The Spanish Journal of Psychology
2001, Vol. 4, No. 1, 19-25

1138-7416

Subliminal Messages for Increasing Self-Esteem: Placebo Effect

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Although experimental research has confirmed the capacity of the human cognitive system to process information that does not reach consciousness (unconscious perception), empirical evidence of the incidence of subliminal verbal messages included on audiotapes claiming to improve human resources and correct some behavioral problems is meager and inconsistent. Our study assesses the influence of "subliminal tapes" designed to increase self-esteem. Participants were randomly assigned to four experimental conditions. One group listened to a tape of music with supra- and subliminal messages; another listened to a tape of music with only subliminal messages; the third group's tape had only music, although the participants believed that it also included subliminal messages; a fourth ("waiting") group heard no tapes, but filled in the same self-esteem scales. Participants in the first three groups filled in the Tennessee Self-Concept Scale (Fitts, 1965) before and after listening to the tape for several days. All groups showed a similar pretest-posttest improvement in self-esteem ($p \leq .003$), except for the waiting group, which did not improve ($p = .311$). This implies that only a placebo effect took place. Our data are not in accordance with those obtained by other authors. We comment upon the possible reasons for these discrepancies.
Key words: subliminal messages, unconscious perception, increase in self-esteem

Aunque la investigación experimental ha constatado la capacidad del sistema cognitivo humano para procesar información que no accede a la conciencia (percepción inconsciente), los datos empíricos sobre la incidencia de los mensajes verbales subliminales incluidos en cintas de audio, comercializadas para potenciar los recursos humanos y corregir algunos problemas conductuales, son muy escasos e inconsistentes. Nuestro estudio evalúa la influencia de "mensajes subliminales", grabados en cinta, diseñados para mejorar la autoestima. Los sujetos fueron asignados aleatoriamente a cuatro condiciones experimentales. Un grupo escuchó una cinta con música y mensajes supra y subliminales; otro, una cinta con música y mensajes subliminales únicamente; en la tercera condición la cinta sólo contenía música, si bien los sujetos creían que también incluía mensajes subliminales; un cuarto grupo ("de espera") fue sometido a las mismas mediciones de autoestima, pero no recibió la cinta. Los participantes de los tres primeros grupos completaron la Escala Tennessee de Autoconcepto (Fitts, 1965) antes y después de haber escuchado la cinta durante varios días. Todos los grupos mostraron una mejora similar entre el pretest y el postest de autoestima ($p \leq .003$), salvo el de espera, que no mejoró ($p = .311$). Ello implica que únicamente tiene lugar efecto placebo. Nuestros datos contradicen los obtenidos por algunos otros autores. Se analizan las posibles razones de estas discrepancias.
Palabras clave: mensajes subliminales, percepción inconsciente, mejora de la autoestima

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This research was carried out with the collaboration of New Age Consulting, which provided the audiotapes. The second author is also the director of NAC.

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More and more CDs and audiotapes are coming onto the market containing (supposedly) subliminal messages designed to correct various behavioral problems and, in general, improve human resources. They claim, among other things, to help people give up smoking or drinking, lose weight, relieve pain, fear, or depression, increase self-esteem, improve performance in sports and other personal and professional activities. All of this generates considerable economic activity and involves substantial personal effort, which should have the backing of some kind of evidence about the effectiveness of these tapes and CDs, if they are to be justified. Thus, the first thing we should ask is whether it is possible to process information that, apparently, escapes our notice. Does unconscious perception exist? If so, we would have to determine what kind of information can be processed in this way. The next question we must ask is what effects could it have? Given that, in recent years, there has been a considerable amount of research on some of these issues in experimental psychology, we should make the most of the information provided–especially when the empirical evidence in the applied field is so flimsy.

