The Duplic and Codic: the Importance of a Consistent Taxonomy of Verbal Behavior

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Abstract

Behavior analysts operationally define relations among environmental stimuli and behavior both functionally and topographically, and an insistence on objectivity, precision, reliability, and accuracy for technical descriptions and definitions is a unique and defining characteristic of the field. However, occasionally, technical terms are inconsistently used by behavior-analytic educators, researchers, and practitioners, and these inconsistencies should be addressed. Because they can pose conceptual and practical issues if not fixed, terminological inconsistencies are not merely inconveniences. In the current paper, we identified and explained terminological inconsistencies with the usage of the term *transcription* in published behavior-analytic textbooks, manuals, and other reference materials. In addition, we revisited previous analyses and recommendations and restated the need for clarity in a verbal operant taxonomy, particularly for instructors, trainers, and authors of future textbooks, trainings, and manuals.

Keywords Verbal behavior · Transcription · Codic · Duplic

As instructors and trainers of coursework and content in applied behavior analysis (ABA), we have occasionally stumbled upon terminological inconsistencies that appear to have lingered in textbooks, manuals, and training materials for a very long time, sometimes decades. In some cases, these inconsistencies pose few challenges to skilled instructors and students because they can discriminate the controlling variables for the usage of certain terms in the presence of certain audiences (e.g., continuous reinforcement/fixed ratio 1, emergent/derived, noncontingent/fixed time/response

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independent, Type I punishment/positive punishment, classical/respondent, maintenance/retention). However, using multiple terms to refer to a single, well-defined behavioral phenomenon might be less problematic than using a single term to refer to functionally distinct behavioral phenomena or using unnecessarily restrictive terms to describe general environmental relations.

Behavior analysts distinguish themselves from other practitioners (e.g., psychologists, sociologists) by specifically and objectively defining theoretical, experimental, and clinical terms both topographically and functionally. Skinner (1945) was an early critic of fuzzy and circular definitions of psychological phenomena, and in many ways, his early criticisms of vague terminology and hypothetical constructs, combined with his keen powers of observation and specificity, set the occasion for an analytical account of human behavior that allows practitioners to predict and control behavior in powerful ways. Some might even argue that this level of prediction and control rivals that which is seen in other natural sciences, but there still exist terminological issues in behavior analysis, due in part to a dynamic and evolving science of human behavior and changing societal norms and expectations, but also due in part to inconsistencies across training programs, faculty, clinical sites, textbooks, philosophies, and personal and professional persuasions of behavior analysis. Although completely eliminating any variation across researchers, educators, and practitioners is unreasonable, it is important to routinely address these inconsistencies to attempt to provide clarification and to remove the fuzziness from our science of which Skinner was so critical for its existence in other fields.

Due to updated empirical data, conceptual analyses, social relevance and validity, and parsimony, the definitions and uses of certain terms must be refined over time. A recent example of this refinement process is the debate among behavior analysts regarding the correct usage of the terms *count*, *frequency*, and *rate*. The details of this debate are not relevant to the current discussion, but the factors related to how scientific and applied fields decide on the best usage of terms are relevant. Carr, Nosik, and Luke (2018) provided an example of how to determine common usage of terms and ultimately for how to make recommendations for the usage of such terms in training programs and in practice. They reviewed published textbooks and journal articles to determine the contexts and controlling variables for using different definitions of *frequency* and made usage recommendations accordingly. A similar analysis was used in the current assessment on the usage and status of the terms *transcription*, *echoic*, and *textual*.

As faculty teaching in graduate programs in ABA, we recently noted inconsistencies with how *transcription* is defined, described, and applied across a few primary ABA textbooks, as well as issues with the status of the *echoic* and *textual* operants as fundamental or primary. Given the initial recognition of these terminological issues, we further investigated by reviewing other published textbooks, manuals, references, glossaries, and online training modules. The review was completed to determine the pervasiveness of the inconsistent usage of *transcription*, to provide recommendations and clarity to the field of ABA regarding the proper usage of *transcription* and other related terms, to determine if the *echoic* and *textual* operants should be considered as elementary, and to clarify and reinforce an already established taxonomy of verbal operants that appears to not be in universal and exclusive usage.

