Toward A Behavioral Theory of “Creativity”
A Preliminary Essay

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Abstract

“Creativity” is an ordinary language term that appears to have value to the culture. “Creativity” is often determined by the admission of “creative” behavior. Creative behavior is a term that can be deconstructed by behavior analysts leading to training procedures to increase this behavior. Behavior analysis is a theory of context akin to evolutionary theory. In this type of theorizing the question is not if the context can be arranged to lead to greater amount of “creative” behavior but how to a the context to select for such behaviors. This paper attempts to serve as a preliminary essay on the selection of creativity, the production of novel arrangements of the placed on such use in incentive programs to increase creativity.

Keywords: Creativity, verbal behavior, novelty

Introduction

In the operational analysis of psychological terms, Skinner (1948) discussed the importance of taking ordinary language phenomena and attempting to determine the contexts in which they occur. Skinner did not clearly lay out the determinants for whether an ordinary language phenomenon is significant for behavior analyst to explore specifically; however a general read of the work suggests a two prong test. Prong one- the term would need to be meaningful in the sense that properties or functions ascribed to the behavioral event would produce conditions that define the event. In addition, prong two the fruitfulness by specifying the functions and defining conditions, we can predict new events or control (increasing or decreasing the occurrence of such events according to cultural values Creativity appears to be an ordinary language term that would meet this two-pronged test, for it is a term that has important social interest, particularly in the school system and for employers and it appears that behavior analyst can do work to specify contexts to increase its occurrence.

As Skinner (1974) pointed out, definitional issues have always plagued the study of creativity. Many would like to drive creativity into the organism and speak of a “creative mind”; however, the concept of the “creative mind has always been plagued with problems including issues of mind-body dualism (Skinner, 1974).

Behavior analysis represents an alternative tradition. Broadly viewed, the problems facing behavior analyst studying creativity are the same as behavior analyst’s interested in food and water seeking activities or for that matter any class of behavior. In essence, the problem is one of understanding behavioral variability. In coping with the problem, the behavior analyst is confronted with the task of specifying functional relationships that may exist betw the behavior being observed, the relevant conditions and factors that affect the behavior, and biological constraint the behavior. In sort the questions become how do we define “creativity?” What factors make the person act “cre

Behavior analysis takes a unique focus in the study of creativity as opposed to psychology because they are interested in developing a theory of context (Hayes & Hayes, 1992; Morris, 1988; Zuriff, 1980, 1985). This theory
focuses on answering why questions as to orderliness and the workings of the phenomenon in reference to these environmental / contextual conditions. Context is not just setting specific but also the ongoing action in time (Morris, 2003). In behavior analysis, the context is broken down over scales of analysis that roughly correlate with different reference points. Thus, in the tradition of behavior analysis all behavior is:

the joint product of (i) contingencies of survival responsible for natural selection and (ii) contingencies of reinforcement responsible for the repertoires of individuals, including (iii) the special contingencies maintained by an evolved social environment (Skinner, 1981 p. 501 abstract).

Given the above, for behavior analysts “creativity” is the result of the interaction between a person’s gene endowment and environmental experiences including the experiences, which might be termed culture. Since intervention at the phylogenic/genetic level (level 1) is unethical and/or impossible at this time, the focus is prima on selection at the ontogenetic level (levels 2 and 3). Thus to begin a behavior analysis of creativity we should look at the contexts that the term is used. When we speak of creativity, it is often in terms novel response productions. For example, Getzels and Jackson (1975) were able to distinguish two groups of adolescents attending private school. group was a group that the peers labeled as “highly intelligent” and the other group was a group the peers label as “highly creative.” The groups were equal in their academic standing. The group labeled “creative” was seen as novel in work”, “spontaneous” and “playful.” Guilford (1957, 1966) proposed that the distinction between convergent and divergent response production is a good place to begin the study of creativity. In a convergent response production the responses can be classified as an integration of established stimuli (summation of stimulus control) for a relevant response. Divergent response production entails responses with less stimulus control between the response and the “correct answer.” Guilford characterized the divergent mode as “creative.” Some research appears to support that those children labeled as “creative” have increase rates of “idea”(for our purposes verbal productions that meet stimulus control criteria)- called ideational fluency. For example, asking a child to tell some things that are round. Garcia (1980) found that children labeled as “creative” were much better at verbalizing novel strategies to solve problems. This view of creative behavior in children remain consistent, as children who engage in higher rates of behavior categorized as “spontaneity,” “playfulness,” and even at a young age the ability to see the humorous side things (Dasnky, 1980; Dansky and Leiberman, 1977).

