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SHORT COMMUNICATION

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Distraction resulting from disease related words in alcohol-dependent inpatients: a controlled dichotic listening study

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Abstract To test whether alcoholics develop an information processing bias towards disease-related stimuli, 30 alcoholic inpatients and 30 controls were administered a dichotic listening task. Three different stimulus types were presented to the right (ignored) channel: neutral words, rare neutral words and alcohol-related words. The hypothesized information processing bias should cause patients to make disproportionally more shadowing errors in the third condition. An ANOVA revealed a significant condition effect ($P < 0.001$), a tendency towards a group effect ($P = 0.09$) and a significant interaction ($P < 0.01$) in the expected direction. There was a marked increase of errors in alcoholics when disease-related stimuli were presented compared to the neutral conditions and to the controls.

Key words Alcoholism · Dichotic listening · Neuropsychology · Cognitive psychology · Semantic network

Introduction

Clinical evidence points towards the eminent role of "alcohol" in the addicts' thinking, emotions and behavior. During the drinking history of a person, specific disease-related semantic concepts may be shaped and the accessibility of these semantic structures may be enhanced. In consequence, an information processing bias should be evident when alcohol cues are presented (Hill and Paynter 1992). In different experimental paradigms, such a bias may either facilitate task-relevant information processing (e.g. priming in a lexical decision task) or may cause distraction from the relevant task (e.g. dichotic listening). In our study, the second possibility was investigated, as several dichotic listening studies with patients suffering from various diseases demonstrated increased distractability when disease-related words were presented. Burgess et al. (1981) described a modified dichotic listening procedure in which phobics detected more disease-related targets in the unattended channel than controls. A corresponding effect was shown with obsessive-compulsives (Foa and McNally 1986). Matthews and MacLeod (1986) found more (prose) shadowing errors in patients with a generalized anxiety disorder, when threat words were presented in the irrelevant channel. Our hypothesis states that alcohol-dependent patients show disproportionally more shadowing errors than controls in a dichotic listening task, when disease related words are presented in the irrelevant channel as compared to neutral conditions.

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Methods

Subjects

Thirty alcohol-dependent inpatients with a chronic course of the disease (ICD-10 and DSM-III-R criteria) were recruited from an inpatient detoxification and motivation program at the Department of Psychiatry, University of Tübingen. Patients were severely ill, as demonstrated by high amounts of consumed alcohol (213 ± 157 g alcohol per day), duration of dependency (6.3 ± 4.7 years) liver damage (Gamma-GT: 113 ± 159 IU/l) and high values on alcohol dependency scales [e.g. MALT-S (Feuerlein et al. 1977): 17.5 ± 4.4].

Patients dependent on other psychotropic substances in addition to alcohol or with an additional diagnosis of affective, schizoaffective or schizophrenic disorder were excluded. All subjects were right-handed and had normal hearing ability. The control group consisted of 30 normal "social drinkers" with a maximum consumption of 40 g alcohol per day. They were recruited from acquaintances of the authors. They were not familiar with the alcoholism research program or alcoholism therapy. Both groups were comparable concerning age (patients: 36.5 ± 8.5; controls: 37.3 ± 7.8 years), sex (6 females vs 7 females, respectively) and verbal IQ [103 ± 15 vs 107 ± 14 respectively (MWT-B; Lehrl 1977)]. At the time of testing, patients had abstained from drinking for about 7 days on average. They were unmedicated and no longer showed any withdrawal symptoms. The tests were carried out at an early stage of therapy so as to minimize possible treatment effects on the hypothesized disease-related semantic concepts.

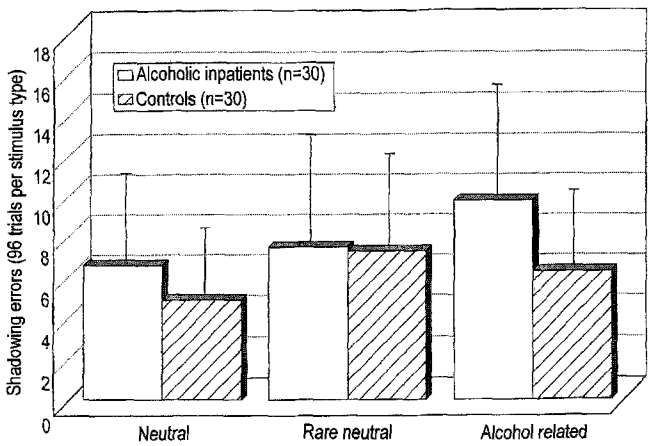

Fig. 1 Shadowing errors in a dichotic listening task (mean ± SD) of 30 alcoholic inpatients and 30 healthy controls concerning three different conditions in the irrelevant channel (stimulus type: neutral-, rare neutral-, alcohol-related words)

