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# The Experimental Analysis of Human Sexual Arousal: Some Recent Developments

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Experimental analyses of human sexual arousal have been decidedly sparse. Recent developments in the analysis of derived relational responding, however, have opened the way for a modern behavior-analytic treatment of complex or "novel" human behavior, including specific instances of human sexual arousal. The current article examines some of these developments and their relevance to the analysis of emotional behavior, with a focus on sexual arousal. Recent research that has examined the acquisition of sexual stimulus functions within a relational frame paradigm is then outlined. Finally, a series of relational frame interpretations of a variety of human sexual arousal phenomena is offered.

*Key words*: human sexuality, sexual arousal, relational frame theory, stimulus equivalence, derived transfer, respondent, operant

Behavior analysts have spent relatively little time investigating the conditioning of human sexual arousal to previously neutral stimuli. What little research has been conducted in this area, within a behavior-analytic paradigm, has been largely confined to the respondent conditioning of sexual stimulus functions in visual stimuli, such as the human form (see McGuire, Carlisle, & Young, 1965), abstract symbols (Langevin & Martin, 1975; Lovibond, 1963), female clothing (Rachman, 1966; Rachman & Hodgson, 1968), and red circles (McConaghy, 1969). Although these early basic experimental analyses appeared to be promising, basic sex research pioneers (e.g., Bancroft, 1970; McConaghy, 1969) soon concluded that conditioned sexual responses to experimental stimuli were simply too weak to serve as realistic experimental analogues of sexual arousal outside the laboratory. In the interim, it has also come to light that good analogues of deviant arousal, such as fetishism, cannot be created through traditional laboratory conditioning procedures (LoPiccolo, 1994; Rachman, 1977; see also Marks, 1987; O'Donohue & Plaud, 1994). Perhaps for this reason, among others (e.g., ethical constraints), little has been done to supplement the early basic behavioral sex research (Laws & Marshall, 1990; Quinsey & Marshall, 1983).

Basic analyses of operant processes in sexual arousal response patterns have also been sparse, with only a handful of relevant studies published over the past 20 years (see Earls & Castonguay, 1989; Marshall & Barbaree, 1988). Nor have clinical studies provided a solid empirical base from which to approach the analysis of any particular dimension of human sexual behavior. Those studies conducted under the rubric of behavior analysis have generally been concerned with altering already established unwanted sexual arousal responses, rather than examining how sexual arousal is established in the first place (see O'Donohue & Plaud, 1994, for an excellent review of this research). In effect, there has been no detailed experimental analysis of the basic behavioral processes involved in human sex-

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ual arousal since the preliminary investigations conducted in the 1960s.

In recent years, however, developments in the analysis of derived relational responding have provided important opportunities for the analysis of complex human behavior, including some types of emotional behavior, such as sexual arousal. In the following sections, we outline recent research that has illustrated the relevance of derived relational responding to complex emotional and sexual arousal response patterns. Relational frame theory (RFT) will then be presented as a behavior-analytic approach to derived relational responding and to human language more generally (see Hayes, 1991, 1994; Hayes & Barnes, 1997). Finally, relational frame interpretations of several human sexual arousal phenomena will be considered.

## DERIVED RELATIONAL RESPONDING AND EMOTIONAL AROUSAL

As indicated in the previous section, a number of researchers have challenged the suggestion that human sexual arousal may be explained using the traditional concepts of respondent and operant conditioning (LoPiccolo, 1994). Interestingly, some investigators working on derived stimulus relations have been breaking new ground in the analysis of other forms of emotional arousal (see Dougher, Augustson, Markham, Greenway, & Wulfert, 1994) that may prove to be relevant to the analysis of sexual arousal. We will examine this research briefly before highlighting its potential relevance to the current endeavor toward a modern experimental analysis of human sexual arousal. Parenthetically, the reader should note that the terms *sexual* and *emotional arousal* are not part of the technical nomenclature of behavior analysis, but in the interests of communication with those outside the discipline we have opted to use these commonsense labels as part of our research program.

In a study conducted by Dougher et al. (1994), subjects were trained on a series of six interrelated conditional discrimination tasks. On three separate training tasks, subjects were presented with a series of abstract shapes. Choosing the abstract shapes, referred to as B1, C1, and D1, was reinforced when the abstract shape named A1 was presented as a sample. On three further tasks, choosing the abstract shapes named B2, C2, and D2 was reinforced when the shape named A2 was presented as a sample. A third set of abstract shapes (A3, B3, C3, D3) served as incorrect comparisons, but relations among these were neither trained nor tested. A test for two four-member equivalence classes was then administered: A1-B1-C1-D1 and A2-B2-C2-D2.

A mild electric shock applied to each subject's forearm then served as an unconditioned stimulus (US) that followed presentations of B1 (i.e., respondent conditioning). Stimulus B2 was also presented, but in the absence of the US. Conditioned emotional responses to B1 and B2 were measured as skin conductance responses (SCRs). Subjects were then presented with the remaining members of each equivalence class to test for a "derived transfer" of respondent eliciting functions. Transfer was said to occur if SCRs to all members of the B1 class were greater than any of the responses to members of the B2 class. Using this stringent criterion, 5 of the 8 subjects showed evidence of respondent conditioning and a derived transfer of respondent eliciting functions through equivalence relations. In effect, this study demonstrated the emergence of *derived emotional responses* to B1 class members. These data, therefore, may have important implications for our understanding of complex patterns of emotional arousal. As Dougher et al. (1994) suggest, anxiety responses may be established for stimuli solely by virtue of the participation of those stimuli in derived relations with aversive events.

