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On Choice, Preference, and Preference for Choice

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Abstract

In this paper, we examine several common everyday meanings of choice, propose behavioral definitions of choice, choosing, and preference, and recommend ways for behavioral researchers to talk consistently about these concepts. We also examine the kinds of performance in the contexts of various procedures that might be appropriately described as a preference for choice. In our view, the most appropriate procedure for demonstrating preference for choice as a consequence is a concurrent chains method, in which choice is a reinforcer for an approach response. The single-stimulus procedure, however, is more appropriate for demonstrating preference for choice as an antecedent.

Keywords

choice; preference; preference for choice; concurrent chains; single-stimulus procedure

Providing choices and assessing preferences are important in the context of supporting people with developmental disabilities because of their deficits in communication, learning, and other areas. Choice, often seen as an important dimension of quality of life (e.g., Hughes & Hwang, 1996; Wehmeyer & Schwartz, 1998), is relatively rare for those who can't ask for things, can't obtain them on their own, and who are limited in their range of activities. Presenting choices is also a quick way for teachers and caregivers to identify positive reinforcers.

More broadly, preference and choice are important concepts in the experimental analysis of behavior. Most individuals have large repertoires of discriminated operants. When two or more stimuli are present that are respectively correlated with reinforced instances of two or more behaviors, what causes the individuals to behave one way or the other at a given time? This fundamental inquiry relates closely to our everyday concepts of choice and preference, and has been a focus of considerable research.

Researchers have explored whether animals prefer choice to no-choice conditions for several decades (e.g., Catania, 1975; Catania & Sagvolden, 1980). But what exactly does it mean to prefer choice? In our own research with persons with developmental disabilities we have considered various methodologies for exploring this question, and have found it difficult to agree on what sort of data, derived from what sort of procedures, should be characterized as showing a preference for choice. The answers seem to require clear behavioral definitions of preference and choice, and clear guidelines for their use in behavioral procedures and experiments. These have been lacking in the behavioral literature, perhaps because “choice” and “preference” have various everyday meanings that tend to muddy the conceptual and terminological clarity needed in scientific investigations.

The purposes of this paper are therefore to provide behavioral definitions of choice, choosing, and preference, to recommend consistent ways for behavioral researchers to talk about these concepts, and to describe circumstances that would constitute preference for choice.

Choice

Everyday Meanings of Choice

Choice has multiple everyday meanings, including (a) a variety or array from which to choose, (b) the act of choosing, (c) an alternative, and (d) that which is chosen. Choice is also sometimes described as a mental process that must be completed before it is expressed or communicated through overt action, but this meaning has historically been of less interest to behavioral researchers. Yet another meaning of choice is “the power or liberty to choose.” This meaning can be collapsed into meaning (a) by interpreting the question, “does the person have a choice?” as asking, “has the environment been arranged such that stimuli likely to control two or more response options have been made salient to him or her?”

Meanings (a) and (b) are used heavily by behaviorists, as seen in the variety of related terms in research reports: “choice options, choice stimuli, choice-making, choice behavior, choice effect, choice arrangements, and choice procedures.” In our view such variability in the use of the term “choice” is an impediment to effective communication between researchers, and between researchers and practitioners. At the very least, writers should specify whether any particular instance of “choice” refers to a subject’s behavior, or to the antecedent stimulus arrangement that occasioned it. How else can our use of the term be sharpened? In particular, exactly what sort of stimulus arrangements constitute choices.

Behavioral Definitions of Choice and Choosing

Choice seems to involve not only multiple stimuli, but multiple discriminative stimuli, including S^D s and $S^?$ s. As Catania and Sagvolden (1980) noted: “An organism can choose among alternatives only to the extent that stimuli are correlated with their availability” (p. 77). This definition parallels our everyday sense of the availability of choice. A person may say “I don’t see any other options” in situations where he or she is able to discriminate (e.g., by tacting) only one (only one stimulus is exerting control). Other stimuli that would potentially correlate with reinforcement for different behaviors may be present, but are ineffective S^D s. In these situations, the person may seek advice from others to help identify additional options to maximize his or her reinforcers. The requirement that the stimuli be discriminative stimuli is especially relevant for persons with developmental disabilities because their discriminative repertoires are often smaller. For example, tangibles may serve as S^D s for choosing, but stimuli in pictorial or spoken form may not (e.g., Conyers et al., 2002; de Vries et al., 2005; Schwartzman, Yu, & Martin, 2003).

