

Skinner's Definition of Verbal Behavior and the Arbitrariness of the Linguistic Signal

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Abstract

The linguistic concept of the arbitrariness of the linguistic signal is at the center of Skinner's definition of verbal behavior. The role of the conventions of the verbal community, instead of mechanical and geometrical principles, in establishing the contingent relation between the verbal response and its consequences constitutes the crucial distinction between verbal and non-verbal behavior. A change of emphasis on the elements in the definition of verbal behavior from the agent of reinforcement, the listener, to the criterion for reinforcement, the conventions of the verbal community, is advocated. The concept of the arbitrariness of language has its origins in ancient Greek philosophy and was kept alive through an uninterrupted tradition that reached linguistics. Skinner's formulation of verbal behavior was influenced by that tradition, especially in the version presented by the linguist Leonard Bloomfield.

Keywords: Definition of verbal behavior, Distinction verbal/non-verbal behavior, Arbitrariness of the linguistic signal, Skinner, Bloomfield.

Much has been written about Skinner's approach to verbal behavior, which has been evaluated as either innovative and revolutionary or inadequate and problematic (see e.g. Hayes, Blackledge, & Barnes-Holmes, 2001; Leigland, 1997; Moore, 2008, p. 162; Osborne, 2003). This paper analyses Skinner's definition of verbal behavior, examines its boundaries, and suggests a change of emphasis in its elements; discusses especial problems on the study of verbal behavior raised by the conventional nature of the relations encompassed by its contingencies of reinforcement; and briefly presents one root of Skinner's definition of verbal behavior on philosophical and linguistic discussions of language, especially in the concept of the arbitrary nature of the linguistic signal.

Key elements of Skinner's distinction between verbal and non-verbal operants already appear in *The Behavior of Organisms* (Skinner, 1938): (a) Verbal responses are "non-mechanically effective" in contrast with the responses that produce their reinforcement by acting upon the environment (p. 50); (b) The verbal field is "defined as that part of behavior which is reinforced only through the mediation of another organism" (p. 116). In addition to

the differences in complexity, verbal behavior is considered to be the realm where science can possibly find differences between the behavior of men and other animals (p. 442).

Verbal Behavior (Skinner, 1957, p. 1-2) clarifies the meaning of the phrase "non-mechanically effective": while a non-verbal response is reinforced according to the geometrical and mechanical relations that its properties have with the environment, a verbal response acts indirectly upon the environment through the mediation of a listener. In spite of the inclusion in this broad definition not just of language, but also of gestures, drawing, etc., Skinner took vocal verbal behavior based on languages, generally English, as his main data (p. 14), and in practice confined his analysis to it. Explicit restrictions were soon added to the definition: "the 'listener' must be responding in ways which have been conditioned *precisely in order to reinforce the behavior of the speaker*" (Skinner, 1957, p. 225). Verbal behavior is shaped by a verbal environment in which people respond in ways which are characteristic of the group to which they belong (p. 226). These ways are the language of the community (p. 36), the languages studied

by the linguist (p. 461). Verbal behavior arises from the interaction between speaker and listener related to the practices of the verbal community— its language (p. 226).

The definition of verbal behavior in Skinner's *Upon further reflection* (1987) is very clear about the relationship between verbal behavior and languages: "Verbal behavior is behavior that is reinforced through the mediation of other people, but only when the other people are behaving in ways that have been shaped and maintained by an evolved verbal environment, or language" (p. 90).

For now we will be talking about verbal behavior based on languages, but later we will return to the broader definition.

Skinner characterized and distinguished verbal from non-verbal behavior by means of two interrelated criteria: (1) The properties of the verbal operant do not relate it to its consequences through the geometrical and mechanical principles that describe the organization and functioning of the physical environment, but through the practices of the verbal community; (2) The consequences of verbal behavior are presented through the mediation of a listener, whose behavior of presenting the consequences was conditioned according to these practices. The two criteria were presented together, but while the reinforcement through the listener had been frequently stated, the lack of geometrical and mechanical relations between verbal behavior and its consequences, though not denied, has been much more rarely mentioned. Even more rarely mentioned is the role of the language of the community in conditioning the listener's behavior. That language is referred to much more often by the somewhat vague expression "the practices of the verbal community". Almost never highlighted is that the presentation of the consequences by the listener is contingent upon the presence in the speaker's behavior of the properties that are conventionally characteristic of the language of the verbal community.

