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Relational Frame Theory and Skinner's *Verbal Behavior*: A Possible Synthesis

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The current article suggests a possible synthesis of Skinner's (1957) treatment of verbal behavior with the more recent behavioral interpretation of language known as relational frame theory. The rationale for attempting to combine these two approaches is first outlined. Subsequently, each of the verbal operants described by Skinner is examined and subjected to a relational frame analysis. In each case, two types of operants are identified; one based on direct contingencies of reinforcement and the other based on arbitrarily applicable relational responding. The latter operants are labeled verbal because they can be distinguished from other forms of social behavior, and they appear to possess the symbolic or referential qualities often ascribed to human language. By applying relational frame theory to Skinner's verbal operants, we aim to contribute towards the development of a modern behavior-analytic research agenda in human language and cognition.

Key words: verbal behavior, relational frame theory, verbal operants, language, cognition

The purpose of the current article is to provide a possible synthesis of Skinner's (1957) treatment of verbal behavior with the more modern behavioral treatment of language known as relational frame theory (RFT) (e.g., Hayes, 1991; Hayes & Barnes-Holmes, in press). The current article will not contain a detailed description of these two separate approaches because this material is already available. Furthermore, we will not attempt to review any of the empirical evidence in favor of either Skinner's *Verbal Behavior* or RFT. Our aim here is simply to suggest one way in which two apparently disparate approaches to the study of human language, within behavior analysis, might be combined at a purely conceptual level. If we are successful in this regard, we assume that subsequent empirical research will either support or contradict the current work. The article will start by outlining the rationale for attempting a synthesis of Skinnerian and RFT approaches to language, and will then systematically work through the verbal operants described by Skinner (1957), and subject each of them to a functional RFT analysis.

This article is dedicated to the memory of B. F. Skinner. We express our gratitude to the reviewers for providing many constructive and helpful comments on earlier versions of the current work. We also thank Steve Hayes for everything!

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RATIONALE FOR THE PROPOSED SYNTHESIS

There is a tendency within some areas of behavior analysis to interpret the recent upsurge of research into stimulus equivalence, derived stimulus relations, and verbal phenomena as a rejection of Skinner's (1957) account of verbal behavior (e.g., see Sidman, 1994, pp. 562–573). Although some RFT researchers have criticized certain aspects of Skinner's work (e.g., Hayes, 1994; Hayes & Wilson, 1993), it would be a mistake to assume that there is nothing of merit to be found in his account from an RFT perspective. In fact, we believe that combining Skinner's work with RFT will help us to develop a clear and useful research agenda for the behavior-analytic study of human language and cognition.

The reader may be surprised to learn

that almost 10 years ago Chase and Danforth (1991) suggested one way in which Skinner's formulations could be integrated with RFT. These authors adopted a definition of verbal relations that was consistent with Skinner's (1957) analysis, but added one critical feature. They defined verbal behavior as a relation in which

> (a) A response is emitted by an individual; (b) the critical consequence is provided by the behavior of another individual (the listener); (c) the listener's behavior is explicitly conditioned to respond to the stimuli produced by the first individual; and (d) the explicit conditioning of the listener involves conditioning to arbitrary stimulus relations, probably conditioning to relational classes, for example, equivalence classes. (Chase & Danforth, 1991, p. 206)

The authors pointed out that Feature a distinguishes behavior from nonbehavioral events, Feature b distinguishes social behavior from nonsocial behavior, and Feature c specifies the requirement that the listener's behavior be conditioned to the stimuli produced by the speaker in order for the listener to reliably provide consequences for the speaker's behavior. Chase and Danforth added Feature d to Skinner's definition for two main reasons. First, most if not all social behavior involves the qualities described in Features a, b, and c, and thus at least one other defining feature is needed if verbal behavior is to be distinguished from virtually all other forms of social behavior. Second, examples of behavior that are often described as verbal include a symbolic or referential quality (Barnes & Holmes, 1991; Hayes, 1991; Hayes & Hayes, 1989; Skinner, 1986) or generalized relations among arbitrary stimuli (Hayes, 1994; Hayes & Hayes, 1989; Skinner, 1986; see also Barnes-Holmes & Barnes-Holmes, in press). By adding Feature d, therefore, Chase and Danforth (1991) concluded "that verbal behavior involves arbitrary, social or culturally determined relations among events in the world, symbols, pictures, gestures and sounds" (p. 206).

Consistent with Chase and Danforth (1991) (Feature d above), RFT argues that verbal behavior involves a history of reinforcement for responding in accordance with a range of contextually controlled, arbitrarily applicable relations known as relational frames. The types of history and the behavioral processes involved in relational frames have been considered, at a conceptual level, in a number of other sources (see Barnes-Holmes & Barnes-Holmes, in press, for a detailed examination of this issue; see also Barnes, 1996; Barnes & Hampson, 1993, 1997; Barnes, Healy, & Hayes, in press; Barnes & Roche, 1996; Hayes, Gifford, & Wilson, 1996). In brief, RFT argues that derived relational responding is established, in large part, by an appropriate history of multiple-exemplar training.