Unconscious perception

It is now reasonably well established that the human cognitive system processes much more information than that which reaches consciousness. In recent years, experimental laboratory research developed in this field has been highly refined, with quite consistent results in favor of the existence of *unconscious perception* (and of unconscious memory, learning, thought or, in general terms, "unconscious cognition"; see Froufe, 1997; Öhman & Soares, 1998; Weiskrantz, 1997). Nevertheless, most of the studies on unconscious perception use simple and isolated stimuli (usually words), presented visually in masked form (Dehaene et al., 1998; Draine & Greenwald, 1998; Merikle, Joordens, & Stolz, 1995; Öhman & Soares, 1998; see also Bornstein & Pittman, 1992; Weiskrantz, 1997). Currently, it is established that apparently "invisible" words or any other stimuli with specific permanent representation in the mental system of knowledge can activate in our minds ideas and connotations related to their meaning.

The case of oral verbal communication is quite different, especially where complex messages are concerned. Evidence in favor of semantic processing of "inaudible" verbal information is much more precarious. And still more so with regard to complex and open messages (without specific permanent representation in the knowledge system), such as sentences, as were studied in this paper.

Certainly, there is some evidence supporting the processing of spoken words that go unnoticed because they do not receive attention: experiments on dichotic listening. It has sometimes been found (Bentin, Kutas, & Hillyard, 1995; Vila & Tudela, 1982) that unattended words reaching the ear are processed semantically and have some behavioral or psychophysiological effect, despite not accessing consciousness. However, this kind of data has been considerably more inconsistent and difficult to replicate than that corresponding to the semantic codification of similar masked visual stimuli. As stated above, there is even less evidence regarding the processing of complex auditory events, such as sentences. Nevertheless, there are some studies in the field of subliminal psychodynamic activation (SPA; Silverman, 1983), in which effects generated by the processing of inaudible sentences have been observed (e.g., Chimera, 1987; Doche-Budzynski & Budzynski, 1989). But we cannot ignore the enormous methodological difficulties involved in demonstrating that given effects are due to specific elements manipulated in a study and, above all, that these elements go *completely* unnoticed by the experimental participants (Froufe, 1997; Merikle et al., 1995). Thus, in spite of demonstrations of unconscious perception, the limits of the automatic processing of audio-verbal masked messages are still unknown, although they are probably very narrow. At present, we think that unconscious perception is restricted to an *activation* process of existing mental representations of information. If so, it is impossible to carry out a *constructive interpretation* of unnoticed complex messages.

With regard to the effects induced by the display of stimuli that do not reach consciousness, the experimental literature has recorded influences of a cognitive, affective, and electrophysiological nature. However, these are usually subtle effects revealed in experimental tasks especially designed to be highly sensitive to this kind of manipulations. For example, the *priming effect*, consisting of the transitory facilitation of the recognition of a degraded stimulus and similar operations, due to the previous masked presentation of this stimulus or others related to it. Most studies work with influences that could be called "soft effects" of unconscious perception (e.g., Dehaene et al., 1998; Merikle et al., 1995). Despite some references (Neuberg, 1988; Pittman & Bornstein, 1989; Silverman, 1983), reports of lasting influences on the development of behaviors, decision-making, or personality change in relevant everyday life situations ("hard effects") are rare. These effects have in no way been rigorously verified, as have the soft ones. Thus, it is one thing to discuss unconscious perception of certain stimuli, but it is quite another to assume that this may have tangible effects in our lives, as claimed by the subliminal self-help tapes and CDs.

Subliminal self-help tapes

In research carried out specifically on the incidence of subliminal messages on audiotapes, the results available so far are scarce and inconclusive. Some researchers have reported influence of this type of message, either as exclusive treatment (Costello & Budzynski, 1991; Doche-Budzynski & Budzynski, 1989; Taylor, 1988), or as a complementary

element within a treatment that also uses other strategies (Monahan, 1991; Reid, 1990). Nevertheless, some of these studies have been presented by their authors as pilot explorations, whose preliminary results have barely been replicated. Other works have found that tapes with subliminal messages have shown no discernible effects whatsoever (Lenz, 1989; Merikle & Skanes, 1992; Russell, Rowe, & Smouse, 1991) or, at best, have only generated a placebo effect (Greenwald, Spangenberg, Pratkanis, & Skenazi, 1991). The issue of the effectiveness of this type of material, therefore, remains unsolved (see, in this respect, Durkin, 1998).