The essential properties of verbal behavior – its form (the topographies that integrate the operant class), the probability of a given form of response, its over-all

frequency, its energy and pitch level (Skinner, 1957, p. 22)- arise from the relation that they maintain with the consequences of this behavior, and this relation has a particular nature. It is not described by geometrical and mechanical principles, but by the ones that describe the language, the collection of the conventional practices of a verbal community. Thus, the properties of verbal behavior are selected by the environment according to the conventions of the language, and a listener is a necessary mediator due to the inability of verbal behavior to achieve practical consequences by itself. Verbal behavior has little environmental support and constraint, with its limits dictated by the compatibility of the topographies involved in its many and various forms, the need to reach the listener, and, above all, by the conventions of the verbal community. In this way the critical distinction between verbal and non-verbal behavior lies in the criterion of reinforcement, not in its source or agent, because this criterion gives rise to the properties that distinguish verbal from non-verbal behavior. According to Skinner (1957,1987), vocal verbal behavior: (1) is executed at an energy level not related to the magnitude of the effect it achieves in the environment (Skinner, 1957, p. 204); (2) is normally very fast (p. 205); (3) frequently receives intermittent and delayed reinforcement (p. 205); (4) has its effects multiplied by reaching many listeners (p. 206); (5) does not depend on vision to be effective (Skinner, 1987, p. 80); (6) does not involve the use of the hands (p. 80); (7) has available a great variety of speech sounds (p. 80); (8) allows easy comparison between emitted and heard sounds making it possible to achieve great similarity between them (p. 80); (9) is learned by means of product duplication, which is highly precise (p. 80).

The verbal environment and the boundaries of the definition of verbal behavior

Because the relations involved in the contingencies that shape verbal behavior are conventional, arbitrary, they need to be kept stable and to be taught by the verbal community. The conditioning of the listener

consists mainly in the establishment of discriminative control by the phonetic forms over his operant behavior. This control includes the arbitrary relations that link phonetic forms to meanings in the language: On hearing *Give me the doll*, the listener must give the doll and not the table. The discriminated repertoire of the listener under control of verbal stimuli transforms him automatically into a teacher of verbal behavior, into someone who can shape and maintain a speaker's verbal behavior. The listener will reinforce the speaker's verbal behavior that presents the forms contained in the arbitrary relations that are conventional in the verbal community.

Although the lack of geometrical and mechanical relation of the verbal response to its consequence had been mentioned in the literature as the critical feature of verbal behavior (e.g. Lee, 1984), the mediating role of the listener has been more emphasized, giving rise to some misconceptions, like the misunderstanding that the behavior of the rat in pressing the bar is verbal because it is reinforced through the experimenter, trained by his scientific community to do so, and who would be acting as a listener (Hayes, Blackledge & Barnes-Holmes, 2001). A footnote in *Verbal Behavior* started this misconception:

Our definition of verbal behavior, incidentally, includes the behavior of experimental animals where reinforcements are supplied by an experimenter or by an apparatus designed to establish contingencies which resemble those maintained by the normal listener. The animal and the experimenter comprise a small but genuine verbal community. (Skinner, 1957, footnote 11, p. 108)

This understanding has been kept in our field in two forms: in a narrower sense, whose content is not clearly specified (Osborne, 2003), the behavior seems to be considered verbal only in those situations where the experimenter is personally delivering the reinforcement; in a broader sense, the behavior of interest in animals in operant experiments is considered to be verbal just because the reinforcer is

programmed by the experimenter (Michael & Mallot, 2003; Hayes, Blackledge & Barnes-Holmes, 2001). Verbal also would be the behavior of the dog whose barking or sitting by the door had been reinforced by the opening of it by someone (Michael & Mallot, 2003). If the consequences are arranged or delivered by humans, so the behavior selected is verbal. Skinner's definition of verbal behavior has been criticized as being in fact so broad as to encompass actually all operant experimental studies and as being not functional because, instead of turning to the history of the organism of interest (the speaker), it would turn to the history of another organism (the listener) (Hayes, Blackledge & Barnes-Holmes, 2001).