We suspect that the derived transfer effect may also have important implications for our understanding of "nov-

el" sexual arousal. More specifically, the foregoing data suggest that stimuli may acquire sexually arousing properties by virtue of their participation in derived relations with conditioned or unconditioned sexual stimuli. In fact, we tested this suggestion in a recent study. Across two experiments (Roche & Barnes, 1997, Experiments 1 and 2), 7 subjects were seated comfortably before a microcomputer on which a series of related conditional discrimination tasks were presented (i.e., see A1 pick B1, see B1 pick C1, see A2 pick B2, see B2 pick C2, see A3 pick B3, see B3 pick C3; all stimuli were nonsense syllables). For 4 subjects, training on these tasks led to the emergence of the following equivalence relations during testing: A1-B1-C1, A2-B2-C2, and A3-B3-C3. The remaining 3 subjects were not tested for equivalence relations at this stage. Using a respondent conditioning procedure, sexual and nonsexual functions were then established for the C1 and C3 stimuli, respectively. Specifically, a short sexually explicit film taken from a popular sex instruction video (i.e., Stanway's *The Lovers' Guide*) followed quasi-random presentations of C1 on 80% of trials, whereas a short nonsexual film (i.e., National Geographic) depicting scenic landscapes followed quasi-random presentations of C3, again on 80% of trials. A 45- to 60-s interval separated the conditioning trials.

We probed for respondent conditioning by measuring phasic changes in skin resistance (SRR)[1] during the 5-s nonsense syllable/film clip interval on the 12 final conditioning trials (i.e., six responses to either stimulus were recorded). Within approximately 18 conditioning trials, subjects generally showed differential conditioning (i.e., C1 produced significantly greater SRRs than did C3). Subsequently, these differential respondent conditioning functions transferred through equivalence relations to the A1 and A3 stimuli, respectively. That is, 5 of 7 subjects showing significantly greater SRRs to C1 over C3 also showed a significant response differential to A1 over A3. (The response differential to A1 and A3 was derived, in that A1 and A3 were not paired with film clips at any stage.)

These data indicate that the study of derived stimulus relations has provided us with an opportunity to examine parameters of emotional responding that have formerly been outside the purview of behavior analysis (i.e., instances in which sexual responding is derived). In particular, the transfer of functions in accordance with derived relations suggests that emotional responses in the world outside the laboratory may sometimes arise in the absence of direct reinforcement or stimulus pairing. Although this derived transfer effect is interesting in its own right, we have taken the view that the systematic study of such effects may make a serious contribution to a behavior-analytic account of human language and, most important from our perspective, how language may affect human sexual arousal. As part of this research agenda we have adopted RFT (Hayes, 1991, 1994; Hayes & Barnes, 1997). We recognize that this theory represents only one of several possible approaches to the analysis of derived relational responding and language, but we believe that there are good reasons for adopting it over other accounts, not least of which is that RFT appears to

[1] Electrodermal measures were used because they are more sensitive than other measures of arousal (e.g., penile plethysmography, heart rate) to paired stimulus paradigms with short intertrial intervals (Dawson, Schell, & Filion, 1990). Indeed, it has been argued that of all the nongenital measures of sexual arousal, EDA is perhaps the most reliable (see Zuckerman, 1983). The reader should also note that sexual arousal is a fuzzy concept that researchers have found difficult to define objectively (see Zuckerman, 1983). We have taken the view that a physiological sexual response is a set of autonomic reactions that are correlated with the occurrence of particular stimuli that are normally referred to as sexual. Although this view will likely prove to be less than completely adequate, it has served as a useful starting point.

provide the most conservative and parsimonious treatment of complex human behavior. Examining this and related issues, however, would take us beyond the scope of the current article; moreover, this topic has been dealt with elsewhere in considerable detail (Barnes & Roche, 1996; Hayes & Barnes, 1997, in press). In the next section, therefore, we will take RFT as a given in our research program, and explain how this approach may provide important insights into the role of language in human sexual arousal.

## RELATIONAL FRAME THEORY, VERBAL EVENTS, AND HUMAN SEXUAL AROUSAL

From the RFT perspective, some of the basic abilities that characterize verbal competence may be approached as a transfer of functions in accordance with derived stimulus relations. For example, suppose that the spoken words "stop," "cease," and "desist" participate in an equivalence relation for a child. After appropriate responses to the word *stop* are reinforced, the child should respond in the same way to *cease* and *desist* without explicit reinforcement (Barnes, Browne, Smeets, & Roche, 1995; Barnes & Keenan, 1993; Wulfert & Hayes, 1988). In effect, the control exerted over behavior by stimuli participating in equivalence relations parallels the control over human behavior exerted by verbal stimuli in the real world (Barnes & Holmes, 1991; Hayes & Hayes, 1989).

The foregoing suggests that the analysis of the transfer of functions provides a new behavior-analytic perspective on some important language effects, as well as some instances of sexual arousal. Indeed, many language and sexual effects are functionally similar. For instance, the behavior of derived "stopping" (given the word *cease*) in the above example and derived sexual responding, as demonstrated in Roche and Barnes (1997), both involve the transfer of psychological functions in accordance with an equivalence relation. Although different in form, these behaviors overlap functionally. The Roche and Barnes data suggest, therefore, that some instances of sexual arousal may be as verbal or symbolic as many language effects. For this reason, the relational frame research paradigm lends itself readily to the analysis of both language and human sexual arousal.