An operant analysis of the producer can help increase the amount of “creative” or novel works. In addition operant analysis of the effects of creative works can inform about the nature of society and the community in which live. Skinner (1974) in Beyond Freedom and Dignity stated that it would be by the arts that a culture was transformed.

Creativity refers to a kind of behavior in which a person is likely to engage in under certain circumstances behavior analysts characterize creativity as an operant class1, (behavior, which operates on the environment to pr

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1 In Baer’s (1982) account all responses in a class are related directly, and an event that produces an increase or decrease in the probability of one member is correlated with a similar change in the probability for all members. Baer developed the concept of response class from Skinner’s (1938) concept of response induction. Baer further elaborated that response classes were hierarchical in nature with higher order and lower order elements. Baer’s (1982) theoretical concept of response class hierarchies was shown in a number of studies including Russo, Cataldo, & Cushing (1981). In this study, it was shown that noncompliance co-varied with a number of antisocial behaviors. Intervention on noncompliance showed rapid change in the other areas without directly targeting those behaviors. Programs that specifically work on child compliance may have generalized effects to other areas of aggressive functioning (Russo, Cataldo, & Cushing, 1981). These programs greatly enhanced the treatment of children with conduct difficulty, because
an effect). This class of behavior is often characterized as either novel or unusual, while still producing a desired effect. Indeed in Winston and Baker’s (1985) review of operant studies of “creativity” they noticed that one or both of the following measures were used (a) the variety of behaviors that are emitted such are increased number of geometric forms; and (b) occurrence of behaviors that were not previously shown by the individual (novel) or the occurrence behaviors considered original. Holman, Goetz and Bear (1977) summarized creativity studies as containing the following characteristics: novelty, originality, and uniqueness. The question of creativity then becomes “How can environment be arranged and incentive programs be designed to select for ‘creative’ behavior?” This paper will attempt to explore this issue in five parts of the context- history, setting events, antecedents, behavior-behavior relations, and consequences.

**History Effects**

History is a complicated behavioral phenomenon. Most behavior analysts view history as a process of cumulative acquisition over time based on selection of behavior by consequences, because the environment in which children and adults live tends to be stable (Patterson, 1993) patterns such as creativity tend to be stable. For example, Harrington, Block, and Block (1983) reported the results of a longitudinal study of creativity spanning over seven years from four years of age to eleven years of age. The study found that children identified as creative at four were usually rated by teachers at eleven as highly creative. History can increase or decrease a person’s ability to emit creative novel responses. Two history phenomena are well established in the literature in particular two known topics for cognitive literature do not need much work to operationalize behaviorally. They are proactive and retroactive interference. In proactive interference, old learning blocks the acquisition of new learning. In retroactive interference, new learning blocks the performance of a previously learned activity or skill. Since the primary effect of these two variables is on performance, they are easy to remove from the “retrieval” and “storage” language and their effects performance in particular in children’s production of verbal correspondence about what children see and what the later report that they have seen is clear (see Bruck & Ceci, 1999).