Our study emerged from the collaboration between an experimental psychologist interested in the cognitive unconscious and a clinical psychologist who has occasionally used subliminal tapes as therapeutic adjuncts in her professional activity. We were interested in assessing the incidence of this material on the improvement of human resources. From the tapes and CDs with messages in Spanish, we chose those by New Age Consulting (NAC), S.L., designed to increase self-esteem, because we considered this psychological aspect to be one of the most susceptible to this kind of influence. Undoubtedly, such a strongly subjective characteristic as self-concept is also especially vulnerable to placebo effect, due to expectations. In order to detect this type of spurious influence, we included a specific treatment, as well as a waiting group, with the aim of controlling possible effects of extraneous variables due to the passing of time between pretest and posttest and the repetition of measurements. Of course, we also included a condition with subliminal messages, either alone or with similar supraliminal messages. The comparison of these conditions would allow us to distinguish the real incidence of subliminal messages from placebo, as well as all these effects from the influence of the passing of time and test repetition.

Method

Participants

The research was carried out with junior volunteer students from the Information Sciences Faculty of the Complutense University in Madrid. Of 125 who filled in the self-esteem pretest (66 women and 59 men, aged between 18 and 27), only 83 did so correctly and went on to fill in the posttest 48 days later.

Materials

Tapes. The tapes used were of 30-min duration and contained sounds and music composed to induce a state of relaxation. The majority also had a series of self-affirmations aimed at improving self-image, inserted with analog electronic circuit below the music to make them go unnoticed (see Discussion below). Some tapes also included a few statements of this kind that were perfectly audible. Also, on the case label, besides the usual comments about the advanced techniques and effectiveness of the tapes, there were some examples of the statements included in the recording, such as, *I am a unique and distinctive being; It is in my power to create my reality,* and so on.

There were three kinds of tapes:

1. Subliminal, containing music and subliminal self-affirmations.

2. Sub-supraliminal, containing music and both subliminal (the same as in 1) and supraliminal self-affirmations.

3. Placebo, containing only the music and the case label (which, as mentioned, stated that it contained effective subliminal self-affirmations).

The Tennessee Self-Concept Scale (TSCS; Fitts, 1965). In order to measure self-esteem, we used an experimental adaptation of TSCS developed in Spain by Garanto (1984). The TSCS is a five-point Likert-type scale where respondents are requested to describe the way they perceive themselves. It is made up of 100 items, distributed in five large subscales (physical, moral-ethical, personal, family, and social self-concept), which provide a global self-esteem score. Garanto found that his Spanish version of the scale has external and construct validity, and reliability indexes very similar to those reported in the original studies. The test-retest reliability of the Spanish version is .85.

Procedure

The study was carried out in two group sessions of one hour each; plus the time spent listening to the tape, which each participant did individually in-between the two sessions.

In the first session, which took place during the lecture hours of an unrelated subject, the students were informed about the existence of audiotapes and CDs with subliminal messages designed to improve a variety of human resources, among them, self-esteem. They were also informed that our aim was to check their effectiveness, attempting to be impartial, without prejudging the results. Therefore, we asked for the collaboration of volunteers who were willing to try to increase their self-esteem by this process. The volunteers were then told they should try to listen to the tape daily –or at least 30 times– before the following session, 48 days later. They were informed that they could listen to it while performing other normal activities, but that it was preferable to do so using headphones, while comfortable and relaxed.

They were then given the questionnaire to fill in and, at the same time, the tapes (subliminal, sub-supraliminal, and placebo) were handed out at random, coding the experimental condition (i.e., type of tape) assigned to each participant. By means of the instructions given in the pretest session, all of the participants were led to believe that all of the tapes, as stated in the case labels, contained subliminal messages, in addition to some containing similar audible messages.

In the second session, 48 days later, participants were given another copy of the questionnaire, with a series of additional questions at the end, aimed at obtaining information about their confidence in the procedure and the approximate number of times they had listened to the tape. Lastly, they were informed about the different experimental conditions, without identifying which one each participant had undergone.

Design

The participants were randomly assigned to one of the following four groups.

Subliminal group: Participants assigned to this condition received the subliminal tape. Of the 31 persons in this condition that filled in the TSCS in the pretest session, 20 did so again (correctly) in the posttest session.