Another way in which RFT lends itself to the analysis of language and sexual arousal is in its treatment of multiple stimulus relations. With few exceptions (e.g., Green, Stromer, & Mackay, 1993; Steele & Hayes, 1991), the study of derived relational responding has focused almost exclusively on equivalence classes, and thus the relevance of this work for the study of language has been somewhat limited. Although some progress has been made in analyzing word-referent, or symbolic, relations in terms of equivalence, the study of syntactic relations, temporal conditionality, causality, hierarchical relations, and the like has received scant attention. One of the most important concerns for RFT, therefore, is to extend the analysis of equivalence relations to other types of relational responding, thereby providing an opportunity to study a wide range of language phenomena from a purely functional analytic perspective.

A small number of published studies have empirically demonstrated responding in accordance with multiple stimulus relations (Dymond & Barnes, 1995, 1996; Roche & Barnes, 1996; Steele & Hayes, 1991), and one recent experiment in particular has shown that sexual stimulus functions can transfer in accordance with such relations. In this experiment (Roche & Barnes, 1997, Experiment 4), 6 subjects were exposed to a form of relational pretraining designed to establish the contextual functions of *same* and *opposite* for two aribtrary stimuli (Steele & Hayes, 1991). During this pretraining,

relating *same* stimuli (e.g., a large line with a large line) in the presence of one contextual cue (SAME) and relating *opposite* stimuli (e.g., a large line with a small line) in the presence of a second contextual cue (OPPOSITE) were reinforced. Using nonsense syllables as arbitrary stimuli, subjects were then trained to relate the arbitrary stimuli B1 and C1 to A1 in the presence of the SAME contextual cue and to relate the arbitrary stimuli B2 and C2 to A2 in the presence of the OPPOSITE contextual cue (on all trials subjects were presented with third comparisons that were correct choices on a series of control tasks). The emergence of the derived relations (SAME) B1-C1 and (SAME) B2-C2 was predicted (i.e., A1 is the same as B1, A1 is the same as C1, therefore B1 is the same as C1; A2 is the opposite of B2, A2 is the opposite of C2, therefore B2 is the same as C2). Using a respondent conditioning procedure, sexual arousal and emotionally neutral functions were also established for the two nonsense syllables, B1 and B2, respectively (for some subjects the functions of these stimuli were reversed). The test for a transfer of sexual functions involved the presentation of the C1 and C2 stimuli alone. Four of 6 subjects showed significant respondent conditioning (i.e., a response differential to B1 and B2) and a subsequent transfer of sexual arousal functions in accordance with sameness and opposition (i.e., a transfer of the response differential from B1 and B2 to C1 and C2, respectively).

We believe that these data provide a solid (albeit small) empirical foundation for developing behavior-analytic interpretations of various kinds of human sexual arousal patterns. In what follows, we present a number of such interpretations. Before considering them, however, we wish to emphasize that these interpretations are offered not as definitive behavioral explanations but rather as heuristics for generating further research in both basic and applied domains.

## RELATIONAL FRAME INTERPRETATIONS OF REAL-WORLD SEXUAL AROUSAL

### *Learning in the Absence of a Direct Training History*

Many patterns of sexual arousal are presumably established through direct reinforcement and respondent contingencies in early childhood or adolescence (see Brown, 1986; Wysocki, 1993). However, some sexual arousal responses seem to defy explanation in these terms. For example, cross-dressers often report that they have never seen or heard of another individual cross-dress before they first engaged in transvestism (see McConaghy, 1987). Constructing a behavioral explanation of such sexual arousal patterns readily shows that a derived transfer of functions account may be of service. As an illustrative example, consider the following personal account of sexual development recorded by Zilbergeld (1979):

> The most interesting thing, though, is that for many months after I started masturbating, I never connected what I was doing with girls or what little I knew about sex. Masturbation—"whacking off" is what my room-mates called it—was just an enjoyable activity that boys did alone or in darkness. Only after I heard that one could put his penis in a vagina and experience similar sensations did I begin to put together what I was doing with what I might someday do with a girl and start developing sexual fantasies to accompany my solo ministrations. (p. 22)

In order to clarify the sequence of events reported in the above account, examine the relational network in Figure 1. This network indicates that, for this individual, sexual arousal functions did not transfer from actual masturbation and the word *masturbation* (or *whacking off*) to the word *vagina* and perhaps pictures of vaginas (if this individual had been exposed to pornography) until both participated in a derived frame of equivalence or coordination. For this individual, this relation was established, in part, through verbal interactions with his peers. In effect, the establishment of sexual

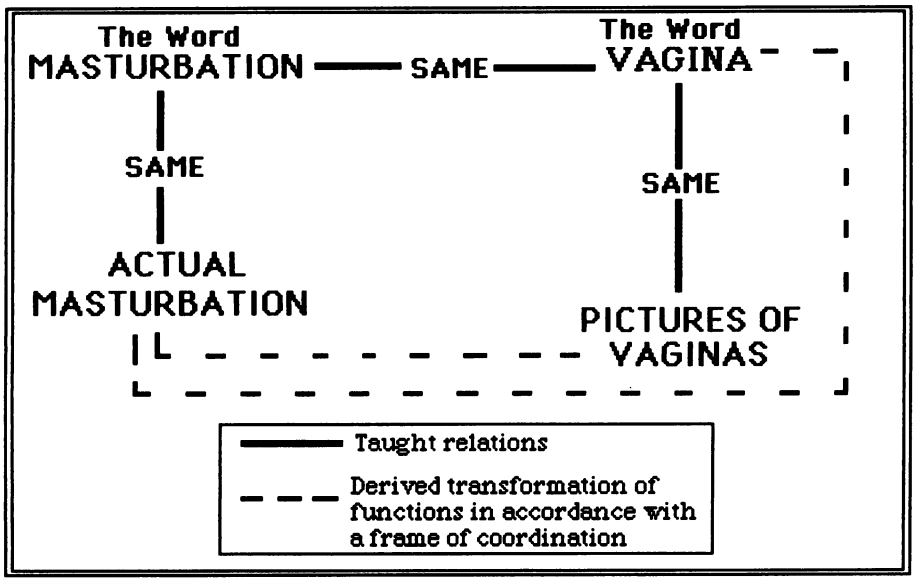


Figure 1. A set of taught and derived relations according to which sexual functions might transfer from masturbation to pictures of vaginas.

arousal functions in the word *vagina,* in the absence of an explicit stimulus pairing or response reinforcement history, can be conceptualized as a derived transfer of sexual arousal functions in accordance with a derived frame of coordination.