Skinner (1957) proposed specific terminology when describing and categorizing individual verbal operants. In *Verbal Behavior*, he distinguished *language* from *verbal behavior*; *language* referring to “the practices of a linguistic community” and *verbal behavior* “as behavior reinforced through the mediation of other persons” (Skinner, 1957, p. 2). This distinction between the definitions of the two terms is important, but potentially more important is that in his analysis, *language* and *verbal behavior* are not synonymous and should not be used interchangeably. *Verbal behavior* specifically refers to the behavior of an individual, and understanding such behavior lies in the ability to predict and control specific instances of such behavior.

In the traditional study of language, determining the meaning of words is the primary goal. Skinner (1957) approached the analysis of language and communication differently than traditional linguistics and stated, “Meanings are to be found among the independent variables in a functional account” (p. 14). Essentially, the meanings of words are the causes of verbal behavior, and in order to determine the meaning or cause of verbal behavior, it must be analyzed and categorized according to a combination of function, form, and context, and not form alone. Rather than limiting verbal behavior to only what is said, verbal behavior includes any topography of behavior that is reinforced through the mediation of other persons conditioned precisely in order to reinforce the behavior of the speaker.

The combined functional and formal classification system of verbal operants into units of analysis that was developed by Skinner (1957) is based on the forms of the antecedent controlling stimuli and response products, as well as the specific consequences provided for each operant. For example, the word *cat* is classified as a different verbal operant depending on the functional relation among the forms of the antecedent controlling stimuli (e.g., verbal, nonverbal, visual, auditory, finger-spelled, or another form), the forms of the responses emitted (e.g., spoken, written, finger-spelled, or another form), and the consequences delivered by a person, or group of people, who respond to the verbal behavior. Skinner established the elementary verbal operant categories as the *mand*, the *tact*, the *echoic*, the *intraverbal*, the *textual*, and *transcription*.

Skinner’s categorization of verbal operants included the identification of both formal and functional relations. Formal relations are determined by the correspondence between the constituent parts of the antecedent stimulus and response products (e.g., letters, sounds) in a verbal episode, and whether the topographies of the stimulus and response are the same or different. When the antecedent stimulus matches the beginning, middle, and end of the response product, the stimulus and response exhibit point-to-point correspondence. For the stimulus and response to exhibit point-to-point correspondence, the letters or syllables of a written or spoken (or other topography) word must match the letters or syllables of a written or spoken (or other topography) response—for example, writing the word *cat* in response to hearing the word *cat*. When the stimulus and response are in the same sensory modality and have a similar topography, they exhibit formal similarity. If the sensory modality of the stimulus is visual and the topography is written, then the response must also be written (i.e., text based) for formal similarity to exist—for example, writing the word *cat* in response to seeing the printed word *cat*. An *echoic* is currently considered a specific and fundamental verbal operant under the control of auditory verbal stimuli where the response generates a sound pattern that has point-to-point correspondence with the antecedent

stimulus and is in the same form, an example being saying “cat” in response to hearing the word *cat*. A *textual* is also considered a specific and fundamental verbal operant in which a vocal (or subvocal) response is under the control of a nonauditory (e.g., written) verbal stimulus. An example is saying “cat” in response to seeing the written word *cat*.

Clearly, Skinner (1957) very carefully defined the verbal operants, taking both function and form into consideration. Interestingly, and somewhat inconsistently, he defined *transcription* in two fairly different ways. The first was “the copying of written material” (p. 71), where the stimulus and response are both written and exhibit point-to-point correspondence. The second was “taking dictation” (p. 71), where a written response exhibits point-to-point correspondence with an auditory spoken stimulus but does not exhibit formal similarity. Skinner’s analysis and categorization of *transcription* are consistent with common usage as referring to writing something exactly as it is spoken or written, but this is not consistent with his categorization of other verbal operants, and this lack of consistency can be confusing for students, researchers, instructors, and practitioners of ABA. In addition, Skinner did not thoroughly explore verbal behavior from the perspective of nonvocal communicators, particularly the forms of antecedents and responses, and it is somewhat surprising that, as a field, we have not reanalyzed some of Skinner’s categorizations.