**Setting the Stage.**

**Precurrent Behavior**

Creativity can be seen as the search for possible responses. In this case an analysis of pre- current behavior such children typically have large repertoires of disruptive behavior that to target specific individual elements of would make treatment very difficult. By the late 1980’s, Carr (1988) began to describe varying response topographies as functionally equivalent. Thus non-compliance could be seen as a variety of elements to escape assignments. If this is the case then reinforcement of functionally equivalent incompatible responses could increase compliance rates. Some research supports this idea. Incorporating the concept of behavioral momentum and reinforcement matching may enhance compliance programs (Strand, 2001; Walder & Herring, 1999; Strand, Walder, & Herring, 1999) by reinforcing child social approach. Children might be more likely to comply with requests after their social approach has been rewarded with attention (Walder & Herring, 1999). Thus the concept of the response class has moved the treatment of disruptive behavior from the impossible targeting of hundreds of behaviors, to the very difficult task of targeting compliance, to the relatively easy reinforcement of social approach programs.
Pre-current behavior is behavior that operates on the environment to create the opportunity for responding. In this view stimuli that are generated by pre-current behavior are reinforcing. Pre-current behaviors change the present situation. Examples of simple, pre-current behavior’s maybe thoughts and/or feelings.

More complex pre-current behaviors maybe arranging objects in groups, rearranging the order of things, generating a rule. Pre-current behavior for creative responses may include teaching sequences to arrange objects (teaching people to identify and describe their own emotional responses to guide the creation of a picture. In the next section, we explore a form of pre-current behavior sometimes called “curiosity”

**Setting the stage for creativity by setting the stage for “curiosity”**

Behavior analysts view “curiosity” as classes of exploratory behavior. Often this form of behavior emerges in response to particular setting events such as to reduce environmental uncertainty or as the result of particular establishing operation (such as a person who is food deprived looking in his refrigerator to find food or settings that would produce “boredom”). A large body of evidence suggests that novel and thus uncertain stimuli set the occasion for exploratory behavior (Butler, 1953; Harlow, 1950; Montgomery, 1951, 1953, 1955; Thompson & Heron, 1954; Barnes and Baron (1961) found that stimulus novelty could increase exploratory behavior. Consequently, informational reinforcement (Foxall, 1995) and ecological reinforcement (Bijou & Bear, 1965) plays a critical role in the selecting for this class of behavior. Researchers since the 1950’s have shown that discrimination learning can be established when the only apparent reinforcer is the opportunity to engage in exploratory behavior (Butler, 1953; Harlow & McClearn, 1954; Montgomery & Segall, 1955). The significance of this phenomenon is crucial in understanding the evolution of our culture and the process of science. For example, a scientist may speak of the “excitement” of finding novel ways of conceptualizing a case or classifying a phenomenon and this seems to describe the critical reinforcer but little is known about the context in which makes such “excitement” reinforcing. Usually, such contexts occur when the temporal proximity to effective behavior are “close” in the sense that the discriminative stimuli are clear.

The relation between organism’s movements and the engagement in exploratory behavior is particularly strong in the face of aversive stimulation. Aversive stimulation can lead to an increase in exploratory behavior from a “safe distance” (Berlyne, 1950; Whiting & Mower, 1943). Several researchers have demonstrated a similar approach in children when a child asks to see again an object that frightened them (Woodworth, 1921; Valentine, 1930). Woodworth & Marquis (1947) found similar behavior in adults. This exploration decreases the uncertainty of the environment by providing information as to potential ways to avoid future aversive stimulation.

Exploratory behavior is a good first step to ensuring the creation of “creative works.” Children who explore their surroundings will come into greater contact with models, who will demonstrate unique behavior to be added to their repertoire. For example, the child who is able to “surf the net” may be exposed to many different WebPages.

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2 Bijou and Baer (1965, p5) define exploratory behavior as “a sequence of operant interactions that is strengthened and maintained by contingent ecological stimuli under specifiable setting factors.” This lead to the concept of ecological reinforcement, which is similar to the concept of affordance introduced by J.J. Gibson (1979). Affordance is considered to be the various properties of an object which at the ecological level specify how such object relate to the observer. These properties demonstrate an automatic reinforcing effect such as a pleasant smell.
he can draw from later in producing his own website.