For illustrative purposes, consider the example of derived naming, which is deemed to be one of the earliest and more important relational frames (Barnes-Holmes, Barnes-Holmes, & Roche, in press). A caregiver will often utter the name of a person in the presence of a young child and then reinforce any orienting response towards that person. This interaction may be described as hear Name A → look at Person B. Sometimes, the caregiver will also ask the child the name of a person in their presence and then model and reinforce an appropriate tact (Skinner, 1957). This interaction may be described as see Person B → hear and say Name A. During the early stages of language training, each interaction may require explicit reinforcement for it to become established in the behavioral repertoire of the child, but after a number of name-person and person–name exemplars have been trained (along with other name–event and event–name relations), the generalized operant response class of "derived naming" is established. In other words, from multiple-exemplar training the child's derived naming comes under abstract control of specific contextual cues. Suppose, for example, a child with this multiple-exemplar naming history is told "This is Steve."

Contextual cues, such as the word *is* and the naming context itself, will now be discriminative for symmetrical responding between the name and the person. In the absence of further training, therefore, the child will now point to Steve when asked "Where is Steve?" (Name A → Person B) and will say "Steve" when presented with the person and asked "Who is this?" (Person B → Name A) (see Hayes et al., 1996). In fact, recent empirical research has begun to explore the role of multiple-exemplar training in the acquisition of relational frames in young children, and this has provided evidence (albeit limited) to support the RFT approach to verbal behavior (e.g., Barnes-Holmes et al., in press; see also Lipkens, Hayes, & Hayes, 1993).

Based on both conceptual and empirical work in RFT, we take the position that the behavior of both listeners and speakers is essentially verbal if it involves, to some degree, the derived transformation of stimulus functions in accordance with relational frames (see Barnes, 1994; Barnes et al., in press; Barnes & Holmes, 1991; Hayes, 1994; Hayes & Barnes-Holmes, in press; Hayes & Hayes, 1989). From this position, it becomes possible to use Chase and Danforth's (1991) definition of verbal behavior to reexamine the main classes of verbal operants described by Skinner (1957), and to interpret them from an RFT perspective. We will do this by first presenting a Skinnerian account of each of the main classes, in the same order in which they appear in Skinner's text (i.e., mands, echoic behavior, textual behavior, transcription and dictation taking, intraverbals, tacts, extended tacts, autoclitics), followed by an RFT interpretation of each class. This will necessitate distinguishing two different forms of each verbal operant, one based on direct contingencies of reinforcement and the other based on arbitrarily applicable relational responding. The former operants we will label nonverbal because they cannot be distinguished readily from any other form of social behavior, and they do not possess any of the referential or symbolic qualities usually ascribed to verbal events. The latter operants we will label verbal because they can be distinguished from other forms of social behavior, and they do appear to possess the symbolic qualities often ascribed to human language.

We believe that making this distinction will be useful, insofar as it constitutes an important step towards specifying the behavioral processes that are responsible for the emergent or generative nature of human language. Indeed, Skinner (1957) was clearly aware of this quality, when he wrote, for example,

> Thus, we may hear a man called *Jones* and see him respond appropriately to this "vocative." As a result, we may also address him as Jones, or later reply *Jones* to the question *Who is there?* or correctly designate him when asked *Which man is Jones?* But this does not happen in the naive speaker or listener; it is the result of a *long process of verbal conditioning* [italics added]. The young child hearing someone called *Jones* many times does not therefore himself call him *Jones*, nor for this reason report that *Jones was present*, nor point to *Jones* in reply to the question *Which is Jones?* (pp. 359–360).

At the time, of course, Skinner had no access to the data or to the conceptual work on derived stimulus relations, so he was not in a strong position to speculate about the nature of the "long process of verbal conditioning" involved in such emergent language phenomena. The research on derived stimulus relations is now on hand, so perhaps today we are in a better position to speculate usefully about the processes to which Skinner alluded and to provide the conceptual and empirical groundwork for analyzing and synthesizing these processes in basic and applied research settings (see Hayes & Barnes-Holmes, in press, for an example of how this may be achieved).

On balance, however, some might argue that the study of derived stimulus relations, and RFT in particular, provides very little beyond that provided by Skinner, except perhaps more speculation. In response, we would argue

that although RFT does indeed incorporate some speculation as to the processes involved in generating derived relational responding and human language in general, it has also helped to provide the experimental procedures and technical nomenclature with which these speculative processes may be studied (see Hayes & Barnes-Holmes, in press). Indeed, as indicated above, some very recent work has begun to provide evidence to support the RFT view of the processes involved in the development of specific verbal skills in children (Barnes-Holmes et al., in press; see also Lipkens et al., 1993). At the very least, therefore, RFT promises to supplement Skinner's early work on language by helping to integrate it with the study of equivalence classes and derived stimulus relations more generally. Given the importance of both of these areas to behavior analysis, achieving such an integration must surely be a worthwhile objective. We turn now to the details of the conceptual integration of Skinner's *Verbal Behavior* (1957) and RFT, which is the primary focus of the current article.

