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SI: COMPASSION IN APPLIED BEHAVIOR ANALYSIS

Can There Be Compassion without Assent? A Nonlinear Constructional Approach

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Abstract
The topics of compassion and assent are currently of high relevance in and out of applied behavior analysis. A contingency analysis of both terms—compassion and assent—can help elucidate them in a way that yields pragmatic incorporation into practice. Resulting procedures can benefit behavior analysis professionals working with both, humans and animals. This article utilizes a contingency analytic definition of compassion and assent, and illustrates how such definitions can guide the creation of constructional programs. Case examples are provided that detail the use of these definitions, the creation of a constructional programs guided by them, and the influence of a nonlinear contingency analysis.

Keywords Assent · Compassion · Nonlinear contingency analysis · Constructional approach · Compassionate care

Introduction

Over decades of research and practice, behavior analysis has developed a technology capable of changing and shaping complex animal and human behavior. For the most part, the development of the procedures that characterize that technology have been in response to those suffering as a result of the behavioral context in which they live (cf. Skinner, 1975). Terms such as empathy and compassion become immediately relevant (Taylor et al., 2019; Morris et al., 2021). As behavior analysts, we are tasked with providing behavioral definitions of such terms—finding the controlling variables of behaviors tacted as such.

When we recognize others' suffering and express our concern, we may be considered empathetic. That is, our verbal behavior is under the control of the aversive conditions faced by others. As such, it describes their contingencies, e.g. "I feel bad for them, they're going through a hard time." If we act to relieve that suffering, and that relief is what maintains our behavior of doing so, we may be considered compassionate. Compassion includes an added element, not only is our verbal behavior controlled by the aversive conditions faced, but our behavior is reinforced by acts that work to alleviate that suffering others are facing. The mere production of that relief does not indicate compassion. If actions relieve suffering, but those actions are maintained by other consequences (e.g., job requirements, pay, successful program design), that outcome—relief of distress—may be provided, but that behavior may not be considered compassionate. The expert surgeon who prides themselves on the techniques and outcomes, but does not learn a patient's name or follow-up is an example that does not indicate compassion. The beauty of the technique successfully applied, not the relief of suffering (perhaps a welcome by-product) is what maintains the behavior. One may argue that a less skilled, compassionate surgeon is not as desirable as is a highly skilled, inconsiderate surgeon. What we might ask is: why not have both?

The Role of Assent and Compassion

When we develop or implement programs with our learners, is it enough to have as one's goals the alleviation of distress when the program is completed? At times there is little

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recourse, bones must be set, tubes inserted, teeth repaired, and so forth that not only do not relieve immediate distress, but may, in fact, increase it. We will argue that for the most part, and for most behavioral interventions, a continuing goal of not increasing, and more important, decreasing distress should guide our interventions. This attempt to relieve distress or at least not increase it, is a form of compassion that we argue should be reflected in current discussions concerning assent. But why do we value compassion? How is it evidenced, and what role can it play in informing our practice and improving our outcomes?

Both consent and assent are important to our practice, and do overlap (Linnehan et al., 2023). Consent is usually considered a discreet event—it may include signing a document or saying, "I agree." On the other hand, assent requires continuous monitoring, which makes it most relevant to the discussion here. We argue that compassion is most evident when we ensure that assent is continuously obtained. Thus, we hope, through a series of case studies, to demonstrate how genuine assent can be continuously obtained, even from those who do not have language. We will illustrate this by providing examples of how ongoing assent may be attained by behavior professionals who work with both humans and animals in their practice. However, before one can engage in such practice, a distinction should be made between genuine assent and apparent assent (Linnehan et al., 2023). This analysis builds on the conceptual distinction between compulsion, consent, and assent (apparent and genuine) as described in detail in Goldiamond (1976) and Linnehan et al. (2023).

Assent is often characterized by an indication of the willingness to participate in an activity. This "willingness" is distinguished from those who may be compelled, whether through physical means or punishment for nonparticipation. We may assume that positive reinforcement that results in such willingness, frees us from coercive practice. But does it? Are we always attending to the moment-to-moment distress that may occur as a result of our procedures? Are we truly compassionate?