However, even this definition (multiple discriminative stimuli) seems too broad, since there will almost always be multiple stimuli in an individual’s environment that would exert some degree of stimulus control, however weak. In many situations (including various experimental and preference assessment procedures), we distinguish choice by the fact that the options are relatively salient to an observer, and by the fact that at least one of them is relatively likely to evoke a response, compared to the other stimuli present.

The suggestion that choice involves multiple salient options implies that some situations do lack choice. Consider, for example, two arrangements involving a pigeon in an operant chamber. Few would disagree that the traditional concurrent operant situation constitutes a choice. In a chamber with two keys, a pigeon may peck one key or the other. Even when the chamber has only one key, one might argue that the pigeon has a choice between pecking the key and doing anything else. But we can distinguish the two situations on the basis that in the single-key chamber, S^D s controlling behaviors other than keypecking are less obvious, and are generally not specified (and therefore cannot be controlled) by the experimenter. The single-key chamber may be called a no-choice situation on this basis. A similar distinction can be made between paired stimulus and single stimulus preference assessment procedures, as discussed in the next section.

Another feature that distinguishes choice from non-choice is the type of discriminative control exerted by the array of stimuli. Catania (1975) approached this issue by distinguishing between “free-choice” and “forced-choice” situations. In the former, at least two antecedent stimuli are S^D s. In the latter, only one antecedent stimulus is an S^D , and any others are $S^?$ s. These terms provide a way of identifying behaviorally those situations that we might say only “technically” provide a choice, such as a person offering to either give you twenty dollars or punch you in the stomach.

A third logical option, in which all of the available stimuli are effective $S^?$ s, does not describe a choice situation. For example, suppose a man goes to use the restroom in a restaurant, but arrives to find an out-of-order sign on the door to the men’s room. He therefore faces two $S^?$ s: the door to the women’s restroom, and the out-of-order sign on the

men's. The man will probably move on, and we would probably not say that those two salient discriminative stimuli represented a choice. On the other hand, if the man's situation were sufficiently dire, he might barge into the women's room, indicating that the stimulus was sufficiently discriminative for responding.

Let's therefore define choice as the presence of two or more salient discriminative stimuli, at least one of which is a relatively effective S^D , as compared to others in that situation. If two or more of these discriminative stimuli are S^D s, we may call the arrangement a free-choice situation. If only one of them is an S^D , we may call it a forced-choice situation. The discriminative stimuli may be presented simultaneously or sequentially, so long as all of the choice stimuli are presented before the individual chooses. Let's also define choosing as responding under the control of one of the stimuli that comprise a choice.

Preference

What is preference, and how does it relate to choice?

Preference is the relative strength of discriminated operants (cf. Catania, 1998; Pear, 2001). Researchers often measure preference as a pattern of choosing. That is, they describe a pattern of responding under the control of the stimuli that comprise a choice. However, not all preference assessment procedures involve choice as we've defined it, as we will see in a later section.

The amount of responding that constitutes a preference is not entailed by the general definition, but by how large a sample is needed to give confidence about the overall pattern of responding. For a typical adult, responding once is often understood as a sufficient indicator of preference, particularly if accompanied by statements about his or her degree of preference for that alternative. For persons with developmental disabilities, however, it may be impossible to know whether a single response towards one option indicates a strong or weak preference for that option, so multiple responses may be needed.

Some Dimensions of Preference Assessment Procedures

Many different procedures are used to measure preference (Hagopian, Long, & Rush, 2004). These can be categorized along several dimensions.

Directness—Direct and indirect preference assessments may be distinguished on the basis of whether responses to the stimuli are directly observed, or are predicted on the basis of caregiver opinions.

Number of stimuli presented at one time—The stimuli might be presented together or separately. Common stimulus preference assessment procedures include *single stimulus* (SS), in which one approachable item is presented at a time, *paired stimulus* (PS), in which two items are presented on each trial, and *multiple stimulus* (MS), in which three or more stimuli are presented on each trial. In all of these procedures, the stimulus most frequently approached is usually referred to as the preferred stimulus.

In the SS procedure, a variety of stimuli (frequently 6 or 8) are presented singly and in randomized order, several times each. It could be argued that on each of these trials, the client is presented with a choice between approaching the item or doing something else. Moreover, the fact that many items in SS assessments are approached less than 100% of the time shows that on those trials, S^D s for other behaviors were present. Nevertheless, there is only one *salient* discriminative stimulus available before each approach response. The procedure therefore does not involve presenting choices as that term was defined previously.

