with the maladies of prolonged *VDU* exposure (W.H.O. 1989). Headaches and eyestrain were thought to be the results of various factors such as light intensity, flicker rates, contrast and image stability. Screens have been designed to reduce these possible causes but new evidence suggests that the range of electromagnetic frequencies being emitted could play some part in creating chronic stress effects (Loiret, 1995). Cathode-ray tubes create a weak magnetic field which modify the electromagnetic environment surrounding computer operators. Although research has shown that various intensities of magnetic fields have no apparent effect (Oroza et al (1987), Lerchi et al (1990), Cadossi et al (1992) and Wallezek (1992)) certain frequencies nevertheless seem to, at both a molecular level and a cellular level.

The Tecno AO antenna is made of a polymer whose crystalline structure acts as a magnetic oscillator. When placed in an electromagnetic field it emits electromagnetic fields of 8, 12 and 24 Hz.. These frequencies and intensities of emission correspond to those emitted by the human brain when at rest and when performing a focused act (Alpha and Beta waves.)

The possibility exists that the mixed range of frequencies emitted by a VDU will influence neural activity by way of induction. Modifying the biological magnetic perception will then have an effect on brain function that might express itself in terms of the mood experienced by the individual so exposed. Although most research (Youbicier Simo and Bastide, 1996), has demonstrated a physiological effect of the fields of a VDU, and their correction by a compensating emission; there is little research on psychological effects. This experiment will attempt to determine any differences in mood between those using VDUs with compensating emissions and those without. The following hypotheses were constructed:

H<sub>1</sub>: There will be a difference in arousal between those who use VDUs with a Tecno AO Antenna and those who use a VDU without an antenna.

And,

H<sub>2</sub>: There will be a difference in distress between those who use VDUs with a Tecno AO Antenna and those who use a VDU without an antenna.

## METHOD

### DESIGN

This experiment used an independent subject design. There were 2 groups, an experimental (Group 2), who had a Tecno AO Antenna near their VDU screen, and a control (Group 1) who did not. The independent variable was exposure to the VDU screen with or without a device, and the dependent variable was the participant's arousal and distress as measured by scales in the Mood test.

### PARTICIPANTS

100 undergraduates from the University of Luton, design, with SO in each group took part in this experiment. Opportunity sample of volunteers and were unaware of allocated to.

### PROCEDURE

The computer centre at the University of Luton with a large number of computers and VDU screens was used as the location for this experiment. A number of VDU screens were left as normal, in one half of the room, whilst the rest were fitted with the Tecno AO Antennae. The devices were placed underneath the monitors, such that they were out of view, and in some cases, due to the design of the screen, they were placed behind them. Over a period of 2 weeks, Mood tests, in the form of questionnaires, were handed out to computer users in each group, at random. The questionnaire was based on the one used in a study by Peveler and Johnston (1985). Participants had to mark along a visual analogue scale, (which was a 10cm line ranging from definitely do not feel to definitely feel) how they felt. The random trials ensured that extraneous variables were controlled, such as a particularly hard day in terms of assignments, as well as ensuring that a time of day effect did not occur. Once 50 sets of data for each condition were collected the devices were removed from the monitors, and a debriefing notice was placed in the computer centre. The participants' responses were then measured and their scores converted to percentages, e.g. 6.5cm point on the line for relaxed was recorded as 65% relaxed. The variables were combined according to the formula provided by Peveler and Johnston (1985)

Arousal = alert + energetic + lively - sleepy - sluggish - drowsy.

Distress = worried + tense + uneasy - peaceful - relaxed - calm.

## RESULTS

The results are given in the raw data table in Appendix A. The mean score for each variable in each condition was calculated and can be seen in Table 1 below.

These results are graphically illustrated in Figure 1.