RELATIONAL FRAME THEORY AND SKINNER'S *VERBAL BEHAVIOR*

The Mand

Skinner defined a mand as "a verbal operant in which the response is reinforced by a characteristic consequence and is therefore under the functional control of relevant conditions of deprivation or aversive stimulation" (1957, pp. 35–36), or more colloquially as a verbal operant that "specifies" its reinforcement. Imagine, for example, that in the presence of a caregiver a hungry child says "candy," and this mand is then reinforced by the presentation of actual candy. The reinforcer (in this example the candy) need not be present for the response to occur, but it needs to have reliably followed previous instances of the mand. One question that may arise at this point is how to account for a mand for a novel object that (a) has never reinforced the mand in the past, (b) has never reinforced a different mand that might induce the current mand (i.e., response induction), (c) does not physically resemble an object that previously reinforced the mand (i.e., primary stimulus generalization), and (d) has never been paired with an object that previously reinforced the mand (i.e., respondent conditioning). (The reader is referred to Barnes & Roche, 1997, and Hayes & Hayes, 1989, 1992, for material on the limits of respondent conditioning, including higher order and sensory preconditioning, as adequate explanations for a wide range of verbal behavior; see also Leader, Barnes, & Smeets, 1996, and Roche & Barnes, 1997, for relevant empirical evidence.)

Relational frame theory can resolve the foregoing problem, however, by distinguishing between two different types of the mand, which we will refer to as verbal and nonverbal. The nonverbal type involves the explicit training of a particular mand to a particular object, as when a child in a toy shop mands for a toy car because in the past manding for a car resulted in the parent actually buying the toy car and presenting it to the child. The verbal type, however, involves the manded stimulus participating in relational frames with other stimuli. In this example, the frame may contain toys in general. The child learns to say "toy" in the presence of cars, train sets, dolls, and so forth, and the child learns to mand at least one toy. Then, the child need not learn to ask for each specific toy from scratch; the child merely has to respond to the object as participating in a frame of coordination with other toys. The "toy function" transfers through the frame of coordination from the toy car to the train set, and thus explicit reinforcement is not required for the child to mand for the train set (cf. Hall & Sundberg, 1987). In fact, the child may mand repeatedly for the train set, despite the fact that the mand is never reinforced with the manded

object (i.e., the parent always refuses to buy the train set).

Before continuing, we should stress that "pure" verbal manding probably occurs only rarely. In effect, many mands are often followed by appropriate consequences, and thus most mands will have some history of explicit differential reinforcement. Nevertheless, an explicitly reinforced mand should still be defined as verbal, when the mand also participates in a relational frame. For example, a child's mand "chocolate?" may have been reinforced in the past on many occasions, but derived relations between the response "chocolate" and other events may also be present in the child's behavioral repertoire. For example, *chocolate, candy,* and *sweets* may participate in a frame of coordination, and each of these words may participate in a frame of difference with words such as *apple* and *orange.* Thus, if the child were asked, "Would you like something different to chocolate," the response might be "apple," thereby suggesting that the original mand "chocolate?" was verbal because it participated in relational frames with other events.

The general point being made here is so important that it warrants emphasis. The *absence* of explicit reinforcement (or response induction, or primary stimulus generalization, or respondent conditioning) does not define a verbal event. According to the current thesis, it is the *presence* of arbitrarily applicable relational responding, either with or without other behavioral processes, that defines a verbal relation. This approach to defining behavioral events as verbal applies to all of the classes of verbal behavior discussed subsequently in the current article (we shall return to this issue in context of the tact).

Echoic Behavior

This is usually the first outward demonstration of vocal verbal behavior in a young child. Its development can be summarized as follows:

1. Babbling produces a range of human speech sounds.
2. Only native speech sounds are reinforced by caregivers.
3. Babbling evolves into self-repetitions, and again only native speech sounds are reinforced.
4. Hearing his or her own voice reproduce the native speech sounds becomes reinforcing because these sounds have been paired with the primary reinforcers delivered by the caregivers.
5. Through induction and generalization the infant begins to repeat the speech sounds of others as well as its own.

Although echoic behavior is characteristic of infant vocalizations, it is not solely a feature of language acquisition; it is also demonstrated by adult speakers. Skinner did not distinguish between the echoic responses of infants and adults, but RFT suggests that there are two different types of echoic behavior, nonverbal and verbal. The nonverbal type typically involves the simple infant-like imitation of the word *mama,* where *mama* does not participate in a frame of coordination with the child's mother. The verbal type of the echoic requires that *mama* participate in relational frames. For example, the word *mama* may enter into a relational frame of coordination with the child's actual mother and words and phrases such as *mother* and *parent.* Other frames may also be involved, such as different (e.g., *mama* is different than *dada*). In summary, therefore, the unit of echoic behavior is defined by the vocal correspondences (nonverbal echoic) and also, in many cases, by the relational frames (verbal echoic) that may be involved in this behavioral unit.

Textual Behavior

Like echoic behavior, textual behavior is verbal behavior under the control of a verbal stimulus. In this case, how-

ever, the verbal stimulus is visual, as in a written text (or tactual, as in Braille), rather than auditory. An RFT interpretation of textual behavior involves a similar analysis to that offered for echoic behavior. It suggests two different types of textual behavior. The first of these is nonverbal textual behavior, which involves a speaker uttering a vocal response to written material without the words or phrases participating in equivalence (or other) relations with other words, phrases, or events. The second type suggested by RFT is verbal textual behavior (with "understanding"), which involves the vocal response participating in relational frames. To illustrate the distinction between these two types of textual behavior, imagine a father reading a bedtime story to his child. As the father reads the first few pages of the text, the functions of the events described in the story participate in relational frames (i.e., verbal textual behavior). The father, if asked, could describe the events with synonyms, fill in details as if he were "seeing" the events, and so forth. At a later point, however, he may realize that although he has been accurately reading the words on the page (evidenced by the child's lack of complaint), he has no idea of the content of what he most recently read. In other words, the text evoked the appropriate vocal responses, but produced none or very few of the functions of the events being described (i.e., nonverbal textual behavior).