The foregoing also suggests that transvestite arousal need not originate from a direct history of reinforcement or stimulus pairing. To appreciate this point, consider a boy who learns verbally (e.g., is told by his classmates) that "bizarre" behaviors are often considered sexually arousing (see Figure 2, upper section). If this boy is then told at another time (e.g., a week or a month later) that it is "weird" or "bizarre" to dress in the clothes of the opposite sex (it is fair to argue that many children learn this), the words *sexual arousal* may be related to the words *cross-dressing,* in a suitable context, by virtue of a derived frame of coordination. More important, though, the words *sexual arousal* and *cross-dressing* also participate in socially established frames of coordination with actual sexual arousal and actual cross-dressing, respectively. Responding in accordance with these relations makes it likely that, in some contexts, the functions of actual sexual arousal will transfer to actual cross-dressing according to the extended relational network presented in Figure 2. In effect, the operation of this verbal network may facilitate the emergence of transvestite arousal as a form of novel behavior.

### *Sexual Fantasy*

A recurring idea within the sex research literature is that sexual arousal emerges from the subjective content of fantasies. Some researchers, for example, have had success "reorienting sexual deviants who had no normal sexual interest by instructing them that whatever the initial stimulus to masturbation, the fantasy in the five seconds just before orgasm must be of normal sexual intercourse" (McGuire et al., 1965, p. 187; see also Bancroft, 1970; Barlow, Agras, Leitenberg, & Callahan, 1972; Rachman & Hodgson, 1968).

Interestingly, RFT permits the transfer of response functions that are either overt or covert, and thus it provides a

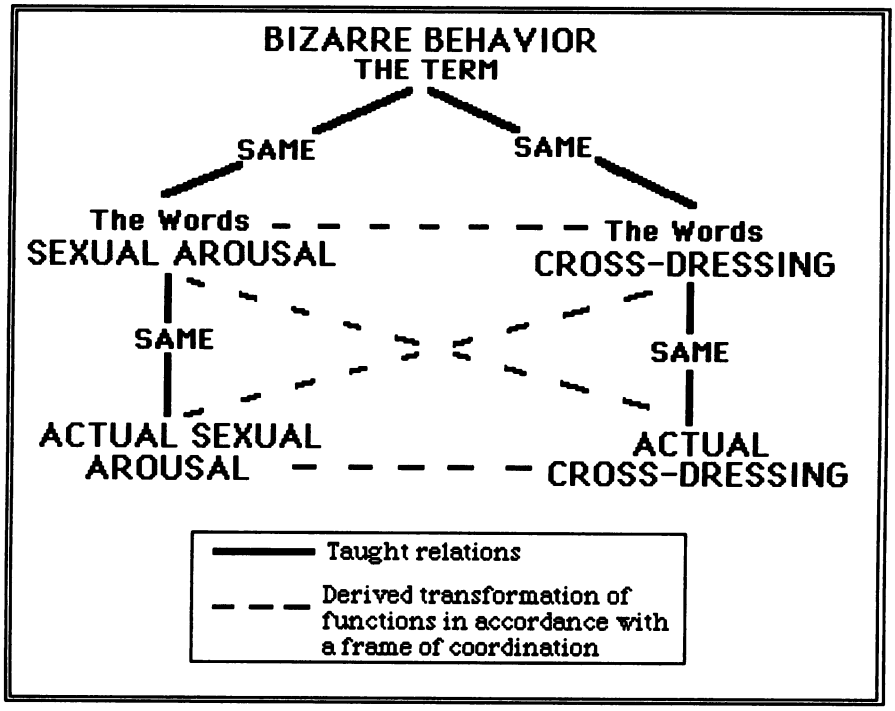


Figure 2. A set of taught and derived relations according to which sexual functions might transfer to produce the novel sexual behavior of transvestism.

conceptual framework for the experimental analysis of covert perceptual functions, such as sexual imagery. In the words of Hayes (1991),

> The transfer of stimulus functions includes not just discriminative or reinforcement functions, but also such things as perceptual functions. As a network of relational events becomes organized, the person may, for example, see one stimulus given another. Consider the following phrase and do what it says: "Picture a car." Many readers presumably did in fact see a car. This perceptual event can be thought of as a transfer of the visual functions of cars to the verbal name symmetrically related to it. (p. 24)

The relational frame view helps us to account for the dynamic relationship between sexual fantasizing and overt behavior (see Figure 3). Consider a young girl, for example, who becomes sexually aroused while listening to the sexual adventures of an older schoolmate (public story → arousal). When this girl becomes sexually aroused in suitable contexts on future occasions (e.g., in the privacy of her bedroom), she may remember or fantasize about the sexual adventure of her friend (arousal → private story). In effect, the relation between the sexual story and sexual arousal has become bidirectional or symmetrical (i.e., either can now produce the other by virtue of the bidirectional transfer of response functions). Thus, when sexual arousal produces fantasizing, this may lead to a further increase in sexual arousal (i.e., a type of feedback loop is in operation whereby arousal leads to fantasizing which in turn leads to more arousal, and so on). The operation of this bidirectional relationship makes it likely that on future occasions sexual arousal will produce fantasizing that will, in turn, increase sexual arousal, and so on. In effect, this behavioral interpretation can account for the covert strengthening of sexual fantasizing in terms of a bidirectional (symmetrical) transfer of fantasy and arousal functions. Although this view is somewhat speculative within the context of sexual arousal responses, recent evidence