**TABLE 1: TABLE SUMMARISING MEAN RESULTS OF EACH VARIABLE IN EACH CONDITION**

VARIABLE	CONDITION	MEAN	STD. DEV.
SLEEPY	NO ANTENNA	50.6	30.8
	ANTENNA	48.6	28.2
ENERGETIC	NO ANTENNA	38.0	27.8
	ANTENNA	47.4	24.2
CALM	NO ANTENNA	63.8	27.5
	ANTENNA	65.4	21.5
ALERT	NO ANTENNA	47.4	26.1
	ANTENNA	60.1	20.4
SLUGGISH	NO ANTENNA	49.9	31.8
	ANTENNA	41.0	22.8
DROWSY	NO ANTENNA	51.2	33.0
	ANTENNA	41.5	26.7
RELAXED	NO ANTENNA	56.9	30.2
	ANTENNA	66.1	21.6
UNEASY	NO ANTENNA	36.4	29.8
	ANTENNA	27.6	22.4
TENSE	NO ANTENNA	39.9	29.3
	ANTENNA	29.7	20.6
LIVELY	NO ANTENNA	48.3	25.9
	ANTENNA	51.3	25.4
WORRIED	NO ANTENNA	40.0	29.4
	ANTENNA	33.5	24.4
PEACEFUL	NO ANTENNA	56.1	29.4
	ANTENNA	65.3	19.7