The narrower interpretation appears to do more justice to what Skinner apparently meant. In *The behavior of organisms* (1938) he presents, as one of the reasons for choosing pressing the lever by the rat as the operant in the experimental situation that he will study, the fact that pressing the lever is *not* like verbal behavior, given that it acts upon the environment (p. 50). The note in *Verbal Behavior* probably refers to shaping by hand (Peterson, 2004) and to experiments where the reinforcer is contingent upon response properties arbitrarily defined by the experimenter, such as raising the head at certain height, irrespective of any kind of effect in the environment (Skinner, 1953, p. 91-92). In both cases the immediate cause for the delivering of the reinforcer is not the action of the response in the environment, but the action of a special listener, the experimenter.

If we test the experimental animal and dog examples against the two interrelated criteria that fully define verbal behavior they will fail the test and not qualify as such. It is true that in all of these cases there is another organism involved, at different levels depending on the example, in the delivery of the consequences. But the delivery of consequences is not contingent upon the presence in the animal's behavior of properties that are characteristic of the practices of a verbal community. Instead, in most of the cases, the delivery of consequences is contingent upon some

relation of the behavior with the physical environment.

The properties of pressing the lever – e.g. the rate, magnitude, and topographies of responses – are selected by the environment according to the mechanical and geometrical relations that they have with the experimental apparatus, qualifying this operant as non-verbal. In spite of the experimenter's arranging the contingencies, they work according to geometrical and mechanical principles. Even in the case of shaping, the moving criterion of reinforcement is defined by the experimenter in general (see e.g. Skinner, 1953, p. 91-93; Donahoe & Palmer, 2004, p. 116-117), although not necessarily, according to the relation of the behavior to the physical environment, not according to the conventional practices of a community.

The similarity between the situations of verbal behavior related to languages and the behavior of interest in experimental animals or in barking and sitting dogs is quite limited. On one hand, those situations share the characteristic of having another organism mediating the reinforcement. On the other hand, the absence of a verbal community in the case of non-human animals deprives their behavior of important characteristics of verbal behavior: (a) There is no verbal community to whose complex and rich conventional practices (its language) the behavior of the animals should conform. As a consequence, the forms of their behavior under consideration are not richly differentiated and they do not show the level of productivity that is characteristic of verbal behavior; (b) There is no verbal community constituted by organisms whose behavior produces similar audible products. Thus the animal does not have the opportunity of learning by imitation and modeling, and functioning as the listener to its own verbal behavior, processes that possibly would make very fast and precise the learning of verbal behavior (Skinner, 1987, p. 74, 80; Donahoe & Palmer, 2004, p. 318-319).

This does not mean that animals are necessarily incapable of verbal behavior, but it does mean that a verbal community – a set of conventional practices characteristic of a group – is a precondition for the shaping and maintenance of verbal

behavior. And it is just not true that the experimenter and the animal, or the human and the dog, constitute a “genuine verbal community”, because a verbal community is constituted by organisms *plus* a set of conventional practices, which are shared by the community and transmitted through generations (Bloomfield, 1933/1961, p. 42; Skinner, 1957, p. 226, 461, 1987, p. 75).

The distinction between verbal and non-verbal behavior is more properly established through the criterion by which the environment selects the properties of the response: If the selected properties of the response are described by the mechanical and geometrical relations that they have with their consequences, the behavior is not verbal; if the description of these properties specifies the conventions of a verbal community, it is verbal. Maybe instead of stressing the role of the listener, our definition should be something like this: Verbal behavior is operant behavior whose properties are selected according to the conventions of a verbal community. This definition would be along the lines suggested by Skinner, particularly in his study on the evolution of verbal behavior (1987, p. 75), where he analyzed an imaginary example of two men fishing: A pulls and pushes the net from the water following the vocal response of B, who observes when a fish is caught in the net. On deciding when B's vocal behavior can be properly called verbal, Skinner did not choose the alternative “when it was first strengthened by A's action in pulling the net (that is, when it became a vocal operant) (1987, p. 89)”, but the one “when it was shaped and maintained by a verbal environment transmitted from one generation to another (when it became part of a ‘language’) (1987, p. 89).”