Antecedents

Antecedents acquire their ability to affect behavior by their association with consequences. Repetitive presentation of antecedents without consequences leads to habituation (Lowe, 1979; Pomerantz & Gardener, 1973). Of particular interest in the study of “creative” behavior would be the study of antecedents, which increase the probability of creative responses. In cognitive psychology, an enormous amount of research has been conducted on what they term “priming effects.” (see Tipper, 1985, 1991, 2001). Priming effects can be inhibitory or excitatory and roughly correspond to the Sd and S-delta phase of response acquisition training.

Nonverbal Antecedents

Nonverbal forms of creativity may emerge from novel production of concepts. Concepts are discriminated behavior in relation to stimuli (Etzel, Milla, & Nicholas, 1996; Quine, 1953). Concept formation has received increasing study by behavior analysts (Etzel, Milla, & Nicholas, 1996). Differences in concept development are representative of a child’s past interactions with the stimuli (Bijou, 1976). For a concept to be formed, enough of relevant stimuli in the environment must be present to discriminate same features from different. For example, if Terrell is asked to separate the black from the read card and is observed to do so we may conclude, “Terrell knows red fi black.” Concept formation is critical in model production and can lead to unique methods for solving problems in “creative” or novel way (see Skinner, 1969).

Researchers have used the setting of play as way to assess creativity and the types of material as antecedent for divergent or convergent play. For example, Pepler and Ross (1981) presented children 3 to 4 years old with various play material. They looked for divergent responses and convergent responses in the play. The convergent play materials consisted of color pieces that would fit together on a form board. The divergent play material consisted of unrelated pieces of paper. These pieces were in the form of random colors and shapes. They concluded that the divergent material was able to stimulate more divergent play.

Verbal Antecedents

Verbal antecedents in the study of “creativity” have the potential to be a very productive area. Verbal behavior serves as discriminative stimuli for performance or discriminative stimuli nonperformance of a behavior. Often antecedents take the form of verbal instruction or rules (Skinner, 1969; Ceruti, ). For example, Howe (2002) show that in children with blocked correspondence from retroactive interference are unblocked by instructing the child “forget” the blocking behavior.

As Skinner (1966) pointed out, though the evolution of culture or verbal communities, people contact shift environments (Skinner, 1986). For example, they listen to different speakers, watch different television shows, read different newspapers and books, log onto the Internet at different rates and times, etc. This leads to different verb stimuli to serve as antecedents.

Looking at the speaker, it is interesting to note how speakers create rules. Often given the environmental context people create their own rules to serve as discriminative stimuli to guide them through the context (Skinner, 1969). rule generation, we refer to the term of “facts” as rules that the environment tacts to the world (Skinner, 1986).
However, rules are responses and their construction lends itself to variation between responses.

In general, autoclitics are how tacts and intraverbals are tacted together. We will discuss some of the facts hold these rules together under the section on recombinative generalization and contingency co-adduction but for rie autoclitics are selected for based on their effects on the listener. Thus, the autoclitics used to entice rule following; interesting within themselves. For example rather than “nagging” children about not talking to strangers (the rule we want them to follow), parent’s just tell them the story of Little Red Riding Hood and ask the child for the “moral” story. This form of rule training has considerable advantages. First in makes repetition much easier then simple drill. Children will often ask for parents to tell the story again. Second, the autoclitics that surround the rule make the story much more descriptive of the types of environmental contingencies that may result from failure to follow the “rule”

Instruction Fidelity

Facts not under tight stimulus control of the environment are more prone to mutation and thus can be said to have a higher mutation rate. It might be question then that “facts” could be more prone to selection forces if tight stimulus control is not promoted by the verbal community; however, increasing the mutation rate for the sake of accelerated evolution could easily backfire. There is a basic law of complexity, which goes like this: Complexity is limited by fidelity of replication. Therefore, accelerated mutation rates could quite easily result in a degeneration of the adaptations already in place. So, there might be a paradox. More forms of a particular instruction may just lead to functional forms. In this respect decreasing the mutation of instruction rate may accelerate the evolution rate (evol in this sense meaning better fit with the social and nonsocial environment). The complexity of the instruction is increased. As with genes with more critical sites of error are now possible. In the history of culture, the printing increased the fidelity of human instruction, allowing for increased complexity. That was in 1434. And look what happened to science, a literal explosion of work. Also, compare cultures, which have a written language with those without.