Azrin and Holz (1966) arranged contingencies such that pigeons were trained to peck a key 25 times (FR-25) for 3 s access to grain. They then proceeded to also shock the pigeon after each key peck (FR-1). The arrangement was peck → shock, until 25 key-pecks were completed, then food. They also arranged it such that a peck → no shock, indicated no food. When the pigeons pecked and there was no shock, they showed signs of distress, wing flapping, feathers erected, and so forth. When the shock was reinstated, the birds calmed down and pecking resumed. Further work showed it was possible to have the birds peck a key that reinstated shock when it was absent. That is, the pigeons *willingly* entered into the activity. Were they actively assenting to the FR-1 shock, FR-25 food schedule? For those who might assume this is unique to pigeons, the experiment was replicated with humans using noise as the punisher instead of shock with similar results (Ayllon & Azrin, 1966). Did the use of positive reinforcement and the willing participation of the subjects, both animal and human, indicate assent? Was there an indication of compassion?

From the pigeon's point of view there are three possible states: (1) peck, shock, eat; (2) peck, no shock, don't eat; (3) don't peck, no shock, don't eat. In essence, given the three possible states of its environment, it has only one way to obtain a critical consequence, food. In essence, it is coerced into pecking and getting shocked by the positive reinforcement contingency (see de Fernandes & Dittrich, 2018; Goldiamond, 1976, for a comprehensive discussion of coercion by positive reinforcement). When Azrin and Holz provided the opportunity to peck another key to earn food, but without shock, the birds immediately switched, withdrawing their assent to pecking the shock/food key. This and subsequent work indicate that for genuine assent to be provided, a nonlinear contingency analysis that takes into account alternative behaviors and contingencies is required (Goldiamond, 1974, 1976, 1984, 2002; Layng et al., 2022).

Genuine assent requires that there must be at least two ways to obtain a critical consequence,[1] or one degree of freedom (all alternatives minus one, *n*-1). Where the degrees of freedom are equal to zero, full coercion is defined (Goldiamond, 1976; Linnehan et al., 2023). Unlike the Azrin and Holz experiment, most instructional programs are not designed to impose both aversive and reinforcing events for the same behavior. Programs are typically arranged for students to where a critical reinforcer is contingent on specified behaviors without reference to the activity specific consequences of those behaviors. For example, if a child completes a matching task correctly, access to an iPad (the critical reinforcer) is provided without reference to whether or not seeing the match is a reinforcer or how repetitive/varied, interesting/uninteresting the task is (activity specific consequences).

Willingness to participate may be indicated even though the activity specific consequence is aversive as a result of the imposed positive reinforcement contingency. That is, although a student may find the task of matching aversive in itself (activity specific consequence), they may engage in the specified behaviors to gain access to the iPad (critical reinforcer)

[1] Based on Goldiamond (1976), de Fernandes and Dittrich (2018) defined critical consequence as ". . . those that when made contingent to any particular behavior generally have a powerful control over it, showing high reinforcement value when added (e.g., food for the starving) or when removed (e.g., electric shock of high intensity). In other words, they are consequences that, given certain conditions or operations, are preferred in all choice situations" (pp. 12–13). Stated differently, given a set of consequences contingent upon behavior, the consequence that governs the contingency is the critical consequence—that is, the consequence one will work for.

if that is their only way of acquiring it (zero degrees of freedom). Only by providing alternative contingencies, whereby the same critical consequence can be obtained, can the activity specific consequences have their effect. In other words, only by providing alternative activities with the iPad as the critical consequence for each of them (degrees of free one or more), can the activity specific consequences begin to be assessed (i.e., the student opts for the tacting task rather than the matching task).

This does not mean that effort is not required or aversiveness is totally eliminated, but the comparative effects of those activity specific consequences are allowed to have their effect on the individual's responding. The behavior analyst can then provide other alternatives against which the current one is evaluated by the behavior of the learner resulting in greater degrees of freedom and valuable information regarding program design. In other words, the student's opting for one activity over another should provide a starting point for behavior analysts to inform further programming (i.e., what is it about the matching task that might be aversive? Or, as an alternative, what is it about the tacting task that the student enjoys?). As degrees of freedom increase, degrees of coercion decrease. This applies to all types of programs including shaping, errorless training, trial and error training, antecedent management, and so forth.