Transcription and Dictation Taking

The behaviors examined thus far have all involved vocal responses. Dictation taking and transcription involve motor responses to vocal (dictation) or written (transcription) stimuli. Consistent with the previous analyses, RFT distinguishes between verbal and nonverbal dictation taking and transcription behavior. The verbal types of these responses involve "writing with meaning," whereby the words or phrases written participate in relational frames. That is, each word or phrase that is transcribed or taken down as dictation produces specific psychological functions for the individual. For example, if the phrase "The goods will be delivered tomorrow" is dictated (or written), this may cause the person taking the dictation (or transcribing) to "see" privately the future arrival of the goods, and perhaps to make arrangements for their arrival after the dictation session (or transcription) is over. The nonverbal types of transcription and dictation taking do not produce any psychological functions via relational frames. For example, a skilled secretary may sometimes successfully take dictation without any "awareness" of the content of what was dictated and written (i.e., the spoken words and written text produce none or only a few of the functions of the events described therein). In this case, he or she may fail to make the necessary arrangements for the arrival of the goods mentioned in the dictated letter.

The Intraverbal

Intraverbals involve responses to stimuli when no formal correspondence exists between the stimulus and the response. For example, when presented with the stimulus "two plus two," most numerate English speakers will respond with "four," or when asked "how are you," in the course of a casual meeting, most speakers will reply "fine, thank you," regardless of their current physical state. Again, RFT makes a distinction between verbal and nonverbal types of this operant class. To appreciate this distinction, consider a parrot that is trained through explicit reinforcement to emit an intraverbal response, such as responding "one, two, three" when presented with the stimulus "count to three." In such a case, the response would not participate in relational frames with other words or events in the world, and therefore would be considered a nonverbal intraverbal. In contrast, a verbal intraverbal may involve the response

participating in a network of relations with other words, phrases, or events in the world. So, for example, a reasonably numerate child could respond appropriately not only to the stimulus "count to three," but also to "count backwards from three" or "what comes between one and three?" In effect, the individual words *one, two,* and *three* participate in a relational frame of comparison, such that the intraverbal counting response "one, two, three" entails "three after two after one" or entails "one before two, and three after two."

The Tact

Verbal behavior under the control of stimuli from the "world of things and events which a speaker is said to 'talk about' " (Skinner 1957, p. 81) has been called tacting. Skinner saw the tact as the most important verbal operant because of the unique control exerted by the prior stimulus. This prior stimulus can be a particular object or event or some property of an object or event. For example, if a child learns to say "square" in the presence of a square, the child is said to be tacting the square. This behavior is established by a history of differential reinforcement for emitting the vocal response "square" in the presence of a square.

A relational frame analysis of tacting behavior argues that the tact, as described by Skinner, is not necessarily a verbal response because it may not involve stimuli that participate in arbitrarily applicable relations with other stimuli. Therefore, RFT distinguishes between verbal and nonverbal tacting in the following way. Imagine that a square occasions the response "square" because, in the past, the response has been reinforced in the presence of squares. This type of behavioral relation is functionally similar to the relation that is established when a pigeon learns to peck a key for food in the presence of a square projected on a translucent response key. This is very different from the verbal tact relation, for which no explicit history of reinforcement is required for the tact relation to emerge. In verbal tacting, a child may respond with "square" in the presence of a square box, for example, because the box participates in a relational frame with the word *square* and other square objects (i.e., explicit reinforcement has never been provided for the tact). Imagine, for instance, that the child was taught to tact a box (e.g., a cereal box) and was then told that a box is often square (i.e., the cereal box, the word *square,* and actual square boxes now participate in a relational frame of coordination). As a result, when presented with a box and asked "what is this," the child may produce a derived or verbal tact by responding with "square," rather than the explicitly reinforced tact (i.e., "box").

In the natural environment, pure verbal tacting probably occurs only rarely; most tacting does not occur without consequences (i.e., one does not move about one's environment tacting everything one sees). Thus, most tacts will have some history of explicit differential reinforcement. Consistent with our previous discussion of this issue (in the context of the mand), it is useful to define an explicitly reinforced tact as verbal when the tacted stimulus participates in relational frames with other stimuli. In doing so, we make a clear functional distinction between formally similar responses that arise from very different behavioral histories. If behavior analysts ignore or gloss over these different histories they may find it difficult, in certain contexts, to predict and to control tacting behavior. In the previous example, for instance, "box" was explicitly reinforced as a tact, but on a subsequent occasion the tact "square" was emitted in the presence of a box. Distinguishing between verbal and nonverbal tacting will help to predict and to control these apparently unexpected behavioral outcomes.

