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Short Communication

Increasing the efficacy of cue exposure treatment in preventing relapse of addictive behavior

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Abstract

Theoretically, cue exposure treatment should be able to prevent relapse by extinguishing conditioned drug responding (e.g. cue-elicited craving). According to contemporary learning theory, though, extinction does not eliminate conditioned responding. Analogous cue exposure with response prevention (CERP) as a treatment of addictive behavior might not eliminate the learned relation between drug-related cues and drug use. This does not necessarily mean that cue exposure cannot successfully prevent relapse. Various suggestions for increasing the efficacy of cue exposure treatment are being discussed from a contemporary learning theory perspective. It is suggested that cue exposure treatment incorporating retrieval cues can be a beneficial treatment in preventing relapse of addictive behavior.

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Keywords: Addiction; Cue exposure; Relapse

1. Introduction

Cue exposure with response prevention (CERP) refers to the treatment in which a drug addict is repeatedly exposed to stimuli associated with their addictive behavior. These drug-related stimuli are termed cues and the reactivity these drug cues elicit is generally considered to be a conditioned drug response. The conditioned drug responses can be subjective (e.g. craving), psychophysiological (e.g. changes in heart rate), or behavioral (e.g. drug-seeking

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behavior) and these responses are considered to motivate and/or increase the likelihood of drug self-administration. Cues thus function as conditioned drug stimuli predicting drug-taking behavior. Repeated exposure to these drug-related cues preventing self-administration of the drug should eliminate the learned relation between drug cues and drug use. This treatment leads to the gradual extinction of the conditioned drug responses. It has been suggested that this form of treatment might limit the probability of relapse. When these responses are extinguished, the primary motivation for continued drug use is eliminated, and thus, the probability of relapse of addictive behavior should be small (Drummond, Tiffany, Glautier, & Remington, 1995; Jansen, 1998).

Several controlled trials investigating the efficacy of cue exposure treatment have been conducted. None of these studies found a substantial effect on relapse by extinguishing cue reactivity. Dawe et al. (1993) studied the efficacy of cue exposure treatment in opiate addicts and found that cue exposure had no additional effect on relapse rates as compared with a control group of patients receiving a standard inpatient treatment. Drummond and Glautier (1994) did find an effect of cue exposure treatment on relapse in alcoholics. They found that cue exposure treatment increased the latency to relapse, though the relapse rate did not differ from a control group of patients having received relaxation training. Niaura et al. (1999) studied the efficacy of cue exposure treatment in smokers for smoking relapse prevention and found that it did not affect relapse at all. O'Brien, Childress, McClellan, and Ehrman (1990), investigating the efficacy of cue exposure treatment in recovering drug dependent patients, found that cue reactivity (i.e. craving) as well as occasional drug use still occurred outside the treatment setting, even in those patients in which conditioned drug responding had been successfully extinguished.

Apparently, the extinction of cue reactivity does not generalize beyond the treatment setting. How can this be explained? Extinction is often regarded as the 'unlearning' of a previously learned behavior. This view of extinction, however, implies that extinction is forever; sadly, it is not (see Bouton, 1994). Conditioned responding can recover after extinction, which indicates that extinction is not merely some form of 'unlearning.' This fact leads to the prediction that CERP in its present form might be inadequate in eliminating conditioned drug responding (i.e. cue reactivity) and thus in limiting the probability of relapse. Cue exposure leads to the extinction of cue reactivity, but cue reactivity may recover after treatment. The notion of recovery of conditioned drug responding can explain why cue exposure treatment has not been found to be a successful technique in limiting relapse of addictive behavior. If, somehow, the recovery of extinguished cue reactivity could be prevented, cue exposure treatment might be additionally beneficial in preventing relapse of addictive behavior after all.

In this article, several suggestions to improve the efficacy of CERP as a treatment of addictive behavior are discussed. The described issues all follow from contemporary research on learning and motivation and are reformulated for clinical practice. First, it is described how contemporary learning theory defines extinction and how it explains the recovery of conditioned responding. Second, different methods to prevent the recovery of extinguished cue reactivity are discussed. Suggestions for future research are addressed.

2. Theoretical notes

2.1. Recovery of conditioned responding

Pavlov (1927) already noted that extinction is not forever. He found that extinguished conditioned responding can recover some time after extinction. This effect has been termed spontaneous recovery and it clearly demonstrates that extinction does not eliminate or break the initially learned relation between a conditioned stimulus (e.g. a tone) and an unconditioned stimulus (e.g. food). Another phenomenon indicating that extinction is not the ‘unlearning’ of an association is the renewal effect. This effect refers to the renewal of conditioned responding after extinction when the conditioned stimulus is presented in an environmental context different from the context in which extinction has taken place. Bouton (1994) states that the conditioned stimulus has acquired an ambiguous meaning after extinction. After extinction, this stimulus predicts both the presentation and the absence of the unconditioned stimulus. In other words, the conditioned stimulus has acquired an excitatory meaning during conditioning versus an inhibitory meaning acquired during extinction. An organism can disambiguate the meaning of the conditioned stimulus by letting its inhibitory meaning depend on the environmental context. Within the extinction context, the conditioned stimulus has an inhibitory meaning, whereas outside this context, the conditioned stimulus has an excitatory meaning capable of eliciting conditioned responding. According to Bouton (1993), the inability of the generalization of the inhibitory meaning of the conditioned stimulus outside the extinction context is due to the organism’s inability to retrieve this meaning. Spontaneous recovery can also be explained in terms of the inability to retrieve the meaning of the conditioned stimulus in an environment other than the extinction context. Extinction takes place against a background of all kinds of stimuli, including time. When the conditioned stimulus is represented some time after extinction, conditioned responding is renewed because the conditioned stimulus is now presented in a temporal context different from the temporal context in which extinction has taken place.