Response variation to instructions are produced by methods that are “at least partly random” (p.73) much like mutation (Popper, 1975). Given enough time and enough reciting, instructions will mutate. Mutations may better selection pressure. First these mutations may serve as metaphors (Skinner, 1957) but quickly selection pressure and leads to rejection of the points, which are metaphoric, and serves to lead to tighter control by the environment (Skinner, 1957). The processes of “instruction” and “selection” can be viewed as a form of adaptation (Popper, p. 73). Scientific theories serve as “structures” (Popper, 1975 p. 73) or as Skinner termed them “autoclitic frames” (Skinner, 1957 cited in Vaughan, 1989 pp. 102-103) that are transmitted by instruction through social tradition and imitation. If mutation occurs, than these new instructions arise from within the organism (from the history in behv analytic terms). These new rules are exposed to certain pressures, challenges, or problems (i.e., are selected or deselected).

Another interesting point about rules and instructions is that not all elements may be “tacted” equally. Thus have profound effects on the use of instruction and rules in the future. For example, as Skinner (1957) pointed out, stories may vary with repeated telling. Sometimes the retelling creates inconsistencies. Vygotsky (1971) noted in analysis of a fable how often fables contradict the “moral” of the story. One experimental technique that Vygotski (1971) utilized in studying the “rules governing the fable” (p. 96) was through experimental deformation. In experimental, deformation one element of the fable is changed and the effect it has on the retelling. Many readers probably had the experience of reading the same tale by different authors and noticing the differences.
Compiling of rules and the recombining of rule elements

Whetherby (1978) proposed the need to study the building of stimulus classes offering Esper’s (1925, 193 matrix account is an account of analogy learning. The stimulus classes are formed in this account by their associati with positive consequences or feedback. For example, the trainer would say “correct” or “that’s right.” Analogy learning has a role in the study of creativity because often the novel production is not a completely novel product; the wedding of two or more previous forms of a solution from different contexts. In matrix training the environment arrangement of stimuli is used to facilitate the acquisition of verbal behavior for a new stimuli.

"Under what conditions would rule fragment and recombine?” is a question of particular interest to those who study creativity. Whetherby’s approach has been quite productive in building generalized language skills in children with severe developmental disorders (see research on recombinative generalization- Goldstein, 1983 & Mineo & Goldstein, 1990). This makes recombinative generalization studies (Goldstein, 1983, 1985, 1993) an area of future interest for behavior analysts studying creativity. Indeed, many of the early work by Esper created novel responses. Esper (1925, 1973) organized artificial linguistic systems into matrices. He assigned two word nonsense combinations to color shapes and taught them to adults. Esper (1973) proposed through analogy adults learn responds to untrained shapes and was successful in demonstrating this.

In the standard training procedure, a matrix is created with a set of words on the ordinate and a set of locations or actions on the abscissa (Goldstein & Mineo, 1990). Each cell represents the product of the two points or the combination. The desired result of the matrix training procedure is to gain recombinative generalization, which is defined as “differential responding to novel combinations of stimulus components that have been included previou in other stimulus contexts”(Goldstein, 1985, p. 281) As Whetherby (1974) pointed out this research could lead to insights into Skinner’s (1957) autoclitic frames. Skinner described autoclitic frames as:

"Something less than full-fledged relational autoclitic behavior is involved when partially conditioned autoclitic ‘frames’ combine with responses appropriate to specific situations. Having responded to many pairs of objects with behavior such as the hat and the shoe and the gun and the hat, the speaker may make the response the boy and the bicycle on a novel occasion. If he has acquired a series of responses such as the boy's gun, the boy's shoe, and the boy's hat, we may suppose that the partial frame the boy's ______ is available for recombination with other responses. The first time the boy acquires a bicycle, the speaker can compose a new unit the boy's bicycle. This is not simply the emission of two responses separately acquire The process resembles the multiple causation of Chapter 9. The relational aspects of the situation strengthen a frame, and specific features of the situation strengthen the responses fitted into it."(Skinner, 1957, p. 336)