The dichotic listening procedure

The subjects were told that the test assesses their capacity of attention, they were not informed that alcohol-related words may appear. After an audiotest and a practice trial, the subjects were administered three dichotic listening conditions. Each condition consisted of 96 pairs of different words, presented simultaneously but to different ears from a stereo tape recorder via a headphone. Words in the left channel (= left ear) had to be repeated aloud (shadowing), while words appearing in the right channel (= right ear) were to be ignored (unattended or irrelevant channel). The presentation rate was 40 word pairs per minute. In the relevant (left) channel, neutral words (household terms) had to be repeated aloud. The three conditions differed in the irrelevant (right) channel. Neutral condition: 100% neutral words; Rare neutral condition: 25% rare neutral words (minerals) and 75% neutral words; Alcohol condition: 25% alcohol-related words (e.g. "black-out", "drunkenness", "beer") and 75% neutral words. Each word was presented only once. Twenty-four alcohol words had been selected for their alcoholism specifity by 80 alcoholics and 5 experts from 500 words which another sample of 60 alcoholics had related spontaneously to their past drinking behavior and history. The two word types (alcohol/neutral) were matched for length (one or two syllables) and word frequency [according to tables of German word frequency of written (Meier 1967) and spoken (Ruoff 1981) speech] as far as possible. Rare neutral words were matched only for length. The order of the three different experimental conditions was balanced across subjects.

Results

An ANOVA of the error rate of each subject in each condition with the factors group (alcoholics, controls) and stimulus type (neutral, rare neutral, alcohol related) revealed a significant effect for stimulus type ($F[2, 108] = 10.5$, $P < 0.0001$), a trend for group ($F[1, 54] = 3.1$, $P = 0.09$), and a significant interaction group × stimulus type ($F[2, 108] = 5.2$, $P < 0.01$). In accordance with our hypothesis, the alcoholic inpatients showed a marked increase in the error rate with the alcohol condition as compared to the neutral conditions (neutral words: $t[29] = 4.07$, $P < 0.001$; rare neutral words: $t[29] = 2.55$, $P < 0.05$). This effect was not obtained with controls (neutral words: $t[29] = 1.79$, $P > 0.05$; rare neutral words: $t[29] = 1.66$, $P > 0.10$). Also, significant differences between both groups were only found in the alcohol condition ($t[58] = 2.71$; $P < 0.01$).

Discussion

The main hypothesis of this dichotic listening study concerned an information processing bias of alcoholics towards an enhanced automatic (not necessarily unconscious) processing of disease-related words. Our results of the error rates of alcoholics and controls showed that both groups differed only in the specific disease-related condition, while there were no significant group effects in the two neutral conditions. These experimental results support the hypothesis of a disease-related semantic category effect in alcoholics, which may influence attention as well as other (possibly unconscious) features of information processing. We used a dichotic listening paradigm with unrelated word pairs with a high presentation rate, as was done by Straube and Germer (1979) or Trandel and McNally (1987). Using this experimental paradigm, it is unlikely that shifts of attention to the irrelevant channel explain the entire effect. However, our study did not aim at clarifying the "unconscious processing versus attentional shift" discussion. We tried to find any kind of disease-related information processing bias in alcoholics and the results of our study gave empirical support to this assumption. Relating the observed effects of an information processing bias to semantic network theories (Quillian 1967, Collins and Loftus 1975), the associative strength and the accessibility of the hypothesized disease-related category may be enhanced in alcoholic patients compared to healthy social drinkers. Effects of word frequency in everyday language – as controlled by our "rare neutral condition" – did not account for this result. Moreover, one can consider the possibility that the activation of a semantic category representing disease-related information might also have an impact on affective structures – e.g. by a "spreading activation" to affective networks as proposed by Bower (1981) and Blum (1989). Such correlations with emotional states after cue exposure (video tapes) were shown in opiate abusers (Legarda et al. 1990). Though empirical support for the hypothesis of a disease-related semantic network in addition to our dichotic listening study was derived from a semantic priming study (Hill and Paynter 1992) and an "Alcohol-Stroop" study (Stetter et al. 1994), such effects should be replicated using various experimental paradigms and different populations of alcoholics.

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