These findings pose serious implications for cue exposure treatment (Bouton, 1988). Extinction is not forever, and thus, it is quite conceivable that conditioned drug responding can be renewed after cue exposure treatment. The question here is how this potential recovery of conditioned drug responding can be prevented.

2.2. Cue exposure within the drug use environment

One does not need to worry whether the inhibitory meaning of a drug cue generalizes to the context in which the addict used to take drugs when you conduct CERP in this particular environment. However, this is not always possible, and an additional problem is that addictive behavior is usually not restricted to one particular environment. Addicts administer their drugs in a wide variety of settings and situations (Hammersley, 1992). Furthermore, this procedure would entail an outpatient treatment in which it is difficult to control for drug use between sessions. It is of great importance that a patient undergoing cue exposure treatment does not take any drugs during this treatment, since such a lapse

might reestablish the originally learned relation between drug cues and drug use. In sum, although conducting cue exposure within the drug use environment can theoretically prevent renewal of cue reactivity, there are just too many practical limitations to be considered as the ideal alternative to ‘standard’ CERP.

2.3. *Cue exposure within multiple contexts*

In case it is impossible to conduct CERP in the drug use environment, one needs to achieve generalization of the inhibitory meaning of the drug cues to contexts other than the treatment setting. An often proposed way of establishing this form of generalization is to conduct CERP in multiple settings (see [Gunther, Deniston, & Miller, 1998](#)). The general idea is that conducting CERP in a number of different environments enhances the probability of generalization of extinguished cue reactivity to an environment other than the treatment setting, thus limiting the probability of renewed cue reactivity. In animal studies, it has been shown that this procedure indeed reduces the probability of renewal. However, conducting CERP in multiple settings will slow down the extinction of cue reactivity. Furthermore, it is completely unclear in how many different contexts one needs to conduct CERP to prevent renewal of conditioned drug responding. Additionally, one can seriously doubt whether an addict in an inpatient treatment will perceive various, artificially created settings within the same treatment facility as distinct environmental contexts.

Even when these drawbacks can be overcome, this method does not prevent spontaneous recovery of drug cue reactivity. One way to tackle this problem is to readminister CERP at intervals to reduce the probability of spontaneous recovery ([Hammersley, 1992](#)). This procedure, however, lengthens the treatment even further. The ideal CERP would be a treatment, which considers and controls for the probability of a renewal effect and spontaneous recovery without having to deal with the drawbacks mentioned above.

2.4. *Cue exposure with retrieval cues*

Conducting CERP within multiple settings at intervals can establish the generalization of extinguished cue reactivity but has its obvious drawbacks. Another, more promising option is to conduct CERP incorporating retrieval cues. Retrieval cues are salient features of the extinction environment, which facilitate retrieval of the inhibitory meaning of the conditioned stimulus when presented outside the extinction context. [Bouton \(1993\)](#) regards both the renewal effect and spontaneous recovery as the inability to retrieve the inhibitory meaning of the conditioned stimulus. He has found that when a salient feature of the extinction context is presented in a context other than the extinction environment, its presence reduces the probability of renewal. Similarly, [Brooks \(2000\)](#) has found that such retrieval cues can reduce the probability of spontaneous recovery. CERP incorporating retrieval cues might thus enhance generalization of the extinguished drug responses to contexts other than the treatment setting. However, what features might function as such retrieval cues? In animal studies, these cues can be almost any kind of stimulus as long as it is perceived as a salient feature of the extinction context. It is not clear, though, what stimulus might function as such a retrieval cue in humans.

Cunningham (1998) has suggested that perhaps wearing a specific clothing article during cue exposure sessions might endow this article with the function of a retrieval cue. Wearing this particular piece of clothing after discharge should help the patient to retrieve the cue exposure treatment setting and this should prevent renewal and spontaneous recovery of conditioned drug responding, thus limiting the probability of relapse. Another example of a potential retrieval cue is the use of a reminder card. Marlatt and Gordon (1985) describe the use of a reminder card in their relapse prevention program. This card is used as a reminder of what to do in case of a lapse. In cue exposure treatment, such a card may be used as a reminder of the treatment setting. It may contain, for instance, a schematic representation of the rationale, which reminds the client of the cue exposure treatment after discharge from a clinic, hence functioning as a retrieval cue.

3. Conclusion

Learning and motivation is a dynamic research area, and thus, contemporary learning theory continues to be an important resource for the implementation and development of behavioral therapy. However, this requires that both researchers and clinicians need to be aware of developments within this area at all time.

Based on principles derived from contemporary learning theory, CERP incorporating retrieval cues (e.g. a reminder card) can be a promising adjustment of standard cue exposure treatment. It does not require extending the length of treatment and may control for a renewal effect and spontaneous recovery at the same time. When cue reactivity is extinguished and recovery of conditioned drug responding can be prevented by cue exposure incorporating retrieval cues, it is predicted that relapse of addictive behavior can be prevented more successfully. Whether CERP incorporating retrieval cues indeed more successfully prevents relapse of addictive behavior is an important empirical question, which needs to be addressed in future research.

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