As mentioned above, the definition of verbal behavior encompasses several kinds of behavior, such as gesturing and drawing, in addition to the ones that involve languages. However, “verbal” is an adjective whose usual meaning involves languages. The naming of the whole set of different kinds of verbal behavior with an expression more suitable for the specific one that involves languages induces the understanding that a language is indeed involved whenever the expression appears.

Verbal behavior based on languages comprises a realm of a rich set of phenomena because it is the product of the sophisticated environments called languages. To make clear what we are talking about and also to have an expression to refer to these particular set of phenomena, maybe we should use the expression "linguistic verbal behavior".

The arbitrariness of the relationship between sound and meaning in linguistic verbal behavior poses specific challenges for our research and contributes to slowing down the accumulation of knowledge in this field. The mechanical and geometrical principles that relate non-verbal operants to their consequences work universally in the same way, which facilitates the understanding of the contingencies involved in experimental procedures. In addition to the contingency shaped behavioral repertoire that we have in relation to these principles, they are very well described by sciences such as physics and mathematics. On the contrary, the conventions that relate verbal operants to their consequences vary according to the various verbal communities, and the researcher will find more difficult to understand a procedure that involves practices of verbal communities in relation to whom he has no contingency shaped repertoire because he is not a member (for the same problem in the linguistic field, see e.g. Diekhoff, 1915/1970, Aron, 1918/1970). In addition to this, most languages are insufficiently, or not at all, described by linguistics (Bloomfield, 1933/1961, p. 57, Crystal, 1997, p. 286-287). In any case, even when the analyst is a member of the verbal community related to the verbal behavior of interest, as behavior analyses studies the behavior of individual organisms, not the functioning of verbal communities, we will need the descriptions of the practices of verbal communities made by other sciences, especially the ones made by linguistics.

The arbitrariness of language in philosophical and linguistic inquiries of language

The anchoring of language in the conventions of the verbal community

instead of in the physical environment is referred to by linguists as "the arbitrariness of the linguistic signal". The linguistic signal is a unity of the language constituted by a phonetic form together with its related meaning. According to the physicalist definition given by Bloomfield (1933/1961), the linguistic meaning is constituted by the stimuli that regularly precedes and follows the emitted form (p. 27).

Linguistic signals have been considered arbitrary since early philosophical debate (for divergences or limiting considerations see Benveniste, 1966, p. 49-55; Jakobson, 1990, p. 407-421; Jespersen, 1922/2007, p. 396). Like many other issues in Linguistics, as well as in other sciences such as Psychology, the origins of this debate are found among the ancient Greeks. This discussion appears in Plato's *Cratylus* as the *phýsis-nómos* (or *nature-convention*) debate, as opposite answers to a question about the origins and functioning of words: Is the connection between words and their meanings natural and necessary, or conventional (Bloomfield, 1933/1961, p. 4; Jakobson, 1990, p. 407-421; Robins, 1997, p. 23-25)?

Coseriu (1977, p. 21) considers Aristotle to be the first source of an unbroken tradition asserting the arbitrariness of language that extends itself from philosophy through nascent scientific linguistics in the 19th century reaching to 20th century structural linguistics. Aristotle considered that "[e]l nombre es sonido con significado en razón de lo que ya está establecido" (quoted and translated from Greek to Spanish by Coseriu, 1977, p. 23). [The name is sound with meaning in regard to which is already established.]. According to Coseriu, in modern wording, it means that for Aristotle the relationship between sound and meaning in language is historically established. Aristotle's statement was descriptive-functional (it was about how linguistic signals work), not genetic (it wasn't about the origins of linguistic signals), and meant that words work by virtue of a historical tradition, not by means of a natural and necessary relationship between sound and meaning.