The Extended Tact

"If a response is reinforced upon a given occasion or class of occasions,

any feature of that occasion or common to that class appears to gain some measure of control. A novel stimulus possessing one such feature may evoke a response" (Skinner, 1957, p. 91). Responses to novel stimuli that resemble other stimuli previously present were described by Skinner as extended tacts. There are many different ways in which novel stimuli may resemble previously presented stimuli, and thus it was necessary for Skinner to define various forms of extended tacts. These included, for example, generic extension, metaphorical extension, nomination, guessing, and abstraction. For present purposes, we will deal only with abstraction (in principle, the following analyses could be applied to any form of extended tact).

Abstraction. "Any property of a stimulus present when a verbal response is reinforced acquires some degree of control over that response, and this control continues to be exerted when the property appears in other combinations" (Skinner, 1957, p. 107). The ability to respond to abstracted properties of stimuli avoids the chaos that could result from the fact that every stimulus shares properties with potentially many other stimuli. If abstraction were not possible, then each stimulus could be expected to control a great variety of responses. Abstraction is demonstrated, therefore, when a single property of a stimulus is tacted. For example, the property of redness may control the emission of the vocal response "red," whether the response is occasioned by a red apple, a red ball, or a red book.

The verbal-nonverbal tact distinction applies to abstraction in much the same way that it applies to the simple tact relation. According to RFT, for an abstracted tact relation to be verbal, the abstracted property must not only control the tact response but it must also participate in a relational frame or frames with the response and perhaps other stimuli. For example, the nonverbal abstraction of the property of redness may be the result of a history of explicit reinforcement for responding "red" in the presence of red apples, red balls, red books, and so on; however, this nonverbal form of abstraction would not readily lead to the bidirectional relational responding characteristic of verbal behavior, in this case pointing to the red objects when asked, "Point to red" (i.e., training see red objects → say "red" does not automatically produce hear "red" → point to red objects). Verbal abstraction of the property of redness requires that the abstracted property control the tact response *and* that both the property and the response participate in a relational frame or frames with other stimuli (e.g., property and response coordinate in a bidirectional relation, and perhaps participate in a difference relation with other events, such as the spoken word "green" and the color green).

The foregoing interpretation of abstraction has implications for other instances of the tact relation. Consider, for example, that both nonverbal and verbal tacting behavior may be controlled by extremely subtle properties of stimuli, and that these properties may include relations among stimuli. Such terms as *above* and *below*, *near* and *far*, or *larger* and *smaller* tact the formal or physical properties of stimuli in relation to each other or to the speaker; for example, when one object is described as "bigger" or "smaller" than another. The reader should note, that although responding in accordance with relational frames is not required for this example of relational responding, it seems likely that it would usually be involved in some way (e.g., the word *bigger* may participate in a frame of coordination with *larger*). In any case, verbal tacting behavior is likely involved when these types of relations are arbitrary as opposed to nonarbitrary in nature. For example, the words *tiny* and *big* may participate in an opposite relation, although they are both small words in relation to *massive* and *small,* which both contain more letters. In effect, the relations among these

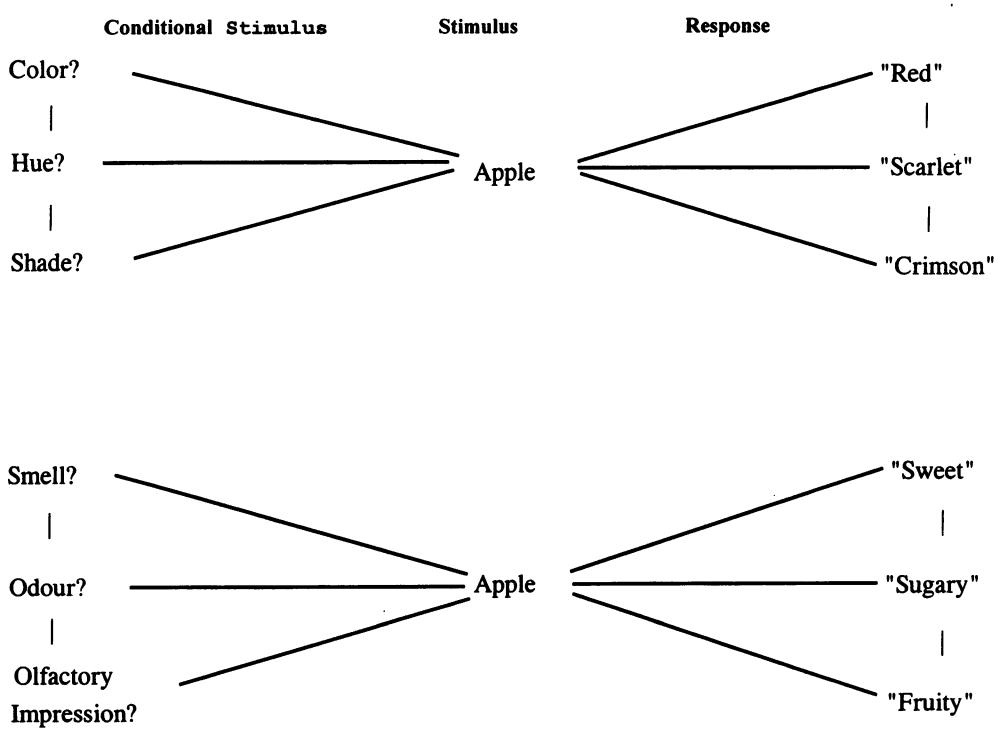

Figure 1. Schematic representation of verbal conditional tacts showing some of the possible relational frames that may be involved in verbal conditional tacting behavior.

words cannot be based on their physical properties alone. Instead, the relations are arbitrary in that they have been determined by the practices of the verbal community, and thus relational frames will almost certainly be involved when one or more of these relations is tacted.

