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## **AVERSIVE CONTROL IN HUMANS: THE ROLE OF VERBAL PROCESSES**

*CONTROL AVERSIVO EN HUMANOS:  
EL PAPEL DE PROCESOS VERBALES*

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### **ABSTRACT**

The opinion put forward in this article is that verbal processes may play a crucial role in the establishment and maintenance of aversive control in humans, and can give rise to behaviors that are not predicted by traditional behavior-analytic theories. For example, behavior can be controlled by aversive consequences that have never been contacted. These verbal processes may play a key role in some psychopathologies, such as phobias and anxiety. The basic research on this topic – although limited – is supportive, but more studies are needed to fully explore this important area.

*Keywords:* aversive control, verbal behavior, avoidance, transformation of function, derived relational responding

### **RESUMEN**

La opinión propuesta en este artículo es que los procesos verbales pueden jugar un papel crucial en el establecimiento y mantenimiento del control aversivo en humanos, y dar lugar a conductas que no son predichas por teorías

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analítico-conductuales tradicionales. Por ejemplo, la conducta puede ser controlada por consecuencias aversivas que nunca han sido contactadas. Estos procesos verbales pueden jugar un papel clave en algunas psicopatologías, tales como fobias y ansiedad. La investigación básica en este tópico— aunque limitada— es favorable, pero se necesitan más estudios para explorar completamente esta importante área.

*Palabras clave:* control aversivo, conducta verbal, evitación, transformación de funciones, responder relacional derivado

It is clear that, although human and nonhuman behaviors can be explained by many of the same processes (e.g., respondent conditioning, reinforcement, punishment), human and nonhuman behavioral outcomes often differ greatly. Nonhumans do not suffer from existential angst, worry about injustice in the world, or commit suicide; and human behavior is often not under the control of proximal environmental events. For example, most people will subject themselves to the somewhat unpleasant event of attending a dentist in order to postpone or terminate possible dental discomfort in many years time, even if the individual has never experienced dental pain previously. The view advanced in this article is that verbal processes play a central role in aversive control in humans. The limited experimental data supports this notion of control by aversive verbal consequences, but more research is needed to support and extend these findings. A better understanding of this subject might be useful because it is possible that the processes involved in clinically relevant phenomena, such as phobias for example, are largely verbal.

Avoidance learning, which is one aspect of aversive control, has received much attention within the behavior analytic literature, stimulating both empirical research and theoretical debate (Dinsmoor, 1954; Herrnstein & Himeline, 1966; Sidman, 1962). In a typical un signaled avoidance preparation, pressing on a lever postpones an imminent shock. This avoidance behavior is considered to be particularly interesting because it is not obvious what consequence reinforced the lever press. For example, the absence of an aversive stimulus, such as shock, cannot be a reinforcer, because the absence of shock is common to many kinds of situations. According to Dinsmoor (2001), there are currently two behavior-analytic interpretations of avoidance learning. The first approach, termed *two-process* theory (e.g., Dinsmoor 1977; 2001), assigns a primary role to response-produced stimuli and/or by exteroceptive stimuli that are contingent on the avoidance response. Such stimuli are considered to act as *safety signals* because they introduce a period of no aversive stimulation. The second approach, *single-process* theory, hypothesizes a direct reinforcing effect resulting from the negative correlation over time between rate of responding and the frequency or the severity of the shocks (e.g., Herrnstein, 1969; Herrnstein & Himeline, 1966; Sidman, 1966).

In contrast to the many studies on the topic of aversive control with non-human subjects, there is far less research on the critical processes involved in aversive control with human subjects. It is possible that other processes, beyond those specified by one and two-factor theories, are involved in avoidance learning in humans: it is suggested here that these processes may be verbal. In order to describe control by aversive verbal consequences, it is first necessary to explain relational frame theory (RFT; see Hayes, Barnes-Holmes, & Roche, 2001), the perspective that is taken here, and also to explain what is meant by the technical term *verbal* when used in the context of an RFT approach. A comprehensive review of RFT is beyond the scope of this article, but a brief outline should suffice in the current context.

Several studies (e.g., Sidman, 1971) have suggested humans can learn to relate stimuli that have not been directly paired with each other. For example, if told that nauseous is another word for queasy, and that queasy is another word for sick, most people who understood the word sick would avoid eating a food that would make them feel “nauseous”. Making the connection between stimuli that have not been directly paired is referred to as *deriving* the association between stimuli; the relations among untrained, related stimuli are termed *derived relations*.