The subsequent long journey of this conception sometimes highlighted the

negative component of Aristotle's view – not of necessity by nature-, sometimes the positive one – historically instituted (Coseriu, 1977, p. 24). A certain displacement of Aristotle's descriptive-functional perspective in the direction of a genetic one soon appeared: Very often, the authors discussed the *origins* of the tradition that established the relation between sounds and meanings. Already in scholasticism, Aristotle's "historically instituted" became "intentionally established", considering the intentionality of the establisher of the linguistic signal. Subsequently, the philosophical discussion is kept in same lines, and we see the appearance of expressions like *ex arbitrio*, *arbitrary*, *arbitrarius* (p. 27). Regardless of the fact that from the beginning of the use of the term in this context *arbitrary* meant "intentionally established or imposed", it subsequently came to mean just "not motivated or related by nature", which is not necessarily a genetic statement (p. 28).

Through the philosophical weave of this notion, the diversity of languages was considered to be evidence supporting the notion of the arbitrariness of the linguistic signal (p. 28). The arbitrariness of the linguistic signal was, and still is, understood as the lack of a natural causal connection (such as the one found in the relation smoke–fire) or sameness (such as the one linking a thing to its image) between sound and meaning (or between the linguistic signal and the extra-linguistic world) (p. 51). Even though the authors sometimes considered onomatopoeias as a possible exception to the arbitrariness, philosophers and subsequently linguists also argued that they are just a few and their role in the language is not very important (Coseriu, 1977, p. 33, 49, 55; Robins, 1997, p. 23-24); onomatopoeias are more often conceived of as also arbitrary as the differences on them from language to language evidence (Coseriu, 1977, p. 43).

From the very beginning of their science in the early 19th century, linguists in general embraced the thesis of the arbitrariness of the linguistic signal, as did the influential linguists Whitney and H. Paul (19th century) and Saussure and Bloomfield (20th century).

Two textbooks of Bloomfield, both mentioned by Skinner (1979) in 1934 (Vargas, 1992), are of interest in connecting the linguistic issue of the arbitrariness of the linguistic signal to Skinner's definition of verbal behavior. The first is *An introduction to the study of language* (1914), written under the influence of the psychology of Wundt (Bloomfield, 1914/1983, p. vi), and largely mentalistic in respect to some more general, fundamental explanations of language. It was considered to be a scholarly synthesis of the available linguistic knowledge at the time, giving continuity to a few very good, but not up to date, existing introductions to linguistic science, such as Whitney's *Language and the study of language* (1867) and Strong, Logeman and Wheeler *Introduction to the study of the history of language* (1891) (Bolling, 1970/1917; Diekhoff, 1970/1915; Kess, 1983). It was influential as a textbook but was superseded by the extremely influential second one, *Language* (Bloomfield, 1933), and nowadays it is not very well known even in the field of linguistics (Kess, 1983).

The first chapter of the book (Bloomfield, 1914/1983) discusses the nature and origins of language, mainly in line with Wundt's psychology (Aron, 1918; Esper, 1968, p. 188-192; Kess, 1983; see also Bloomfield, 1913/1970). It presents an evolutionary point of view according to which mental states of animals give rise to expressive movements, natural physical reactions (such as, e.g., a facial expression of bitterness, which would have appeared as a result of the movement of withdrawing the back of the tongue, more sensitive to bitter tastes). Gesture-language (such as pointing or depicting something through movements, for example, a hat characteristically used by someone) is expressive movement weakened or somewhat modified and used for communication. The relation between the gesture and what it expresses is generally apparent, such as the act of pointing, which would have evolved from a child's grasping something that he or she could not reach. Vocal language arose from expressive movements, and appeared when not the movement itself but the sound it produced became the object of the attention of the

others. Differently from most part of expressive movements, the sounds of vocal language are not indicative of what they express. Even onomatopoeias, where there seems to be a direct connection between the sound and the related experience, are very limited in number and their forms are related to other forms of the language (Bloomfield, 1914/1983, p. 81). The absence of a natural (immediate) connection of sound and meaning allows transference of meaning and explains linguistic change and the diversity of languages through time and space: In vocal language, "there never was a stage in which a hearer could recognize any but an arbitrary connection between sound and sense" (Bloomfield, 1914/1983, p. 16). The form of utterances depends on the habits of the speaker's speech community on both sounds and meanings:

... just as each language uses only a limited set out of the infinity of sounds possible to the human vocal organ, so each language divides the infinitely various experiences of life into a limited number of classes within each of which all experiences are named by the same expression. The classes so recognized by the different languages are ... very different... the description of the various experience-classes and of the sound-complexes used to express them, constitutes the *lexicon* or *dictionary* of a language. (Bloomfield, 1914/1983, p. 90)

Bloomfield stressed the advantages of vocal language over soundless expressive movements. It: (1) allows more variation; (2) is less laborious and slow, demanding not much muscular effort; (3) depends on hearing instead of sight, the former but not the latter being almost always open for the incoming stimulation and independent from the necessity of turning the body (1914/1983, p. 8).