Sub-supraliminal group: Participants assigned to this condition received the sub-supraliminal tape. Of the 31 that filled in the questionnaire correctly in the pretest, 22 did so again in the posttest.

Placebo group: Participants assigned to this condition received the tape with only music. Of the 31 participants assigned to this condition, 22 answered the questionnaire correctly in the posttest.

Waiting group: The participants assigned to this condition were not given tapes until the posttest session. In the first session, they simply filled in the questionnaire, and were informed that they would not receive the tapes until the following session. Of the 32 participants in this condition, only 19 correctly filled in the questionnaire and collected the tape with the subliminal messages in the following session.

Thus, we used a 4 × 2 mixed factorial design, the first factor between-subjects and the second within-subjects. In order for the design to be suitable for testing the *interaction* between the subliminal and supraliminal messages, a group with just supraliminal messages should have been included. Unfortunately, NAC's lack of tapes with *only* supraliminal messages precluded the introduction of such a condition and the completion of the design in this sense. However, if no significant differences between the sub-supraliminal group and the subliminal or the placebo groups are revealed, we can rule out such interactive influence. Nevertheless, the presence of significant differences must not necessarily be attributed to interaction, because it could also –and quite probably– be due to the exclusive incidence of the supraliminal messages.

Results

The data of 42 participants had to be discarded from the analysis either because it was incomplete (three cases) or due to their failure to attend the posttest (39 cases). Of the remaining 83 participants, 20 belonged to the subliminal group, 22 to the sub-supraliminal, 22 to the placebo group, and 19 to the waiting group. Table 1 shows the means and standard deviations of the pre- and posttest self-esteem scores of the four experimental groups.

Given the mixed factorial design, we first verified the assumptions of equality of variances and compound symmetry. Levene's contrast indicated a critical level of .133 for the pretest and .519 for the posttest, which allowed us to maintain the hypothesis of equivalence of variances in both cases. On the other hand, the Box test produced a critical level of .459, which allowed us to assume equality of the covariance matrices.

We performed an analysis of variance (Groups × Pre-Post Measurement), which allowed us to make the following three main observations. Firstly, no differences between groups was observed for the two mentioned measurements considered jointly, $F(3, 79) = 0.40$, $p = .752$. Secondly, we found a higher posttest ($M = 3.71$) than pretest ($M = 3.55$) score in the self-esteem questionnaire, $F(1,79) = 3.76$, $p = .0001$. Thirdly, a significant interaction effect was observed, $F(3, 79) = 2.73$, $p = .049$.

This implies that, overall, there was no marked difference between the groups, that the self-esteem score improved from the first to the second measurement, and that this improvement was not the same in all groups. Specifically, the *t*-test subsequently applied showed that there were statistically significant differences in the subliminal group, with a mean increase of 0.14, $t(19) = 3.40$, $p = .003$; in the

Table 1
Means and Standard Deviations of Pre/Posttest Scores in the Tennessee Self-Concept Scale for the Four Groups

Groups	Pretest		Posttest		
	M	*SD*	*M*	*SD*	*n*
Subliminal	3.60	0.40	3.74	0.41	20
Sub-Supraliminal	3.57	0.49	3.83	0.53	22
Placebo	3.46	0.43	3.65	0.45	22
Waiting	3.57	0.57	3.62	0.51	19
Total	3.55	0.47	3.71	0.47	83

sub-supraliminal group, with a mean increase of 0.26, $t(21) = 4.07$, $p = .001$; and in the placebo group, with a mean increase of 0.19, $t(21) = 4.00$, $p = .001$; whereas in the waiting group, whose mean increase was 0.05, $t(18) = 1.04$, $p = .311$, there was no such improvement.