The same distinction between verbal and nonverbal tacting may be made when the issue of conditional control over the tacting response is considered. Clearly, any event or situation may have many properties that might be tacted. Whether any properties are tacted and which properties are tacted will depend on other variables that may act upon the speaker. This fact presents no difficulties, because behavior may be determined in multiple ways. For example, one may tact the color of an apple when asked about its color and may tact its smell when asked what it smells like. If this conditional tacting response involves only direct-acting contingencies (e.g., explicit reinforcement, response induction, stimulus generalization, respondent conditioning), then it may be defined as a nonverbal conditional tact. If, however, the conditional tact involves responding, at least to some degree, in accordance with relational frames, then it may be defined as a verbal conditional tact. For example, the conditional stimuli and responses may participate in frames of coordination with other stimuli and responses, such that any of the latter could be substituted for the former without seriously affecting the function of the conditional tact (e.g., a listener would respond in a similar fashion to any of the possible combinations shown in Figure 1). This example also serves to illustrate the extensive network of frames of coordination that may occur in even the simplest of verbal interactions—consider also that only frames of coordination are shown; other possible frames could be included. Note also that the response a subject emits when tacting can also partic-

ipate in relational frames with other possible responses. Clearly, the verbal tact constitutes a substantially more powerful instance of "verbal" behavior than its nonverbal counterpart.

Tacting verbal behavior and the creation of unseen realities. One important restriction in defining the tact relation is that it must occur in the presence of the event tacted. This restriction raises the issue of words that superficially seem to be tacts but cannot occur in the presence of what they name. For example, when does one actually see governmental units like states or nations, subject matters like economics or politics, processes like creation or evolution, and so on? Such entities must enter into verbal behavior in other ways; they do not exist in a form that can be tacted in the normal sense. One solution to this problem can be found, however, by adopting the nonverbal-verbal distinction. From the RFT perspective, the verbal tact involves the construction of contextually controlled relational networks of objects and events in the world. Once these have been established, it becomes possible to tact these networks themselves. Clearly, these networks of relations can never be seen, as physical objects or events, because they involve behavioral relations extended across time and space. For example, most people have learned the concept of "politics" through the gradual construction of a network of nonarbitrary and arbitrary relations among the relevant people, places, and events that the verbal community defines as part of the political structure or process. When these stimulus relations have been established, a young girl (from Ireland) may tact this network when she says, "Politics is politicians debating in the Dail" (the parliament building in Dublin). In effect, the girl tacts her own verbal behavior (i.e., what she has learned to say about a certain cluster of people, objects, and events in the world controls the emission of the word "politics"). It should be noted that because tacting a relational network involves tacting one's own verbal behavior rather than "things" in the environment, this phenomenon may be better considered an example of derived or verbal autoclitic behavior. We shall consider this type of behavior later.

Verbal behavior under the control of private stimuli. In tacting an external stimulus, both speaker and listener have access to the object being tacted, but this is not the case with private stimuli. For example, in tacting a pain only the speaker may have contact with the actual object or event (i.e., the pain) being tacted. Skinner suggested four ways in which the verbal community could establish tacts without direct access to the private stimulus: (a) The reinforcement could be based on "a common public accompaniment of the private stimulus" (1957, p. 131), for example, a child may be taught to say "that hurts" after a fall that results in a scraped knee or some other obvious physical symptom; (b) the verbal community may reinforce a vocal response describing an internal state that is consistent with some overt physical behavior of the speaker; for example, tacting a toothache may be reinforced in the presence of behavior such as rubbing the jaw or touching the gums; (c) a tact may be established to a public stimulus, and the response may then transfer to a private event by virtue of common properties between the public and private event; for example, tacting a sharp pain may emerge from the metaphorical extension of tacting sharp objects; and (d) a tact may be established to some public behavior of the speaker, and if the overt behavior is then reduced in magnitude to the point of being imperceptible to others, the private stimulus that accompanied the public behavior may continue to be tacted by the speaker; for example, a young girl may be taught, in certain contexts, to tact her own crying as "sorrow," but as she matures some of the private events that accompanied her crying may persist in the absence of overt crying, and thus, as an adult,

she may tact "sorrow" without actually crying.