Response form of choosing—Preference assessments for persons with developmental disabilities typically measure approach frequency or duration of engagement (Hagopian et al., 2004). Other response forms are possible, including frequency of happiness indicators (e.g., smiling, see Spevack, Martin, Hiebert, Yu, & Martin, in press) or verbal responses. As Pear (2001, p. 259) suggests, "...one should always indicate what measure of amount of behavior one is using to index it."

Physical correspondence between the discriminative stimuli and the consequences for selecting them—In many preference assessments, the stimuli that control choosing are the same tangible items that the respondent will then receive and consume. In other situations, the S^D s and consequences are nonidentical, but may correspond to varying degrees (e.g., pictures of edibles or activities, written or spoken names of edibles, or two different colored, but otherwise identical, micro-switches that activate different toys).

What do stimulus preference assessments measure?

These procedures measure preference, or the relative strength of discriminated operants. They therefore also measure the stimulus control exerted by the assessed items, as well as their relative reinforcing value. However, a positive correlation between the strength of stimulus control for choosing and the reinforcing value of the consequence is not guaranteed. For example, a tangible stimulus will reliably control an individual's approaches to it only if approaches have historically been reinforced. It is possible that a tangible stimulus could be a strong reinforcer without exerting much control over reaching for it (i.e., a "false negative" in the preference assessment), because the person has previously had few opportunities to approach it. Conversely, it is possible that a stimulus could control approach without being a very good reinforcer (i.e., a "false positive") if for some reason, approaches to that stimulus have historically been reinforced by some other stimulus that is not present in the preference assessment situation. As trials in the assessment procedure continue, however, preference scores of these items will tend to correlate more closely with their reinforcing value.

There are at least two other reasons that a high preference item may not be an effective reinforcer. First, the response requirements are often quite different in preference assessments as compared to training situations. A stimulus that maintains a high rate of approach or switch-pressing may not maintain a high rate of much more effortful responses (see Ivancic, 2000, for a review of this issue).

Second, motivating operations such as satiation, deprivation, and the availability of even stronger reinforcers may differ considerably between preference assessment and training conditions, and may affect both preference scores (e.g., McAdam et al., 2005) and reinforcing effectiveness.

When a person shows a preference, what is preferred?

When a person shows a preference, one discriminated operant is more frequent than another, when two or more are possible. In such a case, what should we say is preferred? Is it the reinforcer, or the S^D ?

Behaviorists often talk about preference for a reinforcer. Fisher and Mazur (1997), for example wrote in their extensive review, “An individual’s preference for a given reinforcer is determined by how much responding is allocated to that reinforcer relative to the amount of responding allocated to other available reinforcers, a measure called relative response rate” (p. 389). This usage seems to apply in almost all cases. It is especially appropriate when two responses are very similar, and when the stimuli antecedent to those responses are similar, but the responses are reinforced by two qualitatively different reinforcers (e.g., candy versus pretzels). For example, if a person presses more frequently a button that delivers pretzels than a button that delivers candy, it seems natural to say that he or she prefers pretzels over candy.

Is there a situation where it is appropriate to say a person prefers the S^D ? In many preference assessments with persons with developmental disabilities, the discriminative stimuli are tangible items and the consequence for choosing is to receive the item. In this situation it’s appropriate to say that the person prefers an S^D , because the S^D s and the reinforcers are the same physical stimuli.

Is there a situation where it is appropriate to say a person prefers the S^D s only? It’s not difficult to imagine a concurrent operants arrangement in which the response topographies and reinforcers were equated, but two very different S^D s were presented. An individual that responded differentially to these antecedent stimuli could appropriately be said to prefer one over the other. However, even if preference for one stimulus were shown, it would very likely disappear over time, if the reinforcers continued to be equated. If the preference persisted, the most reasonable conclusion, barring the influence of phylogenetic factors, would be that the experimenter had not been successful at controlling all of the reinforcers.

Preference for Choice

What does it mean for someone to prefer choice? As we have seen in the previous section, there are circumstances under which it seems appropriate to talk about preferring a particular consequence, or about preferring antecedent stimuli. How should “preference for choice” be understood in each of these situations?

Preferring Choice as a Consequence

Preference for choice can be demonstrated using a concurrent chains procedure (e.g., Fisher, Thompson, Piazza, Crossland, & Gotjen, 1997). At the start of each trial two discriminative

stimuli are presented. Responding to S^{D1} will lead to another choice presentation (i.e., two new discriminative stimuli are presented), while responding to S^{D2} leads to a “no choice” presentation (i.e., only one discriminative stimulus is presented). The discriminative stimuli available in the choice and no-choice presentations (i.e., subsequent to approaching S^{D1} or S^{D2}) could be edible items, which would be given to the subject if approached.