Bloomfield's 1933 textbook *Language*, exceptionally influential in linguistics (Coseriu, 1986, p. 149; Hockett, 1984, 1999; Lepschy, 1982, p. 84-85; Robins, 1997, p. 237-238), briefly but fully states the arbitrariness of the linguistic signal, and

is much more concise about gestures and their relation to vocal language. Speech and gestures are conceived of as similar kinds of behavior in the sense that they do not act directly in the extra-linguistic world, but function as stimuli for a listener, whose behavior acts directly in the extra-linguistic world (Bloomfield, 1933/1961, p. 22-27, 38-39). In spite of some measure of imitation present in gestures (for ex, two fingers imitating a man walking), and thus some similitude or natural relationship to what they mean, they are mostly conventional and used as an accessory to language (p. 39, 144, 147). Still more than in the case of gestures, "the connection of linguistic forms with their meanings is wholly arbitrary" (Bloomfield, 1933/1961, p. 145) and established by the conventions of the verbal community. Different words for the same meaning in different languages (for example, *doll* in English and *boneca* in Portuguese) indicate the arbitrariness of the relationship between form and meaning, instead of a necessary natural relation. Requiring some more subtlety to apprehend, but very important for the understanding of languages, the linguistic forms of different languages do not correspond to their meanings in the same way (277ff), that is, there is not a one-to-one correspondence between the linguistic forms of different languages. The whole system of the language is arbitrary, is conventional, and the way that each language classifies the world is unique. For example, in English *A person plays a guitar* and *A child plays with the toy*; in Portuguese *A person toca a guitar* but *A child brinca with the toy*. The same phonetic form – *plays* - is related in English to an action that a person performs with the guitar and to an action that a child performs with the toy. In Portuguese two different phonetic forms – *toca* and *brinca* - are related to each one of these two actions.

The link between the conceptions of verbal behavior and the arbitrariness of the linguistic signal

Skinner distinguished the non-verbal operant of pressing a lever down from verbal operants on the basis that the former,

but not the latter, has an external support (it needs the lever) through which it acts upon the environment (Skinner, 1938/1991, p. 50). Verbal behavior escapes easily from stimulus control, “because by its very nature it does not require environmental support -that is, no stimuli need be present to direct it or to form important links in chaining responses” (Skinner, 1957, p. 47).

When responses that do not act on the environment, such as flexing a leg, are reinforced, “they become gestures” (Skinner, 1938/1991, p. 50). According to Skinner (1938/1991, p. 50; 1957, p. 47), gestures are verbal responses, but many of them might have originated from responses that had practical effects in the world, and are extensions of these practical responses (such as the traffic officer stopping a car by a gesture that would stop someone if it really reached the person). Skinner (1957, p. 466) offers several examples in which behavior that is mechanically effective over someone (such as stopping a person by pressing the hand in the person’s chest) comes to be made in an incipient form (such as just extending the hand without touching the person), and acquires an effect in the behavior of the other, case in which it is a gesture and is verbal behavior. On discussing the evolution of a verbal environment, a language, Skinner (1987, p. 75) debates also the evolution of gestures. Movements can be either physically very similar to the situations that they mean (as the ones used to model a behavior of opening a sliding door) or less similar, as they become farther from having a practical effect in the world and closer to becoming a gesture by acting on the behavior of others (p. 78-79).