In this sense, subsequent unifactorial (treatment of each group) ANOVA of the pre/posttest gains revealed statistically significant group differences: $F(3,79) = 4.03$, $p = .014$. Multiple post hoc comparisons, estimated by means of Tukey's HSD test, revealed significant differences between the waiting group and the remaining groups (that is, groups which heard one of the tapes). The three groups that heard one of the tapes during treatment showed statistically significant score increase, as compared with the waiting group, with a mean difference of 0.10 ($SD = 0.04$), $p = .043$, in the case of the subliminal group; and of 0.20 ($SD = 0.06$), $p = .011$, in the sub-supraliminal group; and of 0.14 ($SD = 0.05$), $p = .018$, in the placebo group. A statistically significant score increase in the sub-supraliminal group was also observed, as compared with the subliminal group, with a mean difference of 0.12 ($SD = 0.05$), $p = .027$. There were no statistically significant differences between the placebo group and the subliminal group (the mean difference was of 0.05, $SD = 0.05$, $p = .621$), nor between the placebo group and the sub-supraliminal group: the mean difference was 0.06 ($SD = 0.06$), $p = .568$.

Discussion

Our data indicate that the improvement in the three groups receiving tapes was not due to the passing of time, measurement repetition, or the like. However, the fact that there are similar improvements in the groups receiving tapes *with* and *without* subliminal messages indicates that a placebo effect occurred, rather than an effect actually resulting from the concealed content as such. Although improbable, one could also speculate that the effects were due to the music (since the only group that did not improve is the one that did not receive the tape), but in no way were they due to the subliminal messages. Thus, despite the acknowledged insufficiency of the design, all of the effects observed could be explained in terms of placebo.

The results of this study do not support the capacity of auditory subliminal messages –as they were used here– to increase self-esteem. This is in accordance with some previously mentioned studies (Greenwald et al., 1991; Lenz, 1989; Merikle & Skanes, 1992; Russell et al., 1991), either using the same variable (self-esteem) or others, such as the improvement of memory, academic performance, and motor skills, or weight loss in obese people. Naturally, this may be due to the fact that messages of this nature are not processed or, if they are, do not have the kind of effect sought by these studies. As already mentioned, there is empirical evidence and theoretical reasons to suspect that unnoticed information can only be processed when it involves simple and familiar stimuli that have a specific permanent representation in the mental knowledge system; i.e., in the case of verbal information, probably words (especially when presented visually), but not sentences (especially when presented aurally). On the other hand, most of the effects observed in experimental research on unconscious perception are related to parameters that are more "sensitive" and susceptible to modification than those used in our tapes, which are about everyday life aspects.

On the other hand, as Greenwald et al. (1991) also observed, the tapes with subliminal messages generated placebo effects, which are frequent in situations vulnerable to the influence of expectations (Kirsch, 1999; Kirsch & Sapirstein, 1999; Prioleau, Murdock, & Brody, 1983). Placebo treatment produced a moderate increase in self-concept scores from pretest to posttest, but reliable and no smaller than the one observed in the subliminal condition. Although in other studies no such influences were found (e.g., Lenz, 1989; Merikle & Skanes, 1992), the aim of subliminal tapes in these cases was to reduce weight or to improve academic achievement and motor skills performance, outcomes surely less vulnerable to placebo effect than self-concept.

The above-mentioned data and our own results are not in accordance with those obtained in a series of studies in which genuine effects of subliminal messages were observed (e.g., Costello & Budzynski, 1991; Doche-Budzynski, & Budzynski, 1989; Kotzé & Möller, 1990; Monahan, 1991; Reid, 1990; see Swingle, 1992, for a general discussion and review). The discrepancy may be due to the fact that, in these cases, the verbal messages were occasionally perceived consciously (we hardly need remind the reader of how difficult it is to guarantee the total absence of consciousness) or to some other reason (as mentioned, most of the studies are considered preliminary by their own authors). Besides, Kotzé and Möller did not use typical tapes with phrases designed to improve some personality aspect, but tapes including isolated words with emotional content, recording their effect on GSR increase, as reported earlier by Borgeat, Boissonneault, Chalout, and Elie (1989). However, from the data currently available, it would seem premature to discard all possible effectiveness of this type of subliminal auditory messages. The contrary results to the efficacy of subliminal messages obtained so far, at least those obtained in our study, given its limitations, may well have various causes.