In an effort to determine the pervasiveness of the inconsistent usage and application of the term *transcription*, we reviewed eight textbooks, glossaries, manuals, and training modules that included definitions of verbal operants (Table 1) commonly used with students in graduate programs and applied training settings for ABA practitioners; the sources were selected given their adoption, usage, and prominence in the field of ABA. We did not include other published material (e.g., journal articles, book chapters) because formal technical definitions tend not to be explored outside of rare terminological articles. We then reviewed the definitions of *transcription* provided by each source (Behavior Analyst Certification Board [BACB], 2012; Mayer, Sulzer-Azaroff, & Wallace, 2019; Peterson, 1978, did not include a definition of *transcription* in the treatment of verbal operants). Table 1 lists the different combinations of antecedent stimulus and response product forms used by the source materials to define *transcription*. Given our review, the term and concept of *transcription* appear to be inconsistently interpreted and defined by a number of authors. There currently exist four separate definitions and descriptions of *transcription* given the different combinations of antecedent stimuli and response product forms.

According to Bostow and Murdock (n.d.), Catania (2013), and Skinner (1957),¹ *transcription* refers to the behavior of writing or typing something that one sees written. However, Cooper, Heron, and Heward (2007); Skinner (1957)¹; and Sundberg (2004)² defined *transcription* as writing or typing something that one hears spoken (Sundberg also includes finger spelling as a response product in his definition). Whereas the BACB Fourth Edition Task List (BACB, 2012) does not list *transcription* as a key behavior-analytic term, translated ABA glossaries provided by the BACB (n.d.) list *transcription* without definitions.

¹ Skinner (1957) included both written/typed and spoken antecedent stimuli forms in his definition of transcription.

² Sundberg (2004) included separate definitions for transcription and copying a text.

Table 1 The controlling antecedent stimuli and response product forms of the different definitions of transcription

Author(s)/Source	Antecedent stimulus form(s)			Response product form(s)	
	Written/ Typed (Visual)	Spoken (Auditory)	Finger- Spelled (Visual)	Written/ Typed	Finger- Spelled
Bostow & Murdock (n.d.)	✓	-		✓	-
Catania (2013)	✓	-		✓	-
Cooper et al. (2007) ^a	-	✓		✓ ^b	-
Skinner (1957)	✓	✓		✓	-
Sundberg (2004)	-	✓		✓	✓

^a Mark Sundberg wrote the chapter on verbal behavior

^b With accurate spelling

Vargas (1982) identified this exact issue over 35 years ago and argued that *transcription*, in common usage, actually encompasses two different verbal operants. He stated that *transcription* should only be used in such a way that it can be classified as a single verbal operant, or it should be omitted altogether for accuracy, clarity, and simplicity. Given the various definitions and usages of *transcription* that we found in the current review of published textbooks, and given Skinner's (1957) original definition of *transcription*, it appears that Vargas's recommendations were not consistently implemented. Given the confusion regarding the topography of several verbal behaviors and in order to provide a more specific categorization of the properties of verbal operants, Michael (1982) suggested the creation of two new unique terms, *duplic* and *codic*, to describe the different topographies of verbal operants that exhibit point-to-point correspondence between antecedent stimuli and response products. Michael proposed that the terms *duplic* and *codic* (Fig. 1) should be used as classifications of verbal operants to ensure taxonomical accuracy and specificity.

A *duplic* is a verbal operant in which the antecedent stimulus and response product forms exhibit point-to-point correspondence and formal similarity. Given this new classification, the *echoic* and *copying a text* verbal operants, as proposed by Skinner (1957), would be classified as *duplics* (see Fig. 1 and Table 2). Additionally, the term *duplic* includes other stimulus and response forms, such as the *mimetic*. *Copying a text*, an example of a *duplic*, would be writing the word *cat* in response to seeing the written word *cat*. A *codic* is a verbal operant in which the antecedent stimulus and response product forms exhibit point-to-point correspondence, but there is no formal similarity. Given this new classification, the *textual* and *taking dictation* verbal operants would be classified as *codics* along with other forms of verbal behavior such as *reading braille* or *sending Morse code*. *Taking dictation*, an example of a *codic*, would be writing the word *cat* when hearing someone say "cat."