Using an object-location matrix, persons with severe retardation through training of four basic elements to establish the frame, generalized to more than forty-nine new combinations (Goldstein & Mousetis, 1989). Also, gi four expressive combinations of object-preposition-location, ninety untrained responses emerged (Goldstein & Mousetis, 1989). Matrix training is still in its infancy. Elements of two and three word combinations are interestin what of complete sentences and elements of stories, musical scores or essays? Can training matrixes develop to ci more original and novel production in these areas?

Bottle necks, Rules, and Founder Effects.
Two important phenomena are needed before a discussion of the “rule governed” behavior literature can be placed into perspective. The first phenomenon is akin to biology. In the biological literature, gene frequencies often change dramatically when a few individuals leave a large population and take up residence away from other members of their own species. If these “pioneers” succeed in starting a new population, its gene pool will reflect the distribution of the genotypes present in the founders. This “founder effect” may lead to a gene distribution that varies substantially from the original population. Another phenomena, the bottleneck effect is related to the founder effect and occurs when only a small portion of the original population survives to serve as the sole source of the population. Akin to this behavioral level is the availability of behavioral repertoires. The literature on “rule governed” behavior is replete with bottlenecks and founder effects. For example in the typical study, subjects enter into a novel situation and then are given instructions. These founder instructions serve to organize the behavior, especially if the instructions undergo and survive a level of selection/reinforcement.

Creativity as a Behavior Response class

Verbal Response Class of Creativity

Krasner (1958) was one of the first behaviorists to recognize that response classes could and probably should be applied to verbal behavior. Since this time, behavior analyst’s have recognized that verbal behavior is class-like, sequential, and novel (Krasner, 1958; Salzinger, 1967, 1967; Garcia & DeHaven, 1974; Harris, 1975; Risely, 1977; Wetherby, 1978; Whitehurst, 1971). For example, many researchers have demonstrated how various types of words may be emitted without direct training. Emergence without direct training appears to occur as a function of reinforcing the occurrence of a few similar words (Krasner, 1958; Salzinger, 1959). Other researchers have demonstrated an increase in the probability that words not directly reinforced will be emitted in a vocal imitation task if a second word is reinforced (Brigham and Sherman, 1968). Harris (1975) reviewed the adequacy of the response class in explaining all novelty in verbal behavior and created a detailed critique.

The Role of Selection

Selection plays a critical role in the development of creative works. This is immediately apparent in speaking with artists. Painters will often recreate the same painting twenty to thirty times keeping elements that they “like” but trying “new things” in areas that they don’t like. A writer might rewrite a chapter of his/her book a dozen times to the chapter the way they “want it to be. “Thus, it appears that automatic reinforcement plays a critical role in the shaping of artistic works. Often a painter will compare the results of what they have accomplished with the some criteria. This form of automatic shaping, where the artist attempts successive approximations to target criteria, is critical to the long hours that often are required in creation of painting or writing. For example, “I wanted a brighter effect” or “I was hoping that it would look sadder” are often statements that artists will make in reviewing their work. Some artists have difficulty articulating the exact effect that they desire verbally but report that they will “know when they see it.”