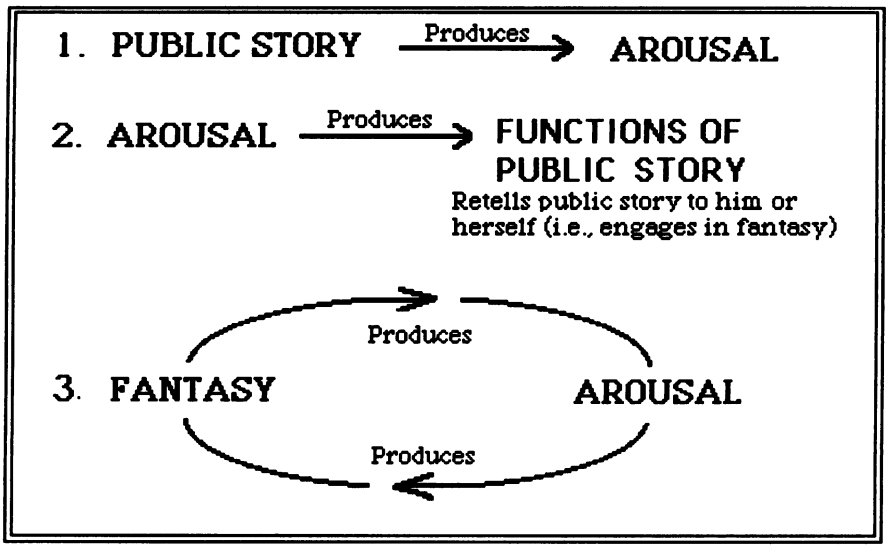


Figure 3. The covert strengthening of a sexual fantasy resulting from the bidirectional transfer of functions between fantasy and sexual arousal.

suggests that symmetrical relations can emerge between two different response patterns produced by the same individual (Dymond & Barnes, 1994).

Another important feature of relational responding is that ongoing interactions with the verbal community allow sexual functions to transfer in increasingly complex ways. For example, the verbal nature of sexual fantasizing makes it likely that sexual fantasies will participate in a relational frame of coordination with each other, and thus some of the sexual functions of one fantasy may transfer to another. Consider an individual who on some occasions sexually fantasizes about a colleague at their place of work, and on other occasions fantasizes about having sexual relations in a public place. Under these circumstances, both acts of fantasizing may become related via terms such as *sexual fantasy*. The transfer of functions from the former fantasy to the latter may result in a fantasy involving sexual relations with a colleague in a public area (see Figure 4). An individual may, therefore, imagine novel and apparently original sexual images and scenarios. Although researchers have long been aware that composite sexual fantasies may emerge (e.g., Laws & Marshall, 1990), RFT provides a set of functional analytic terms with which to discuss the behavioral process by which this phenomenon occurs. In effect, a relational control view of sexual arousal response patterns explains, at least potentially, the occurrence of novel or unique sexual fantasies in nonmentalistic terms.

Of course, this explanation of the covert strengthening of sexual fantasies describes a behavior–behavior relation and therefore leaves behind the possibility of prediction and control. However, such an interpretive account is behavior-analytically acceptable because it is based upon behavioral processes that are known to operate in the manner described (see Donahoe & Palmer, 1994). This fact does not free us from the obligation to identify the controlling variables of sexual arousal whenever possible. Nevertheless, in the case of sexual fantasy, it may be that some of the controlling variables *are* covert, and this may explain the difficulty clinicians have had in predicting and controlling the sexual fantasies and attendant sexual responses of certain indi-

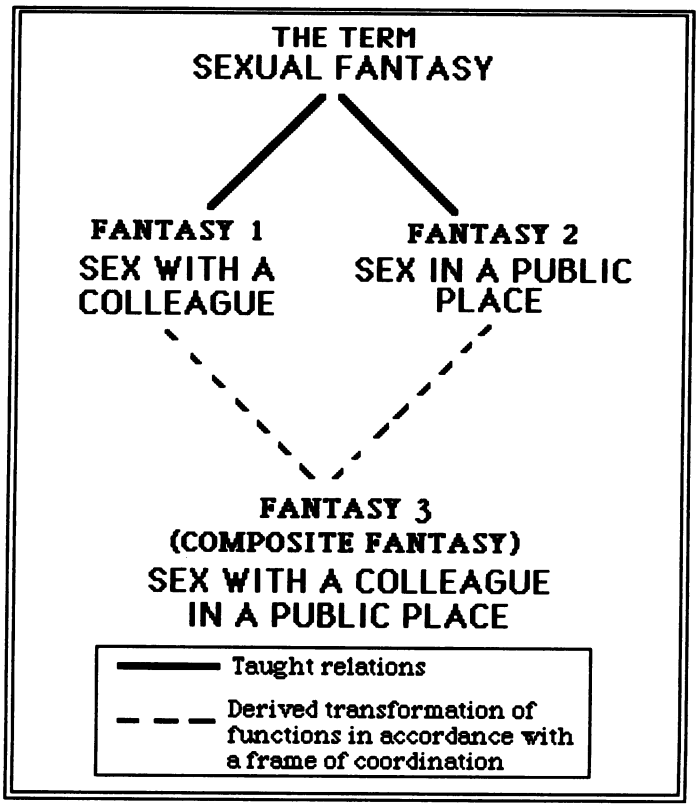


Figure 4. The derivation of a composite and novel sexual fantasy by virtue of the bidirectional transfer of functions between two sexual fantasies.

viduals (e.g., rapists; see Maletzky, 1991).