The foregoing interpretation of control by private stimuli is readily acceptable from the RFT perspective. However, RFT distinguishes between responding to private events based on a history of explicit reinforcement (or on respondent conditioning or on the formal properties of the stimuli alone) and such responding based on the derivation of stimulus relations. According to RFT, for example, when a verbally able child learns to tact a private stimulus such as a toothache, it is likely that the word *toothache* and the actual internal event will come to participate in a frame of coordination. This will also occur when tacting other internal states. For instance, most individuals in the English-speaking community will, in some contexts, respond in accordance with coordination relations among the words *sadness, misery,* and *despair,* and overt behavior such as crying or frowning. The important point here is that by distinguishing between verbal and nonverbal tacting of private stimuli, one may be better positioned to predict certain behavioral outcomes that could not be readily predicted in terms of direct-acting contingencies. Imagine, for example, a young girl who learns to tact crying with the response "sorrow," and then learns that *misery* is another word for *sorrow,* and *despair* is another word for *misery* (i.e., overt crying and the words *sorrow, misery,* and *despair* participate in a frame of coordination). As outlined at the end of the previous paragraph (Point d), Skinner suggested a way in which the girl may come to tact private events as "sorrow" in the absence of actual crying. However, based on the relational frame of coordination, the girl may also come to tact these private events as "misery" and "despair," without being explicitly taught to do so. Furthermore, given the bidirectional nature of relational frames, in certain contexts it may be possible to use the history of verbal tacting to generate some of the private events of sorrow for the girl as a listener. Imagine, for example, that a speaker asks the girl (at some later time when she is relatively happy) to remember the last time that she experienced real despair. According to RFT, at least some of the private events that were previously discriminative for the tact "sorrow" may now be produced by the word *despair* (by virtue of the transformation of function in accordance with the frame of coordination) (see Dymond & Barnes, 1994, 1995, 1996, and Roche & Barnes, 1997, for relevant empirical evidence). In effect, these types of unpredicted behavioral effects are readily understood if one distinguishes between the nonverbal and verbal tacting of private events.

Autoclitics

Behavior that "is evoked by or acts upon other behavior of the speaker" (Skinner, 1957, p. 313) was described by Skinner as autoclitic behavior. Arguably, it is this type of behavior that gives human language its richness and complexity. Various types of autoclitics are available to the mature speaker. *Descriptive autoclitics* are used when a speaker produces verbal behavior descriptive of his or her own behavior; for example, "I see," "I recall," "I tell you." These autoclitics may also refer to the strength of a response; for example, "I guess," "I estimate," "I suggest." *Qualifying autoclitics* qualify the intensity or direction of a listener's behavior. One of these is *negation,* the most common examples of which are the verbal responses "no," "not," and "never." For example, the statement, "The mail has not been delivered yet," cannot be a tact because the event (the mail) is not present and therefore cannot be tacted (i.e., one cannot tact the absence of an event). In this case, the word *not* functions as a qualifying autoclitic for the remaining part of the sentence that is concerned with the arrival of mail. The use of such an autoclitic will normally affect the behavior of a listener in such a way

that it reinforces behavior consistent with the autoclitic (i.e., the listener will not check to see if the mail has been delivered). Another qualifying autoclitic is *assertion*. Just as the vocal response "not" may affect the behavior of a listener in one direction, a response such as "definitely" may affect the behavior of a listener in the opposite direction, such that it may encourage him or her to continue the behavior in question. For example, "This is definitely the right road to Maynooth" may encourage a listener to take the specified road more readily than the statement, "This is the right road to Maynooth." The effects of autoclitics may be quantitative as well as qualitative. For example, vocal responses such as "all," "some," or "many" modify the reaction of the listener to the responses that they accompany. The statement, "All black spiders in Nevada are poisonous," for instance, will perhaps cause greater avoidance of such spiders than if the statement began with "Some." Similarly, the articles *a* and *the* indicate the relation between a response and its controlling stimulus. For example, the statement, "The dangerous spider has been caught," will have a different effect on a listener than if the statement started with "A" (i.e., *The* implies only one spider, whereas *A* implies other spiders yet to be caught).

From the RFT perspective, many autoclitic responses will be explicitly modeled and reinforced during the initial stages of complex language learning and are therefore considered examples of nonverbal autoclitics (in accordance with the current thesis, we also include in this category autoclitics that are established through processes such as respondent conditioning, stimulus generalization, and response induction). Relational frame theory also predicts, however, that the establishment of relational frames will also generate nonexplicitly taught autoclitics, which are therefore defined as verbal. For example, imagine a young girl who has learned to say "It is going to rain" when dark clouds are present. Subsequently, a caregiver might explicitly teach a descriptive autoclitic response so that the girl will respond to the fact that dark clouds do not always lead to rain. That is, the girl may be told to say, "I think it is going to rain," so that the listener does not take it as fact that rain is about to occur. At a later time, the girl also learns that in some contexts *think* is equivalent to *feel* and *feel* is equivalent to *predict,* and thus these three words may participate in a frame of coordination. At this point, therefore, the girl might now say "I predict that it is going to rain" when dark clouds are in the sky, although this statement has never been explicitly modeled or reinforced in the past. In this case, we can rightfully call this a verbal autoclitic because it involves responding in accordance with relational frames on behalf of the speaker. Similar interpretations could also be made for the full range of autoclitics outlined by Skinner (1957). In the next section we will examine one such interpretation (of the relational autoclitic) because it will help us to address one of the most common criticisms of the behavioral approach to the study of language.