Fig 1: Bar Chart Comparing Mean Scores For Variables in Each Condition

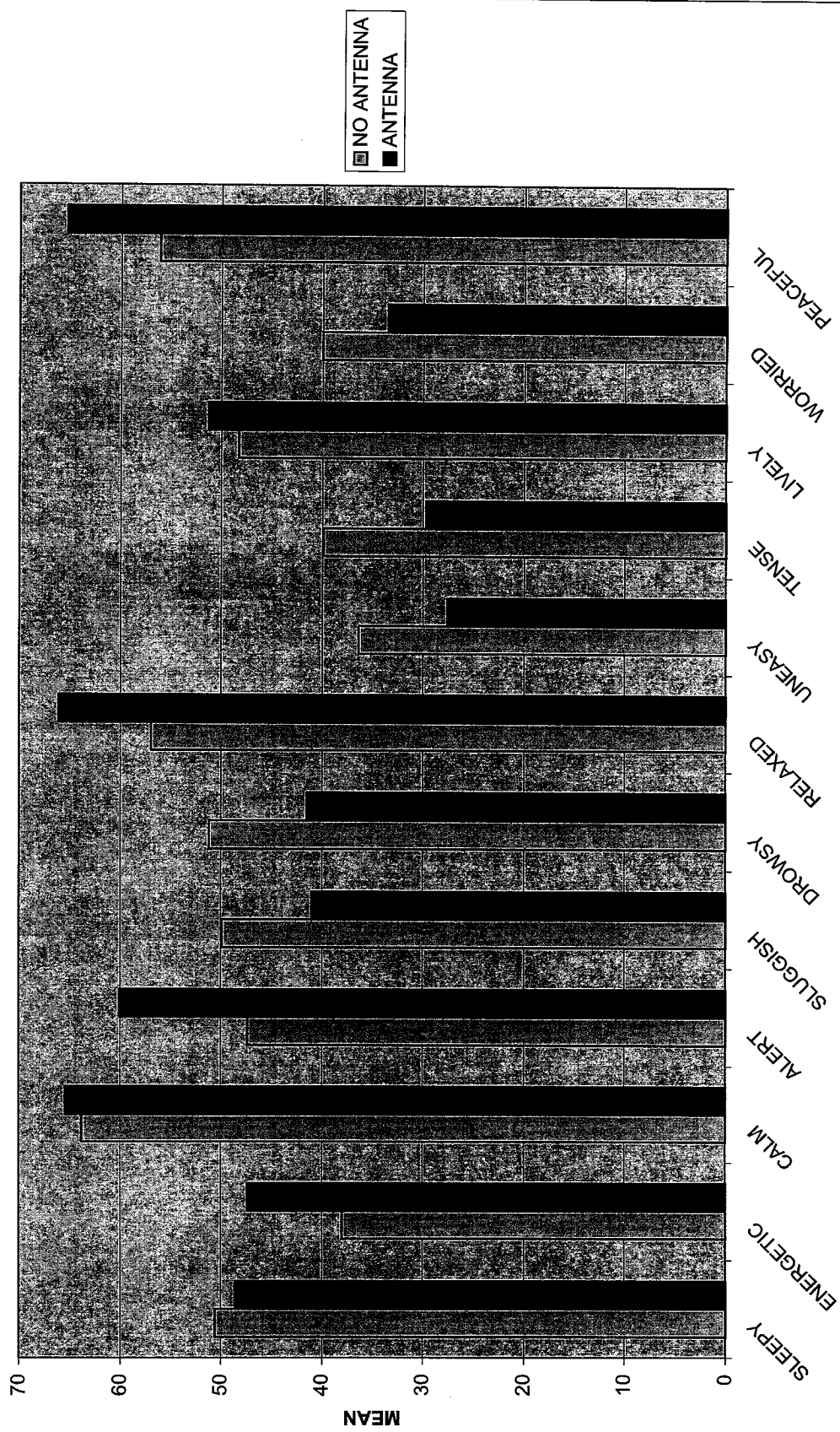


Table 1 shows that there is the greatest difference between the mean scores for Alertness, with Group 2, the experimental group with antennae, feeling on average 12.7% more alert than the controls. The second greatest difference is in tension, with the experimental group feeling just over 10% less tense than the controls. The smallest differences lay in calmness, at just 1.6%. It should also be noted that on the variables measuring distress, the control group showed higher means than the experimental group, and on variables measuring arousal, the experimental group scored higher on average than the control group.

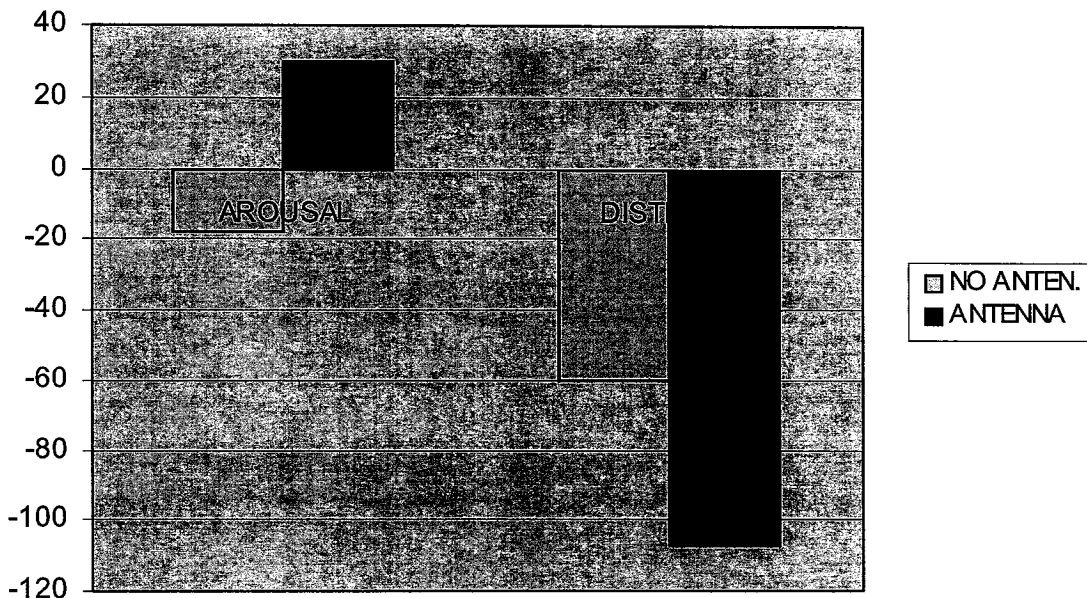
The variables were combined to give measures of arousal and distress. Table 2 below compares mean arousal and distress in the experimental and control groups.