Thus, coercion is not restricted to the use of aversive procedures or punishment, but also can include positive reinforcement procedures. Further, aversive distress-causing activity specific consequences may be overshadowed by positive reinforcement when there is but one way to obtain it. Procedures that withhold reinforcement for disturbing behavior, even when other behavior is reinforced, can also be considered coercive; the use of such procedures do not qualify as compassionate behavior as discussed here. This appears to create a dilemma for many behavioral practices. It suggests that the use of extinction (even when combined with reinforcement), and many DRO, DRI, and DRA procedures cannot be used to indicate genuine assent even if willingness to participate is present, if there is but one way to gain a critical consequence or else that consequence is withheld. Is genuine assent thereby impossible to obtain when implementing behavior analytic procedures?

Fortunately, through the application of a Constructional Approach (after Goldiamond, 1974, 2002), and a nonlinear contingency analysis (NCA; Layng et al., 2022), both effective intervention and assent are possible (for a recent discussion, see Scallan & Rosales-Ruiz, 2023). We can show compassion, gain genuine assent, and produce the long-term behavior changes most beneficial to our learners. In the next section, we will demonstrate with examples how at least one degree of freedom can be maintained in most instances for both humans and animals.

Cases were selected from an ongoing effort to explore and use NCA and the constructional approach to enable verbal and nonverbal populations to provide or withdraw their assent and how that sensitivity to the alternatives available to our learners allows us to provide the compassionate care for which we are striving. If genuine learner assent is present, meaning the learner has alternatives to gain access to reinforcement, programs can proceed and continue building on the current repertoire. On the other hand, if the learner stops, starts crying, pushes the material away, or leaves the teaching area, that indicates that the learner has withdrawn their assent. Simply stopping a program and not teaching anything is hardly ideal. Nor is compulsion justified in such a case. Neither compulsion nor the halting of teaching will likely benefit the learner. The goal is to teach, but our ideal teaching situation is one in which learner assent is present and continually monitored. Thus, ways that allow the practitioner to move from situations in which learner assent is withdrawn to ones where genuine assent can be obtained will be discussed.

Before Beginning, Ask: Is the Program Necessary?

As with any behavioral program, procedures (to gain assent) may take time and effort and are individualized to each learner and situation. Therefore, prior to deployment, practitioners should ask if the program is beneficial to the learner, and can the specific program occasioning assent withdrawal (or dissent) simply be removed. That is, what are the outcomes of completing this program and will they benefit the learner (cf. Mager & Pipe, 1997)? This will help us determine whether or not the program is even necessary in the first place. In other words, do the program outcomes have enough social validity to justify the effort (Baer et al., 1968, 1987; Wolf, 1978)?

For example, a 12-year-old learner who uses an augmentative and alternative communication (AAC) device to communicate is receiving therapy in a clinical setting. The registered behavior technician (RBT), following a prescribed protocol, presents the task of pointing to cards of community signs laid out in an array on the table. The RBT calls the learner to come to the table to complete the task. The learner refuses and continues to walk around the clinic area while playing with a ball—assent is not present. As stated previously, before taking on the task of programming to gain assent, one may ask what the outcomes of this program are and are they worth the investment of time to gain assent for participation? That is, how does the time spent creating this program benefit our learner's overall growth and development? The learner may be able to point to some pictures of signs when laid out in an array, but does that mean they will know what to do when they encounter these signs in the community? At what cost? The time spent could be used

to create other, more meaningful skills that would provide much greater benefit. In this case, we can consider omitting this program and spend the time and effort creating a more meaningful program that will provide greater benefit to the learner's overall growth.