He mentions the advantages of vocal behavior over gestures in natural selection in terms that strongly resembles Bloomfield’s comparison:

Sounds are effective in the dark, around corners, and when listeners are not looking, and they can be made when the hands are busy with other things. There are special advantages, however, in large operant repertoires, especially the enormous variety of available speech sounds. Gestures are not as conspicuously different as speech

sounds and hence are fewer in number, and the sounds one produces are more like the sounds one hears than the gestures one makes are like the gestures one sees (because they are seen from a different point of view). One learns to gesture through movement duplication but to speak through product duplication, which is more precise. (Skinner, 1987, p. 80)

The relations involved in the establishment of verbal operants are, in general, arbitrary, reflecting the arbitrariness of the language. In all the operants the relation between the verbal response and the reinforcer is arbitrary. Also arbitrary is the relation of: (a) the aversive stimulus or deprivation and the verbal response, in the mand (1957, p. 35); (b) the discriminative non-verbal stimulus and the verbal response, in the tact (p. 81); (c) the discriminative verbal stimulus that control textuials (p. 65-69) and intraverbals (p. 71); (d) and the discriminative verbal and non-verbal stimuli that control autoclitics (p. 311). However, although close related, verbal operants are not linguistic units, in the former we will find similarity in some controlling relations. In echoics (p. 55), there is formal similarity between the verbal discriminative stimuli and the verbal response. In transcriptions (p. 69-71) the relation between the verbal discriminative stimuli and the verbal response can be either arbitrary, as in taking dictation or writing in a script different from the one functioning as the verbal discriminative stimuli, or of formal similarity as in copying from a written source through the same script. The similarity found in the relations of verbal discriminative stimuli and the verbal response in echoics and transcriptions happens because their function in a speaker’s repertoire is to build the units from which other verbal operants are made. These units must have formal similarity with the ones found in the verbal community. Verbal operants where there is formal similarity between discriminative stimuli and the verbal response allow comparison and self-reinforcement (p. 70) that can make their learning easier.

The arbitrariness of the relations involved in verbal operants is clearly discussed by Skinner in his approach to the stimulus control in the tact. The correspondence between the speech forms that constitute tacts and the stimuli or properties of stimuli that control these forms is not simple of being studied empirically. The repertoire of tacts found in a given verbal community corresponds to the particular and arbitrary way as this given community analyzed the non-verbal world. Thus, for example, in Portuguese *carne* refers to a part of the body of animals, independently of the context to be or not of feeding. In English two different words, *meat* and *flesh*, refer to this identical aspect of the extra-linguistic reality. The arbitrariness of the analysis is due partially to the fact that many of the properties of the stimuli that control tacts can be identified only by means of a verbal environment. The control of the forms of responses by stimuli or properties of stimuli occurred in an unplanned way, and there is not any apparent logical necessity for which some but not other stimuli or properties have acquired control on the forms:

In studying the properties of the world of things or events which are responded to verbally we must lift ourselves by our own bootstraps; many properties of nature can be identified and dealt with only through verbal practices. Nevertheless the problem of stimulus control in the tact can be meaningfully examined. If the world could be divided into many separate things or events and if we could set up a separate form of verbal response for each, the problem would be relatively simple. But the world is not so easily analyzed, or at least has not been so analyzed by those whose verbal behavior we must study. In any large verbal repertoire we find a confusing mixture of relations between forms of response and forms of stimuli. The problem is to find the basic units of "correspondence." (Skinner, 1957, p. 115-116)

Because we are not able to find out the original forms of words, and also because the diversity of the languages of the world (Skinner, 1987, p. 91), Skinner (1957, p. 468) argues against presenting onomatopoeias as an explanation for the origins of language based on the physical similarity between stimulus and response.

Conclusion

The peculiar relation of language to the extra-linguistic world, embodied in the notion of the arbitrariness of the linguistic signal, is at the heart of Skinner's concept of verbal behavior. Skinner was influenced especially by Bloomfield's discussion of the arbitrariness of language, which emphasized not only the lack of any kind of natural relation between linguistic units and their meanings, but also the ineffectiveness of language in the extra-linguistic world, and its effectiveness in a listener. In brief, several elements raised in philosophical and linguistic debate about the arbitrariness of the linguistic signal appear in Skinner's conception of verbal behavior: the ineffectiveness of verbal behavior on the physical environment, gestures as an evolutionary precursor of vocal verbal behavior and as a kind of verbal behavior, the advantages of signaling by means of vocal signs instead of visual ones, the nature of the relation between sound and meaning in onomatopoeias, the differences of words in different languages and the variety of languages as a sign of the arbitrariness of language, the lack of sameness between the speech sound and the extra-linguistic world, the general arbitrariness of the analysis and classification of the world made by languages.