As seen in Tables 1 and 2, *copying a text* and *taking dictation* would qualify as *transcription* in several of the published definitions, but these classifications are not consistent across authors. The *duplic* and *codic* taxonomies essentially eliminate the use of the term *transcription* because, functionally and formally, *copying a text* and *taking*

Fig. 1. Updated taxonomy of elementary verbal operants, with corresponding controlling antecedent stimuli and examples of different types of duplics and codics. Adapted from *Applied Behavior Analysis*, by J. O. Cooper, T. E. Heron, & W. L. Heward, 2007, Upper Saddle River, NJ: Pearson, p. 534, and “Skinner’s Elementary Verbal Relations: Some New Categories,” by J. Michael, 1982, *The Analysis of Verbal Behavior*, 1(1), 1–3

dictation are different operants, whereas a duplic such as an *echoic* or a codic such as a *textual* are clearly not examples of any type of transcription, and the *echoic* and *textual* do not appear to need to be identified as elementary verbal operants.

It is important to note that verbal antecedent stimuli and response products can be in the same sensory modality and not exhibit point-to-point correspondence, or can exhibit neither, even if the stimuli are functionally substitutable (e.g., translating from one language to another), and these relations are considered intraverbals and not duplics or codics. A response that might appear to be similar to a codic, using an emoji (a cartoon image used in modern communication, particularly in social media and text messaging) to translate a verbal stimulus, would be considered to be an intraverbal, even if a frowning emoji is functionally similar to the word *sad*. Another example of an intraverbal that might appear to be similar to taking dictation, which is a codic, would be the use of shorthand or stenography. In this case, symbols or abbreviations are written or typed by a listener in response to spoken words, where the symbols are functionally substitutable with the words. More examples of intraverbals that are similar to language translation that might seem to be codics but are actually intraverbals would be speaking or writing words that you see signed, signing words that you see written or hear spoken, and speaking words when you feel contracted braille (abbreviated words instead of individual letters) with your fingers. In all of these cases, even though the words or symbols are generally substitutable, they do not have point-to-point correspondence; therefore the specific form of the response is not directly controlled by the antecedent stimulus and are thus intraverbals. These relations further exemplify the utility of a combined formal and functional taxonomy of verbal operants that Skinner first introduced and that we seek to refine.

Table 2 Examples of some common duplcs and codics

Name	Description	Antecedent stimulus form	Response product form	Operant
Copying a text ^a	Writing words that you see written	Written	Written	Duplic
Echoic	Speaking words that you hear spoken	Spoken	Spoken	Duplic
Mimetic	Signing full words that you see signed	Sign	Sign	Duplic
Finger spelling (see finger-spelled)	Finger spelling words that you see finger-spelled	Finger spelling	Finger spelling	Duplic
Skywriting	Using an airplane and smoke to write what you see written	Written	Smoke emitted by aircraft	Duplic
Taking dictation ^a	Writing words that you hear spoken	Spoken	Written	Codic
Textual	Speaking words that you see written	Written	Vocal (or subvocal)	Codic
Finger spelling (see written or hear spoken)	Finger spelling letters of what you see written or hear spoken	Written or spoken	Finger-spelled	Codic
Finger spelling reading	Speaking words that you see finger-spelled	Finger spelling	Vocal (or subvocal)	Codic
Reading braille (uncontracted)	Speaking words that you feel written in braille	Tactile	Vocal (or subvocal)	Codic
Morse code	Producing sounds representing letters of what you see written or hear spoken	Written or spoken	Sounds	Codic
Signal lamp	Producing light signals representing letters of what you see written or hear spoken	Written or spoken	Light signals	Codic
American Standard Codes for Information Interchange (ASCII)	Writing codes representing letters of what you see written or hear spoken	Written or spoken	Written	Codic
Flag semaphore	Producing flag visuals representing letters of what you see written or hear spoken	Written or spoken	Flag gestures	Codic

^a Often referred to as *transcription*

Not mentioned by Vargas (1982) or Michael (1982) in their conceptualizations of the *duplic* and *codic* categories of verbal operants is that by establishing relations between auditory or visual antecedent stimuli and auditory or visual responses, as is the case with the *echoic*, *textual*, and *transcription* operants, as fundamental, other nonvisual or nonauditory stimulus and response forms or verbal tactile stimuli, such as braille, are neglected. By excluding these stimulus forms in analyses, we artificially limit the applicability of the analysis to only those engaging in verbal behavior who can see, hear, write, or speak. Cooper et al. (2007) discussed sign language (p. 531), but it is not provided the same status as operants that involve vocally speaking, hearing words spoken, or reading and writing written words. We can, and must, include other combinations of antecedent stimuli and response products in our analysis of verbal behavior in order to be an inclusive science of all variations of verbal behavior.