**TABLE 2: MEAN SCORES OF AROUSAL AND DISTRESS IN EACH CONDITION**

AROUSAL	NO ANTEN.	-18.1
	ANTENNA	30.0
DISTRESS	NO ANTEN.	-60.5
	ANTENNA	-107.3

At a glance in Fig 2, it can be seen that the mean arousal of the experimental group is higher than that of the control group. The mean distress in the experimental group is lower than that of the control group.

**FIG 2 BAR CHART COMPARING MEAN AROUSAL AND DISTRESS IN THE TWO CONDITIONS.**



## INFERENCEAL STATISTICS

Independent t-tests were carried out to examine the significance of differences in means between the groups. The results are summarised below for the individual variables (Table 3).

**TABLE 3: MAUN INFERENCEAL STATISTICS**

VARIABLE	t-VALUE	D. P.	2-TAIL SIG.	SIG.?
SLEEPY	0.34	97	0.73	NO
ENERGETIC	1.5	96	0.08	BORDERLINE.
CALM	0.32	97	0.75	NO
ALERT	2.68	96	0.01	YES
SLUGGISH	1.59	96	0.12	NO
DROWSY	1.59	96	0.12	NO
RELAXED	1.76	97	0.08	BORDERLINE
UNEASY	1.65	96	0.10	BORDERLINE
TENSE	2.0	97	0.05	YES
LIVELY	0.58	96	0.56	NO
WORRIED	1.18	96	0.24	NO
PEACEFUL	1.83	97	0.07	BORDERLINE

When analysing the means for arousal and distress, again t-tests were used.

The results showed that

**H<sub>1</sub>:** There was a difference in arousal between those who used VDUs with a Tecno AO Antenna and those who used a VDU without an antenna ( $t = 2.16$ ,  $p < 0.033$ , 2 Tailed)

And

**H<sub>2</sub>:** There was a difference in distress between those who used VDUs with a Tecno AO Antenna and those who used a VDU without an antenna ( $t = 2.102$ ,  $p < 0.03$ , 2 tailed)



## DISCUSSION

### Results:

The results show that the experimental group, those with the Tecno AO antennae, were significantly more alert ( $p=0.009$ ) and less tense ( $p=0.048$ ) than the control group. Other variables, although not significant at the 5% level, were in fact borderline. These were, relaxed ( $p=0.082$ ), energetic ( $p=0.076$ ), uneasy ( $p=0.101$ ) and peaceful ( $p=0.071$ ).

These variables were combined into the two formulae stated in the procedure, giving a mean score for arousal and distress in each condition. These scores showed that the experimental groups were significantly more aroused ( $p<0.033$ ) and less distressed ( $p<0.03$ ) than the control group. This led to a rejection of the  $H_0$  on both occasions. It was concluded that:

**H<sub>1</sub>:** There was a difference in arousal between those who used VDUs with a Tecno AO Antenna and those who used a VDU without an antenna.

And

**H<sub>2</sub>:** There was a difference in distress between those who used VDUs with a Tecno AO Antenna and those who used a VDU without an antenna.

### Implications of this Experiment.

The Tecno AO Antenna has a positive effect on the mood of VDU operators. With the device they are significantly more aroused and less distressed than users without it.

The Tecno AO antenna was positioned in various ways depending upon the design of the monitor in order for it to remain hidden. These findings suggest that exact position of the antenna is not important for psychological improvement

The antenna was thought to take 1 month to alleviate physiological symptoms related to VDU use. In contrast, this experiment shows that the antenna has an immediate effect on VDU users, but whether it is by altering their mood or maintaining it, is not yet certain.

The results of this experiment have major implications for VDU users. The Tecno AO antenna may eliminate many of the symptoms associated with VDU use. It has already been shown to reduce physiological effects, and now with evidence of psychological benefits, those using VDUs regularly will value this device

#### **Suggestions For Further Research:**

A similar experiment could be conducted on VDU operators over a longer period of time to examine a possible long-term affect on mood that the Antenna might have. Further research is needed to determine whether the outcome of this experiment is just the result of prevention of negative effects of VDU exposure. It may be that compensating the electromagnetic fields has actually had a positive affect on people's mood rather than merely preventing a negative affect.