*The Impermanence of Aversive Therapeutic Effects*

A common finding in the sex research literature is that conditioned responses and the effects of behavior therapy are relatively short lived (Gosselin & Wilson, 1984; Masters & Johnson, 1979; Rimm & Masters, 1979). Some researchers, therefore, have suggested that the process by which sexual arousal patterns initially arise is not one best described using behavioral principles (e.g., Gosselin & Wilson, 1984; McConaghy, 1987). We would argue, however, that the complexity of verbal behavior, as defined by RFT, may explain the difficulty behavior therapists have in permanently eradicating unwanted sexual arousal. Before we consider this idea in greater detail, it may be useful to look briefly at some specific verbal contingencies that might give rise to deviant sexual arousal patterns.

Although individuals, at least in western culture, are not explicitly reinforced for deviant behavior such as rape, they are, however, exposed to social and verbal contingencies in which caring, gentle, helpless, and submissive women often participate in a relational frame of coordination with sexual attraction (e.g., a beautiful damsel in distress saved by a knight in shining armor is a common theme in the fairy stories told to young children). Men are further exposed to contingencies in which women participate in a frame of coordination with *not knowing their own minds* and *meaning "yes" even when they say "no"* (see Beloff, 1992).

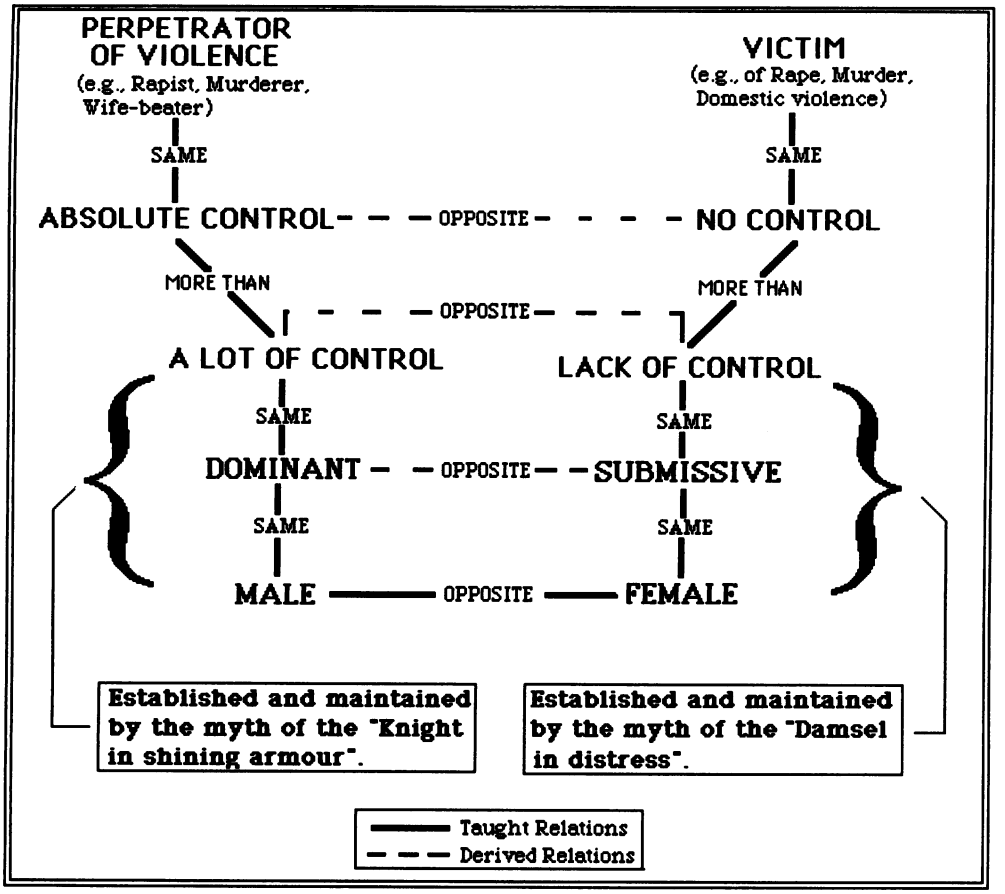


Figure 5. An extended relational network according to which sexual arousal functions might transfer to produce rape.

Thus, women may fall into a frame of coordination with *weakness* and *must be controlled for their own good* and into a frame of opposition with *strength* and *must be taken seriously.*

To appreciate how this analysis may help us to understand the act of rape, consider the relational network in Figure 5. The lower section of the diagram (indicated by brackets) represents one possible set of taught and derived relations according to which members of our culture might respond in the context of gender and sexuality. For example, it is fair to say that most members of western cultures are explicitly taught that, in the context of gender relations, males and females are "opposite" (e.g., members of opposite sexes). Also, through interaction with popular culture (i.e., television, magazines, pop music), many children learn that women are submissive, whereas men are dominant (see Biglan, 1995, pp. 353–358; Guerin, 1994, pp. 283–287). Furthermore, the words *dominant* and *submissive* often participate in frames of coordination with the terms *a lot of control* and *lacking control,* respectively. Given that many members of our culture respond according to the foregoing relational network, we might expect to find that many men are sexually attracted to submissive women or women who lack control. Similarly, we might expect to find that many women are sexually attracted to powerful men or men who possess a lot of control.