It's important in this experiment that the food item available following approach to S^{D2} be matched or yoked to whichever item would be chosen following approach to S^{D1} , so that any difference in response rate to S^{D1} and S^{D2} can not be characterized as a preference for a particular food item. If the rate of responding to S^{D1} were higher in this experiment than the rate of responding to S^{D2} , it would be appropriate to say that the subject preferred choice, and more precise to say that he or she preferred choice as a consequence. This procedural requirement has prompted researchers to talk about confounding choice with preference, or about isolating the effects of choice and preference, or about the effects of choice, independent from preference. These phrases seem odd in light of the extremely close relationship between preference and choice, and it may be better to distinguish between the effects of choice and the effects of preferred items or activities.

Preferring Choice as an Antecedent

What sort of procedure, and what kind of results, would justify saying that a subject preferred choice as an antecedent?

First let's consider a specific implementation that follows the general concurrent chains model provided in the previous section. On each trial, a person will be presented with two boxes that are distinct in color and/or shape. Touching a box causes it to be lifted away from the table, revealing either two edible items (under the “choice box”) or one edible item (under the “no choice” box). If the choice box is selected, the no-choice box and its edible item are removed, and the person is prompted to choose again, between the two edible items. The selected item is consumed. Alternately, if the no-choice box is selected, the choice box and its edible items are removed, and the person is prompted to take the lone edible item.

If the reinforcing value of the edible items is equated across all trials, this procedure can demonstrate that the person prefers choice as a consequence. But can the procedure be altered to detect preference for choice as an antecedent? We could remove the boxes and present that pair of items on one plate, and the single item on another plate, allowing the subject to see which is which. However, we can't do away with the response in the initial link of the chain. That is, if we presented the “choice plate” and the “no choice plate” and let the subject choose an item, there would be only one choice made per trial, among three items. There would be no no-choice option or condition. We could retain the initial-link response by prompting the subject to first touch one of the plates, *not* one of the items. Touching one of the items without first touching a plate would end the trial without reinforcement. But if one plate were touched, the other plate would be removed, and the subject would either choose between the two edible items (choice plate) or take the single edible item (no choice plate).

Unfortunately, the chain design that seems to be required to create a no-choice option entails that the antecedent stimuli on the choice plate in the initial link no longer meet our definition of choice. Since touching either of the edibles on the choice plate in the initial link results in extinction, neither of these items can be a discriminative stimulus for responding, until after the initial-link response has been made.

A possible solution to this problem lies in the single-stimulus preference assessment procedure, in which the choice and no-choice conditions are presented successively. On “choice” trials, the person would be presented with two edible items; whereas, on “no-choice” trials, one edible item (yoked to whichever item was selected on the last choice trial) would be presented. If responding were stronger on choice trials than on no-choice trials (e.g. higher percentage of trials with approach responses, or lower approach latency), we would conclude that the person preferred choice as an antecedent.

Conclusion

Choice is an important dimension of quality of life, but many persons with developmental disabilities encounter few opportunities to choose. Research holds the promise of teaching us how to provide choice in ways that are most beneficial. However, in order for experimental results to be effectively communicated and understood, a consistent terminology relating to choice and preference must be developed. This paper contributes to that effort by making several recommendations.

First, we propose that choice (defined as the presence of multiple, relatively salient discriminative stimuli, at least one of which is an S^D) be clearly distinguished from choosing (defined as performing a discriminated operant when another is possible, following a choice). Whether readers agree or not with the particular names we’ve suggested for these separate concepts, the important thing is to be clear about which is referred to when describing experimental variables.

Second, we suggest that when a preference is evident (i.e., when one discriminated operant is stronger than another, usually in the presence of a choice), it is generally most correct to say that the person prefers, or shows a preference for, the consequence that reinforced the more frequent behavior (e.g., an approach response).

The final objective of this paper was to determine what kind of performance, in the context of what sort of procedure, is appropriately described as a preference for choice. This question is important because caregivers have a responsibility to present valuable choices to persons with developmental disabilities. Research can contribute to this effort by showing how to measure the relative value of different kinds of choices. We suggest that the most appropriate procedure for demonstrating preference for choice as a consequence is a concurrent chains method, in which choice is a reinforcer for an approach response. On the other hand, the single-stimulus procedure is more appropriate for demonstrating preference for choice as an antecedent.

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