Within the field of behavior analysis, proper use of terminology is important and is a defining characteristic of the science of human behavior. Inconsistent usage and application of terminology can lead to confusion, delays in the acquisition of concepts, and ultimately faulty applications of principles in clinical settings. Currently, several different widely used ABA reference materials offer students inconsistent definitions and examples of *transcription*, and these descriptions result in unnecessary confusion in a field that strives for clear and concise conceptual, scientific, and practical operational definitions of behaviors. This inconsistency began with Skinner's initial definition of *transcription* referring to both *copying a text* and *taking dictation*. This continued with the publication of a primary ABA textbook used by many behavior-analytic graduate training programs, *Applied Behavior Analysis* (Cooper et al., 2007), as the authors defined *transcription* as "writing and spelling words that are spoken" (p. 532) and attributed this definition to Skinner, but the authors noted that Skinner also used *transcription* to describe *copying a text*. This example presents a clear inconsistency between two commonly used teaching texts without clarification or guidance regarding how to correctly use *transcription*. We have concluded that using the terms *transcription*, *echoic*, and *textual* in ABA settings does not provide the speaker, listener, or audience with any beneficial information or special advantages when compared to using the terms *duplic* and *codic* and is essentially an unnecessary artifact from vernacular that relies more heavily on the form of the response alone as opposed to the relations between antecedent and response product forms.

With the introduction of the verbal operant categories of the *duplic* and *codic*, Michael's (1982) attempt to provide consistency and clarity to the field of behavior analysis, particularly concerning verbal behavior, was conceptually systematic, inclusive, parsimonious, and logically consistent. Using these terms, or more specifically *taking dictation* or *copying a text*, in place of *transcription* would avoid any potential confusion and inaccuracies in teaching verbal operants. Vargas (1982) supported Michael's (1982) analysis and recommended either the careful and precise usage of the word *transcription* or the removal of the word entirely from the behavior-analytic lexicon. However, the results of a brief analysis of published textbooks, manuals, glossaries, and training modules, as well as conversations with several practicing behavior analysts, BCBA supervisors, and graduate-level instructors, suggest that specific recommendations need to be made for identifying the controlling variables for the usage of the term *transcription* and whether it should be used at all by behavior analysts. In addition, the *echoic* and *textual* operants unnecessarily exclude other

widely used nonvocal and nonvisual topographies of verbal behavior, whereas using the general categories of the *duplic* and *codic* would resolve this issue.

Given the identified inconsistencies with the definition of *transcription* across textbooks and other reference and training materials, and given the fact that these inconsistencies can only result in unnecessary confusion and serve no conceptual, clinical, or educational function, we propose the elimination of the term *transcription* in favor of using the terms *duplic* and *codic*, thus simplifying the verbal operant taxonomy by removing unnecessary and inconsistent terminology. In an expansion of analysis to all variations of verbally controlled verbal behavior, we also strongly recommend that all future ABA training materials exclusively and universally use the terms *duplic* and *codic* as primary operants in place of *echoic* and *textual*. The terms *duplic* and *codic* should be considered primary verbal operants as they are both general and inclusive terms that encompass the more specific but restrictive terms *echoic* and *textual*, as well as other terms that include all possible combinations of antecedent and response product relations (see Fig. 1).

Using the *duplic* and *codic* categories of verbal operants is a parsimonious and inclusive way to provide instructors, students, and practitioners of ABA with clearly defined and consistent categories of a set of verbal operants and will eliminate unnecessary discrepancies and reduce the resultant confusion. To ensure consistency, we propose that instructors include all of the controlling functional and formal categories of verbal operants, across all possible forms, as well as the technical concepts of point-to-point correspondence and formal similarity when teaching the conceptual foundations of, and applications related to, verbal behavior. In summary, we propose that instructors use a taxonomy of verbal behavior that only includes the *mand*, *tact*, *intraverbal*, *duplic*, and *codic*, while providing and describing specific and modern examples of all verbal operants, particularly *duplics* and *codics*, including but not limited to, the *echoic*, *mimetic*, *textual*, *reading braille*, *copying a text*, and *taking dictation*.

Compliance with Ethical Standards

Conflict of Interest The authors declare that they have no conflicts of interest.

Ethical Approval This research did not involve human participants and/or animals.

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