In addition, the role of momentum in creative work has yet to be explored. Some artwork and clothing styles continue long after they have stopped being fashionable. Such resistance to extinction is an interesting study in itself.
Selection and Contingency Co-Adduction

Andronsis’s (1984) work on contingency co-adduction is critical to understanding the role of selection. In co-adduction, large response classes of behavior merge together to produce novel responses based not on stimulus characteristics but on characteristics of the contingencies of reinforcement. Often this leads to completely novel abstract behavior termed “symbolic”

Selection and derived stimulus relations

One of the most important contributions to behavior analysis over the last thirty years has been the study of equivalence relations. In the standard equivalence training paradigm if A being trained to B and B is trained to C then when a subject is shown C and responds with A we say that equivalence has occurred (Sidman & Cressons, 1973). Equivalence relations might represent a broader category of arbitrary relational responding in humans (Barnes, Ht & Smeet, 1997; Hayes, 1994) and approximates what is termed in ordinary language “symbolic” behavior and “meaning.” However, in some respects equivalence is greater then meaning. For example, when I tell the story of my cat dying, the words often evoke images and feelings of sadness. Good writers need to be particularly skilled in using equivalence relations. An example would be in reading the sentence “the small boy wanted holding two chickens in his hands, while his tiny dog pranced beside him” the reader may begin to have images of the boy walking with his dog. The ability to invoke rapid and clear images is critical to a good storywriter. Speechwriters have to be similarly skilled. The ability to evoke rapid images and emotions is critical to a well-written speech. A good writer can have profound effects on his reader. Thus better exploration of equivalence relations can be helpful in exploring and forming relational classes.

The study of equivalence relations has particular relevance to the study of “creativity.” In the standard equivalence format a matching to sample situation is set up and subjects are trained to match A to B, then subjects trained to match B to C. In the test condition, the untrained A to C relation is tested. If when A is presented the subject responds with C, the experimenter concludes that equivalence has been achieved (Sidman, 1994; Zentall & Smeets, 1996). One interesting point of equivalence research is called transfer of function without direct interaction (Doug Markham, 1996).

Equivalence training may ease transfer of function across modalities of speaker and listener behavior (Sidman & Cressons, 1973; Goldstein, 1993). Still more research needs to be done in area of formulation of stimulus relations (McIvlane, Dube, Greene, & Serna, 1993).

Consequences to Strengthen creativity

Selection and Novelty

Research conducted with both the animals (Pryor, Haag, & O’Reilly, 1969) and humans to generate novel responses (Goetz & Bear, 1973; Goetz & Salmonson, 1972; Holman, Goetz, & Bear, 1972; Nueringer, 1986, 1992; Nueringer & Voss, 1993; Winston & Baker, 1985). Research on animals has demonstrated that dolphins can be trained to emit “creative” responses (Pryor, Haag, & O’Reilly, 1969).
Multiple studies have been conducted on the generation of novel responses. Goetz and her colleagues have spent a considerable amount of time in increasing diversity of responses. Some studies have increased the diversit children’s block building (Goetz & Bear, 1973), easel painting (Goetz & Salmonson, 1972), and felt pen drawing lego building (Holman, Goetz, and Bear, 1977). Analysis of the procedure used demonstrates the selection of behavior through the use of reinforcement. In these studies, the behaviors are usually behaviors already within children’s repertoires (e.g. block building) and then reinforcement placed on novel forms. Once a sufficient number of novel forms of behavior have been reinforced creativity emerges as a generalized response class.

In more complex studies with adults (Nueriger, 1986, 1992; Nueringer & Voss, 1993), the research quest became “Can a person be trained to behave completely randomly?” Nueringer (1986, 1992) set out to answer this question. He programmed a computer system to determine if number sequences that he gave were truly random. If sequence was random the computer would signal so, if not the computer would signal this was not the case. Using technique Nueringer was able to train subjects to behave completely randomly. As an interesting point of the study subjects were not able to identify “how” they were coming up with the numerical sequences, yet they were able to do so. This shows that unpredictable behavior can be strictly deterministic.

**Conclusion**

While the purpose of this paper was to briefly introduce what behavior analysis has to offer in the study of training of the creative, it is clear that much greater amounts of research need to be conducted in this area. Creating environments, which maximize the potential of artists and writers to produce their work, will lead to greater enjoyment for all. Curriculums that produce greater creativity in children will have countless pay-offs for children even outs the arts.

**References**


motives. *Journal of Comparative and Physiological Psychology, 47*, 73-76.


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