Although the foregoing analysis refers only to sexual arousal patterns that

fall within what we might call a "normal" range, the relational frame interpretation offered here makes its most significant contribution to our understanding of less widespread sexual activities such as rape. Consider, for instance, the upper right section of Figure 5. This extended relational frame indicates that, in a suitable context, men may respond to the term *lack of control* as related to the term *no control* through a relational frame of comparison (i.e., greater than). Also, in an appropriate context, the term *no control* may be related to the term *victim* according to a frame of coordination. This extended relational network represents one of the processes by which terms pertaining to femininity (e.g., *woman, female*) may become related to those pertaining to victimization. In most contexts, of course (e.g., that of reading the present paper), the derivation of such a relation involves the transfer of nonsexual functions. More informally, you, the reader, likely responded to the derived relation between the terms *female* and *victim* at a purely intellectual level. In some limited contexts, however, the sexual arousal functions that have been socially established for terms pertaining to femininity will transfer according to this extended relational frame to terms pertaining to victimization. Under these circumstances, verbal descriptions of powerless, submissive, or victimized women (e.g., in pornography) will actualize sexual arousal.

The argument that only a minority of males commit rape in our culture does not undermine the current account. For most men, social contingencies (e.g., moral guidelines, penal systems) make it unlikely that if sexual arousal transfers to images or descriptions of coerced or victimized women, this transfer will automatically lead to actual rape. Thus, we might expect to find that there are many more men who have fleeting rape fantasies when presented with descriptions or images of victimized women than there are men who actually commit rape. Indeed this supports a common view espoused in the feminist literature that the basic elements of rape are present in most men's sexual relations with women (see Segal, 1990, p. 233). From this extreme perspective, acts of rape carried through to completion are differentiated from normal heterosexual relations only by degree but not by kind (see also Brownmiller, 1985).[2]

Of course, the particular historical and current contexts in which *specific* sexual functions transfer according to such extended relational networks as that depicted in Figure 5 have yet to be identified. Although this issue certainly deserves further empirical attention, the relational frame interpretation offered here makes an immediate theoretical contribution to our understanding of how verbal functions established in childhood (e.g., by media images and fairy stories) might lead to sexual coercion or violence-eliciting sexual arousal in later life.

The foregoing analysis suggests that using aversive conditioning techniques to countercondition deviant sexual arousal may leave the verbal contingencies governing rape intact; for example, the rapist still lives in a culture in which women are often portrayed as submissive (see Biglan, 1995; Guerin, 1994). Thus, traditional behavior therapeutic methods may not lead to the complete cessation of violent sexual desires (Maletzky, 1991; Marshall, Laws, & Barbaree, 1990). In order to eliminate unwanted sexual arousal completely, it would be necessary to alter the relational frames according to which sexual functions are transferring. Perhaps, therefore, future research in sexual therapy should focus on identifying

[2] Although we refer to rape as possessing sexual stimulus functions, we do not mean to say that the act of rape is purely sexual in nature (see also LoPiccolo, 1994). Rather, the foregoing interpretation serves merely to help us understand how sexual stimulus functions might combine with acts of violence and power to produce rape.

efficient methods for the manipulation of verbal relations.

One way in which a rapist's "deviant frames" might be altered, for example, is by confronting him with rape victims in a nonsexual clinical setting. Under these circumstances, the rape victim may shift from a frame of coordination containing *submission, needing to be controlled,* or *deserving what they got* to a frame of coordination containing *a woman like my mother or sister* (or any platonic female friend or relative who is held in high esteem) or *a human being just like me.* In fact, some therapists have had success with this type of perpetrator-victim confrontation technique (e.g., Murphy, 1990), although success has usually been attributed to mentalistic processes. In contrast, RFT makes no reference to mental concepts in its treatment of complex sexual arousal responses.

*Bizarre Sexual Arousal Patterns*

Another claim often made in the sex research literature is that behavioral principles cannot be extended to cover the entire range of highly complex sexual response patterns that clients present in therapy. For example, Gelder (1979; see also Bourget & Bradford, 1987) pointed out that it is difficult to account for the emergence of a fire fetish[3] in terms of respondent or operant processes. For instance, it is difficult to imagine a situation in which fire reliably predicts the onset of a sexual stimulus or in which contact with fire is sexually reinforced. Indeed, although we may account for many instances of fetishistic arousal in terms of respondent processes (e.g., common fetish objects appear frequently in pornography; see Rosengrant, 1986), unusual fetishes, such as a fire fetish (e.g., Bourget & Bradford, 1987; Cox, 1979), are difficult to interpret in these terms (see Gelder, 1979; McConaghy, 1987).

A relational frame interpretation of sexual fetishism, however, suggests that the cultural and verbal relations according to which individuals respond may account for the emergence of highly unusual fetishes for which there appears to be no explicit reinforcement history. For example, we might account for the emergence of a fire fetish by pointing to the significant overlap between "sexual frames" and "fire frames." More specifically, both sexual arousal and fire are spoken of as *explosive* and *hot.* In popular romantic literature lust is often referred to as *burning desire* and love as a *flame.* In popular music, lyrics and song titles have contained phrases such as "Come on baby light my fire" (The Doors), "Come on stand next to my fire" (Jimi Hendrix), and "Burning love" (Elvis Presley). Finally, under the reference term *fire,* the *Oxford English Dictionary and Thesaurus* (1996) lists the terms *fervor, vehement emotion, to stimulate* (the imagination or emotion), and *become heated or excited.* Thus, given that terms pertaining to fire and sexual arousal often participate in frames of coordination with each other, we would expect to observe occasionally a transfer of functions from sexual arousal to fire, even though prevailing physical contingencies make such a transfer unlikely (i.e., exposure to "sexually attractive" fire is painful). In effect, RFT suggests that the specific arbitrarily applicable relations according to which the fetishist responds are of primary importance in the control of sexual arousal patterns. Thus, RFT may account for a wide range of human fetishistic behaviors.[4]

[3] Although rare, fire fetishism (also known as pyrolangia or sexual arson) has not gone unreported. Cox (1979) stated that, having set a fire, the fire fetishist "will claim that he has had his best ever orgasm as he watched the flames leap up" (p. 343).