Grammar and syntax as autoclitic processes. In Skinner (1957), the properties of grammar and syntax are explained, in part, by appealing to what he calls relational autoclitics. Words such as *of, before,* or *below* are relational autoclitics in that they can specify events only by their relation to other responses. For example, the word *below* is meaningless without reference to that which is above. The manipulation of words or phrases by, for example, grouping or ordering those responses in specific sequences is also relational autoclitic behavior. As Skinner described it, "the speaker not only emits verbal responses appropriate to a situation or to his own condition, he clarifies, arranges, and manipulates this behavior" (Skinner, 1957, p. 344). Therefore, an arrangement of words such as "the man hit the dog" is a

combination of tacts of objects (man and dog), an event (hit), and various relational and temporal properties of these objects and events. In Skinner's view, the syntactical structure of sentences may be determined, in part, by explicitly taught discriminations of a number of objects and events in the world and the relations between those objects and events. Furthermore, Skinner accounted for the generative nature of grammar by appealing to novel environments organizing previously established discriminations into novel sequences. Imagine, for example, that a prior history of explicit reinforcement generated the two statements, "the boy fell" and "the dog ran." Imagine now that the speaker sees a dog fall for the first time. In this case, the individual discriminations contained within the two explicitly reinforced statements may combine in this novel environment to produce the novel utterance "the dog fell."

Although the foregoing example illustrates one way in which novel utterances may be produced by a speaker, according to RFT this is an example of a nonverbal relational autoclitic because it does not necessarily involve relational frames. From the RFT perspective, verbal relational autoclitics involve derived stimulus relations. Although groupings of words almost certainly occur, in part, through the direct reinforcement of a number of discriminations that are then organized in novel ways by novel environments, it is still necessary to explain how an adult speaker generalizes from these environmentally organized sentences to novel sentences for which there is no environment that could possibly organize the sentence. For example, the nonsense sentence "Green ideas sleep furiously" is correct grammatically, but there is clearly no physical environment that could possibly organize the sentence in this way (see Chomsky, 1959). The question arises, therefore, how can behavior analysis account for this type of generativity in human language? In other words, what are the functional classes through which word order sequences that are organized by actual environmental events transfer to new instances in which an environmental event is not directly responsible for the organization of that sequence? Relational frame theory suggests at least one way in which this might occur.

From the RFT perspective, large numbers of words may participate in various relational frames. For example, in some contexts there may be one group of words that participate in a frame of coordination (e.g., "thing words" or nouns) and another group that participates in another frame of coordination (e.g., "describing words" or adjectives). These two frames may also participate in a relational network in that all nouns are responded to as different than adjectives (i.e., two frames of coordination related to each other via a frame of difference). During a child's early verbal interactions, it is likely that he or she will be explicitly taught (e.g., via modeling and reinforcement) to utter some of the words from these two classes in a particular order (adjective-noun). After this explicit training, the word ordering may then transfer to other members of the two frames of coordination (adjective and noun) without further training. The production of a word sequence, nonsense or otherwise, that relies to some extent on the transfer of word ordering functions in accordance with relational frames is by definition a verbal relational autoclitic response. It is important to note, however, that word sequences often change in different linguistic contexts. For example, if the child is taught to use *is* in an adjective-noun sequence, then the word sequence is reversed (i.e., "the big cat" becomes "the cat is big"). In effect, the word sequence is conditional upon the presence or absence of the word *is*. Presumably this conditional ordering effect will also transfer through relational frames (see Wulfert & Hayes, 1988).

These types of transfer through

TABLE 1

Generating a nonsense sentence involves transferring words (indicated by an asterisk) from normal sentences via four (grammatical) frames of coordination into a single sentence

Adjective	Noun	Verb	Adverb
Normal sentences (generated by actual environmental events)			
Green*	Grass	Waves	Gently
Tired	People	Sleep*	Happily
Good	Ideas*	Work	Well
Aggressive	People	Fight	Furiously*
A nonsense sentence (generated by transferring individual words from normal sentences)			
Green	Ideas	Sleep	Furiously

grammatical relational frames may help to explain the generative nature of grammar and syntax (cf. Ellenwood & Chase, 1997; Goldstein & Mousetis, 1989; Streifel, Wetherby, & Karlan, 1976; Wetherby, 1978), and in particular they suggest an interesting interpretation of the formation of nonsense sentences. In effect, nonsense sentences may be possible because the words that constitute them are members of relational frames of coordination that contain large numbers of other words. Thus a nonsense sentence may be generated when individual words within the grammatical frames of coordination from various normal sentences are transferred into a single sentence until that sentence is discriminated as describing an "unreal" environmental event. The result is a novel nonsense sentence, such as "Green ideas sleep furiously" (see Table 1). This illustrates how the relational autoclitic combined with the formation of relational frames (i.e., a verbal relational autoclitic) may give rise to novel nonsense sentences.

CONCLUSION

In this article, we have attempted to show how integrating RFT with Skinner's *Verbal Behavior* (1957) may generate a modern behavior-analytic treatment of the behavior of the speaker that is sensitive to recent research on derived stimulus relations. We should add that some aspects of verbal behavior are too complex to address given the constraints of a single article like this, so we have left these to be described elsewhere. For example, Stewart and Barnes-Holmes (in press) discuss the processes involved in stating and understanding metaphor (see also Barnes, Hegarty, & Smeets, 1997; Chase & Parrott, 1986; Hayes & Grundt, 1997). We do not pretend, therefore, that the current work is definitive or final, but see it as simply helping to generate a modern behavioral research agenda in human language and cognition (Hayes & Barnes-Holmes, in press). In short, by applying RFT to Skinner's verbal operants, we aim to develop a modern, coherent, naturalistic, and purely functional-analytic understanding of human language that will provide a powerful challenge to the many nonbehavioral approaches that abound in the psychological literature.

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