Bloomfield ascribed to psychology the task of elucidating the behavior of speakers and listeners:

We do not understand the mechanism which makes people say certain things in certain situations, or the mechanism which makes them respond appropriately when these speech-sounds strike their eardrums. Evidently these mechanisms are a phase of our general equipment for responding to

stimuli, be they speech-sounds or others. These mechanisms are studied in physiology and, especially, in psychology. To study them in their special bearing on language, is to study the psychology of speech, *linguistic psychology*. In the division of scientific labor, the linguist deals only with the speech-signal ...; he is not competent to deal with problems of physiology or psychology. (1933/1961, p. 31-32)

Skinner's *Verbal Behavior* takes this task attributed by Bloomfield to psychology. It is the first attempt in the history of language sciences to specify and explain a speaker's and listener's repertoires by means of a scientific model amenable to experimental approach. Skinner's very original contribution was to show the behavioral processes by which the arbitrary connections between sounds and meanings that constitute languages are inserted in the contingencies of reinforcement that shape the behavior of speakers and listeners.

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Author's note and Running Head I: A first version of this paper was presented at the 33th Annual Association for Behavior Analysis (ABA) Convention, San Diego, 2007. I am very grateful to David E. Eckerman for his careful reading of the paper and wise suggestions.

Running Head: Verbal behavior and arbitrariness of language.

Author's note II: In September 2007 this version of my paper was submitted to the journal *Behavior and Philosophy*. In January 2008 the editor sent me two reviews, together with his decision not to publish the paper (Marr, 2008).

"Reviewer A" stated that the connection between the first and the second half of the paper was vague, but thought the first part could be published despite disagreeing with the author's central points about the definition of verbal behavior. "Reviewer A" said that it was:

...helpful to distinguish two kinds of definition. When we make a mathematical model or any other kind of formal system, we have the luxury of defining our terms in advance. "A circle is a set of points in a plane equidistant from any [sic] point in that plane." But when we study nature and attempt to classify our observations, our definitions are empirical, rather than a priori. An a priori definition can cut cleanly between members of the class and nonmembers. But empirical definitions have fuzzy boundaries. "A dog is a furry quadruped that barks, chases cars, sheds on the carpet, etc." No matter how hard we work on such a definition, we will face ambiguous cases. (Is a coyote a dog? Is a coy-dog a dog?) Verbal behavior is of this sort. Classes of behavior, like classes of organisms necessarily have fuzzy boundaries. The best definition will not carve up the domain of behavior into perfectly discrete classes; rather, it will be useful. It seems to me that the definition the author settles on has this property. That is, I believe the author has done a very good job of identifying a useful definition, but it is asking too much of such a definition to decide on borderline cases....

In summary, I think the author has done a very good job of summarizing Skinner's various attempts at a definition of verbal behavior and has combined them into a coherent amalgam that is particularly useful. However, I feel that the use to which the author puts this definition is open to controversy. The discussion of the topic of the arbitrariness of the signal, while of interest in its own right, seems to me to be tangential.

Yet the arbitrariness of the relations involved in verbal behavior has been stressed in recent discussions of Skinner's definition of verbal behavior. For example, Palmer (2008) recently also published a paper on this issue and his interpretation of Skinner's definition of verbal behavior - "Verbal behavior emerges in a community that maintains contingencies of reinforcement for behavior that reflects conventional but arbitrary relationships between stimuli and responses" (p. 299)- is similar to the definition of verbal behavior that my paper suggests could be formulated from Skinner's distinction between verbal and non-verbal behavior: "Verbal behavior is operant behavior whose properties are selected according to the conventions of a verbal community." (In philosophical and linguistic discourse about language, where the nomenclature "conventional" and "arbitrary" about this issue originated, these words have basically the same usage.)

Marr, J. E-mail to the author, January, 4th 2008.

Palmer, D. C. (2008). On Skinner's definition of verbal behavior. *International Journal of Psychology and Psychological Therapy*, 8(3), 295-307.