According to RFT, the ability to derive relations does not appear from nowhere – it is a learned behavior, an overarching, purely functional operant (see Hayes & Barnes-Holmes [2004] and Palmer [2004] for a recent discussion of this subject). The term *Relational Frame* is used to describe particular kinds of purely functional operant responding (see Hayes et al., 2001, p. 33), and empirical studies have demonstrated responding in accordance with a number of relational frames, for example More-than and Less-than (Dymond & Barnes, 1995; Reilly, Whelan, & Barnes-Holmes, 2005; Whelan, Barnes-Holmes, & Dymond, 2006), and Same and Opposite (Roche & Barnes, 1997; Whelan & Barnes-Holmes, 2004; Whelan, Cullinan, Valverde, & O’Donovan, 2005). From an RFT perspective, the term verbal is used as a modifier that denotes the event in question involves relational framing in some way.

The feature that gives derived relational responding its psychological significance is *transformation of function*. That is, once a particular behavioral function is directly trained for one stimulus, the functions of related stimuli may be altered in accordance with the relevant relational frame, without further training. If a child were told, for example, that a newly available candy bar tastes terrible, and the child was also told that terrible was the opposite of nice, the new candy bar may fail to function as a reinforcer because it now participates in a frame of Opposite with directly experienced “nice-tasting” candy bars. Thus, a crucial point about verbal behavior is that, although it emerges from operant contingencies, the result of verbal behavior is to change how *other* behavioral principles operate (cf. Ingvarsson & Morris, 2004). For ex-

ample, Hayes, Kohlenberg and Hayes (1991) demonstrated that the punishing functions of a particular stimulus (B3), established through direct stimulus pairing, could be transferred to an indirectly related stimulus (C3) through a relational frame of Coordination.

It is important for behavioral researchers to distinguish between verbal and non-verbal behavior, although this may be difficult because some events that appear similar may have little in common at the level of process. For example, two topographically indistinguishable events, even if they are both produced through verbal behavior and function as punishers, can be verbal or not depending on the relevant history of the responding organism (cf. Skinner, 1957). For example, a verbal punisher is a consequence that functions as a punisher and that participates in a relational frame. If a child were told, for example, that a particular behavior was “naughty”, and the child had previously learned that naughty is the opposite of good, then the word naughty may function as a punisher because it is in a relational frame of Opposite with the word good. That is, for the child, the previously neutral functions of the word naughty were altered in a specific way based on a history of framing relationally, rather than direct training, stimulus generalization or respondent conditioning, for example (see Hayes, Barnes-Holmes, & Roche, 2003, p. 49). In contrast, suppose a person says to their dog that a particular behavior was naughty. The person may say naughty as an instance of framing events relationally (e.g., the bad behavior of the dog is in a frame of Coordination with naughty), and this event may function as a conditioned punisher for the dog. Its behavioral effects on the dog, however, are not due to the participation of the word naughty in a relational frame with other events. Thus, “naughty dog” is not a verbal punisher for the dog.

Despite the importance of the topic of verbal aversive control, there is a relative paucity of basic research in this area, particularly in comparison with the copious data on non-verbal aversive control. One key finding that has emerged from the empirical literature to date, however, is that avoidance behavior can be regulated by verbally constructed consequences (i.e., primary reinforcers or punishers that are never contacted), because the transformation of stimulus functions through derived relations allows verbal stimuli to acquire functions related indirectly to other events (Hayes, et al., 1991; Greenway, Dougher, & Wulfert, 1996; Whelan & Barnes-Holmes, 2004). The technical term given to verbal behavior that establishes given consequences as reinforcers or as punishers is *formative augmenting* (Barnes-Holmes et al. 2001, pp. 109-110).

A study by Augustson and Dougher (1997) is noteworthy because it constitutes an analysis of derived avoidance-evoking functions in the laboratory. An arbitrary stimulus, B1, was indirectly related to C1 and D1 (all stimuli were directly related to A1). In a respondent conditioning procedure, B1 was paired

with shock. Subjects were then exposed to a key-pressing task, and a signaled avoidance task was introduced in which twenty responses or more in the presence of B1 resulted in the successful avoidance of a shock. Subsequently, both the related C1 and D1 stimulus reliably controlled the avoidance behavior, despite the fact that neither stimulus had ever predicted shock.