In the first place, our participants were not seeking help to increase their self-esteem, nor did they turn to these procedures on their own initiative; quite probably, most of them had no particular problems in this respect. This differentiates them markedly from people who decide to spend money on tapes with subliminal messages. The latter presumably have self-esteem problems, are making an effort to increase it, and are willing to use this type of material. In the second place, no doubt partially because of this, most

of the participants (as they admitted in the addendum to the posttest questionnaire) did not listen to the tape a sufficient number of times -many not anywhere near the 30 times that is usually the recommended minimum. In this sense, Reid (1990) observed the relevance of exposure-time dosage: He found no effect of the subliminal messages until participants were exposed to the tapes for more than 15 hours. Taylor (1988) reported a similar tendency. Therefore, this circumstance should be taken into account in future research.

Another main factor should also be considered: Not all tapes with subliminal messages are generated with the same technique. These variations can lead to great differences in the signal/noise (S/N) ratio necessary for messages (the signal) to be masked by the noise and, thus, escape notice. These differences can be relevant in terms of whether or not the hidden messages are processed and generate effects. Urban (1992) described four techniques, which result in very different products (i.e., tapes).

Historically, the first method of generating imperceptible auditory messages has been the simple reduction of amplitude or intensity of the sound until it becomes indistinguishable: the *threshold technique*. This rudimentary technique practically requires the signal to be destroyed if it is to be guaranteed that the messages will not be consciously heard. A more advanced procedure consists of masking the signal with other more intense sounds or music, until the former becomes imperceptible. Within this approach, the most rudimentary option is to record the noise at a certain mean level of intensity and the signal at a markedly lower mean volume level, so that the latter is undetectable once mixed with the noise. The main problem with this technique is that, with signals and noise that vary greatly in terms of both amplitude and frequency (speech and music are both broadband), in order for the message to be undetectable, the average difference in decibels must be very large: about 45 dB or more.

A technically more advanced variation of the above procedure consists of using equipment with an analog electronic circuit that continually adjusts the S/N ratio to a pre-selected level. This technique, introduced in the late 1960s by Becker (Becker, 1966; Becker, Charbonnet, Marino, Steck, & Warren, 1980) and which is popularly known as the *black box*, undoubtedly represents a great advance with respect to previous procedures. However, in order to guarantee that the messages are not consciously heard, they must fluctuate within a band of 25-35 dB below the noise, which may also prevent their sensorial registration. Modern techniques of *digital signal processing* (DSP) allow enormous refinement of the conventional subliminal mixers by a much quicker and more detailed analysis of signals, their compression, acceleration, and filtering in multitracking systems, harmonization of the voice and music frequencies, and so on. This allows masking verbal messages with presentations only 10-15 dB below the noise. Such innovations, which are not yet usually employed in subliminal tape production, may bring about important improvements in masking signals that still remain processable by the auditory system.

It is therefore not surprising that tapes recorded with techniques other than DSP (such as analog electronic circuit to adjust the S/N ratio to pre-selected level, as used in ours and in practically every tape mentioned here: e.g., Greenwald et al., 1991; Lenz, 1989; Russell et al., 1991), should present an S/N relationship that makes it impossible to process the signal. This could make a definite difference in the possibility of processing the messages, and in the efficacy of subliminal audiotapes and CDs.

In sum, our results do not show genuine influence of subliminal verbal messages on audiotapes for increasing self-esteem, but only placebo effect. Nevertheless, due to the various limitations of ours and similar studies, and bearing in mind the opportunities provided by modern digital recording techniques, we believe that, under appropriate conditions, the possibility of this treatment improving human resources to some extent should not be definitely ruled out. A variety of circumstances may influence this kind of effects: the nature and content of messages (sentences or isolated words), recording techniques and corresponding S/N ratio, exposure-time dosage, type of resource or clinical problem involved, circumstances in which people opt for this treatment, etc. Future research should take note of the new technical conditions and continue to explore different pathways. We emphasize that, in recent years, the human mind has proven to be capable of processing far more than the information of which we are conscious. The limits of that capacity, as well as its possible effects, remain to be established. The experimental evidence available up to now about the influence of subliminal audiotapes suffers from a lack of consistency and diversity, which should be corrected in the future.

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Received September 28, 1999
Revision received March 29, 2000
Accepted May 19, 2000