[4] Interestingly, psychoanalysts have also noted the overlap between terms pertaining to fire and sex. Cox (1979), for example, identified the phrases *my best flame* and *you set me*

As an aside, the formal properties of fire and sex likely play some role in establishing the arbitrarily applicable relations between these two events (i.e., physiological changes caused by close proximity to fire may be physically similar to the physiological changes that occur during sexual arousal, such as increased blood flow, oxygen intake, and perspiration). The idea that the formal properties of events in the natural world help to establish arbitrarily applicable relational responding is entirely consistent with the relational frame account. Consider the following passage from Hayes (1994):

> Select two concrete nouns—anything—before reading the next sentence. Now, we will call the first noun "A" and the second noun "B." How are "A" and "B" alike? Different? Why is "A" better? How is "A" the father of "B"? My guess is that every one of these relational questions, or a myriad like them, will lead to a sensible answer justified by supposed formal properties of the related events. But often these same formal properties would hardly control the nonarbitrary capabilities of nonverbal organisms. In other words, the formal properties used to "justify" such relational activities are themselves abstracted as a result of these same relational activities. If it is always possible to answer such questions we must either suppose that all objects are related in all ways to each other, or that such relations are arbitrarily applicable and that formal properties are context for such activities but not the source of them. (pp. 23–24)

According to RFT, therefore, although the equivalence relation between fire and sex may be based to some extent on the formal properties of these events, it seems unlikely that the formal properties are in themselves sufficient to account for the equivalence relation between fire and sexual arousal.

Of course, fire fetishes will not emerge for most members of the wider community. This, however, does not undermine the current account. Specifically, because direct sexual contact with fire is certainly painful and repeated contact is life threatening, it would be expected that very few people would ever develop a fire fetish, even though relational frames obviously support the emergence of such an arousal pattern. The fact that fire fetishes *do* occasionally emerge, despite the immediate physical contingencies that make it unlikely, is testimony to the power that relational framing may exert over sexual behavior. Undoubtedly, much research still needs to be done in identifying the specific contexts in which sexual arousal responses transfer to fire. This fact, however, does not detract from the contribution that a relational frame account can make to our understanding of fire fetishes that emerge in the absence of a reinforcement or stimulus pairing history.

Some researchers may still argue that respondent or traditional operant conditioning accounts might be mounted for many or all instances of fetishistic arousal. They might argue, for example, that an individual who shows fetishistic arousal can often recall a particular experience in the past when the fetishistic event was paired directly with a sexually arousing stimulus. However, to approach the explanation of all fetishism in this way is problematic because retrospective narratives on personal histories can scarcely be relied upon to specify correctly the controlling contingencies of behavior. Because individuals may recount events that did not occur (in rationalizing their own behavior) or fail to remember events that did, conclusions based on retrospective narratives will *necessarily* always remain speculative. Furthermore, adopting the stance that all sexual arousal is explicable in traditional terms will likely delay further the development of a behavior-analytic account of those sexual arousal patterns for which an explicit history of reinforcement or stimulus pairing appears to be absent (e.g., fire fetishism). For this reason, we have constructed our interpretations of sexual arousal using the behavioral processes that we have carefully examined in our laboratory. The strength of our interpretations,

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*on fire* as possible sources of fire fetishism. From a psychoanalytic perspective, however, the emergence of the fetishism is mediated by ill-defined subconscious processes.

therefore, lies in the fact that the derived transfer of sexual arousal is an established phenomenon that occurs reliably under laboratory conditions. If this phenomenon can arise at all, it should arise, at least occasionally, outside the experimental context. Perhaps a more appropriate way of assessing the relational frame account of human sexual arousal, therefore, will be to test rigorously its use in applied interventions for the control of unwanted sexual behavior. Whether the current account will stand or fall will ultimately depend on its demonstrable utility in this regard.

## CONCLUSION

In the present paper, we examined the limited empirical evidence in support of a behavioral approach to human sexual arousal patterns and suggested that further basic research is required. We also outlined some empirical findings from our own research and used them to develop relational frame interpretations of specific human sexual phenomena. Of course, some readers may dismiss the relational frame interpretations of human sexual arousal presented here on the grounds that they are to some degree speculative. However, the interpretations are firmly grounded in behavior-analytic terms attached to a set of experimental procedures (see Barnes, 1994, 1996; Dymond & Barnes, 1995, 1996; Lipkens, 1992; Roche & Barnes, 1996; Steele & Hayes, 1991). In the same way that astrophysicists interpret cosmic events in terms of variables that are manipulable on a smaller scale (e.g., the activity of particles in a particle accelerator), we have interpreted complex sexual arousal in terms of the types of behavioral variables that we have manipulated in our empirical studies (see also Donahoe & Palmer, 1994, p. 127). Casting a wide net in applying RFT to complex behaviors in a range of social settings, as we have done here, may result in the successful application of behavioral principles to a whole host of complex human behaviors in the real world.

Finally, the interpretations offered herein have focused on a small range of human sexual phenomena that lend themselves readily to fine-grained laboratory-based analyses. Alternative and supplementary behavior-analytic approaches may be found in recent works by Guerin (1994) and Biglan (1995). It is our hope that these latter socially based analyses, combined with the approach offered here, will eventually provide a more complete behavior-analytic account of human sexuality.

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