It is important to note that the findings of Augustson and Dougher (1997), Hayes, et al. (1991), and Greenway et al. (1996) can be interpreted in terms of other theories of equivalence, for example the approach promulgated by Sidman (1994). A key tenet of RFT, however, is that psychological functions can not only be transferred through equivalence classes, but can also be transformed in accordance with multiple stimulus relations (Hayes & Barnes, 1997). Recently, Dymond, Roche, Forsyth, Whelan, and Rhoden (in press) extended the findings of Augustson and Dougher by demonstrating the emergence of avoidance functions for stimuli that participated in Opposite relational frames with aversive stimuli (photographs of bodily mutilations). In Whelan and Barnes-Holmes (2004, Experiment 4) a single punishing function for one member of a relational network was established, and based on the relational frames of Same and Opposite, other members predictably acquired reinforcing functions, although no such function had actually been established for *any* member of the network. Furthermore, traditional explanations, which rely on negative correlations over time or stimulus pairings; for example, Herrnstein & Hineline (1966) and Dinsmoor (2001), respectively; could not have predicted the transformations of function that occurred in Dymond et al. and Whelan and Barnes-Holmes's Experiment 4 (although see Tonneau, Arreola, & Martinez, [2006] for an alternative theoretical account). Of course, these are just the initial steps in analyzing verbal aversive control, and many more laboratory studies are needed to explore more fully this type of behavior.

Verbal behavior seems to be almost ubiquitous among humans – even sixteen month old babies can show robust forms of mutual entailment (Lipkens, Hayes, & Hayes, 1993) – but nonhumans, even “language-trained” chimpanzees (Dugdale & Lowe, 2000), apparently cannot derive relations among stimuli (cf. Schusterman & Kastak, 1993). Mineka (1985) suggested that there may be limited utility in extrapolating to humans from avoidance learning experiments with non-human subjects, noting that there are some crucial differences between human and nonhuman avoidance preparations. For example, in laboratory studies of avoidance in nonhumans at least a few pairings of the conditioned stimulus (CS) and the unconditioned stimulus (UCS) must be arranged whereas in studies with humans, such as Augustson and Dougher (1997), no such direct pairings need be arranged. The findings of verbal avoidance learning studies are important, therefore, because they may help to shed light on some clinically relevant phenomena, such as anxiety, obsessive compulsive disorder, and phobias (Friman, Hayes, & Wilson,

1998). Anxiety disorders, for instance, involve avoidance of, or escape from, events that often have no direct relationship with punishment (e.g., fish, harmless spiders). Thus, although there has been debate surrounding whether one- or two-factor theory accounts more satisfactorily for the acquisition and subsequent maintenance of avoidance behavior in clinical populations (Plaud & Plaud, 1998), it is likely that verbal processes play a central role in some kinds of psychopathology.

According to Plaud and Plaud (1998), "Behavior therapists are continually presented with clients whose learning histories appear to be full of aversive events." (1998, p. 911). Perhaps this is because the form of verbal behavior is, by definition, arbitrary and hence control by verbal behavior varies to a much greater extent than nonverbal behavior. A behavioral repertoire that includes relational framing will become more and more verbal and non-verbal functions will become more and more entangled with verbal functions. Dougher and Augustson (1997) have noted that individuals suffering from anxiety often seek treatment, not because of fear of the aversive stimulus itself, but because of the incapacitating consequences of the avoidance patterns that become established around those objects and events. The aversive functions of stimuli can be transformed, such that events with no physical similarity to the original aversive stimulus can themselves become aversive. For example, a panic-disordered person's fear of elevators may occasion the verbal response, "I feel trapped". However, other situations may come to occasion this verbal statement, and the aversive functions elicited by elevators may soon spread to other small spaces, open spaces, or perhaps a job, based on the abstracted features of the situations along metaphorical dimension of "can't easily get out of" (Hayes et al., 2001, p. 94). Friman et al. (1998) have also extended this analysis to posttraumatic stress disorder (PTSD), claiming the hyperarousal associated with PTSD is verbally produced. Friman, et al. (1998) maintain that a verbal account of anxiety provides some support for talk therapy. That is, "If verbal events are functionally related to behaviorally and clinically important events in a client's current and previous environments, it follows that knowledge of the relationships could help the therapist and client predict and influence important behavioral outcomes" (p. 146).

In this article, a distinction has been drawn between verbal and non-verbal behavior, in particular as it pertains to the establishment and maintenance of control by aversive consequences. Basic research with human subjects has suggested that verbal processes can give rise to behaviors that are not predicted by traditional behavior analytic theories. Thus, it is necessary to consider verbal processes, in addition to either one- or two-factor theory,

when analyzing aversive control in language-able humans. The limited data on this topic suggest that an analysis of the verbal processes involved may be useful, but more research is required to fully address the possible utility of this approach. As previously mentioned, verbal processes may play a key role in psychopathologies. It is incumbent on basic researchers, therefore, to develop procedures that will model, in the laboratory, the complexity and flexibility of verbal behavior as it occurs in the natural environment. The significance of the subject matter means that a relatively small increase in effort by basic researchers will result in huge advances in our understanding of human behavior.

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