On the other hand, a 10-year-old learner in a school setting is in class and working on a reading program. When the teacher asks them to read, the learner refuses and puts their head down on the table. Again here, before taking-on the task of programming to gain assent, one may ask what the outcomes of this program are and are they worth investing time into gaining assent for participation? That is, how does the time spent creating this program benefit our learner's overall growth and development? The outcome of this program is improved reading, which will open doors to many opportunities. They can be included in groups, join in on reading activities, take more classes, engage and interact with many kinds of materials and objects of their interest, and they can read directions to play games or with toys they enjoy. In this example, participation from the learner would benefit their overall growth and development, and the time and effort would be well worth it to find a way to program so that our learner is willing to participate in instruction. If programmed correctly, the outcome should be a willing and assenting learner reading to the teacher when asked. When it is determined that a program is beneficial for a learner, but assent is withdrawn, some guiding questions may be asked. The answers to these questions can guide clinicians in creating programs that build on learners' abilities, or entry repertoires, and this can lead to full participation in the program.

The Constructional Approach

Readers may recognize the following questions as the critical elements of Goldiamond's (1974, 2002) constructional approach in which the focus is on building repertoires, not eliminating them (also see, Layng et al., 2022). The *first* question is: where does one want to go? The answer to this question is going to guide the program. These are the behavioral objectives and should identify a clearly defined terminal outcome. In establishing the terminal goal, where feasible, it is incumbent on the practitioner to include learners in goal selection. Where possible, given the verbal level of the individual, a constructional interview which ascertains one's personal goals may be conducted (see Goldiamond, 1974, Layng et al., 2022, for an extended discussion). In the end, what is it that one wants the learner to be able to do, and how will it make life better for the learner? *Second*: where are they now? What is it they can already do? These skills become the entry repertoire and can be used as a starting point. What are the skills they already have that can be built upon and shaped into the target repertoires?

Third: what can one do to get them there? This provides us with the instructional sequence that will be used to reach the terminal outcome. This sequence becomes the steps within the program. *Fourth*: the program will also specify the maintaining consequences that will help keep the program moving along. *Fifth*: how does one follow progress? This is the performance data for the steps of the program which helps with keeping track of the progress throughout. These data guide the movements from one step to the next in the sequence or inform adjustments to the current step.

Taken together, the five questions above will guide the creation of programs that gain assent from learners. These programs are individualized and constructional programs, building on learners' skills already present in their repertoire, ending with meaningful outcomes, with assent monitored along the way. These are not specific curricula or generic protocols. Each learner's behavior should guide the implementer throughout the process such that when provided a critical consequence for engagement in the program and for nonengagement in the program, the learner will interact with the program that is offered. Several case examples will be discussed below to illustrate this process.

Case Example 1: Consequences

John was a 5-year old male diagnosed with autism spectrum disorder (ASD) at a private school. John communicated his needs using single word statements, and is usually one of the most enthusiastic learners in his class. Within his daily morning routine, his parents stopped at a fast-food drive-through on their way to school. However, as a result of running late for work one day, the parent disrupted the established daily routine by driving directly to school, bypassing the fast-food drive-through. John entered the school screaming and crying while being carried in by his parent. The parent apologized, informed the teacher of the situation, and left in a rush to get to work. The teacher walked John to his class room. In the classroom, he was still crying and holding on to the teacher's leg. John flopped to the ground and refused to participate in any activities. Although the critical reinforcer in this context was taking John to the drive-through to reinstate his morning routine, that was not possible in this case. Learner assent was not present for sitting in his seat and participating in the classroom activities. Therefore, what could the teacher do?

To apply the constructional approach questions stated above, the first question is restated: What does the teacher want the learner to do? The teacher's goal was for John to sit in a chair at his desk and participate in class work with his peers (as he has done and seemingly enjoyed in the past). In relation to that goal, where is John now? John was in the classroom sitting on the floor, crying and holding on to the teacher. It is important to note that in the past he had been

able to sit at the desk and complete the work that was presented. That is, the outcome behaviors are in his repertoire under different circumstances. What can be done to help John get from where he was to the goal—with his assent? Using the application of an aversive for nonparticipation in the activity by prompting/redirecting John into his seat by means of physical redirection would restrict the degrees of freedom to zero as the critical consequence, escape, is not available. Providing access to reinforcers only for compliance would also restrict the degrees of freedom to zero if the only way to obtain that consequence is to sit at the table. Ultimately both of those interventions would employ coercion within the program.

Because John was holding on to the teacher, it was determined at that moment that the reinforcer was the closeness and interaction with the teacher. John was allowed to move around the room, he was not immediately forced to sit at the desk or complete the work. A shaping procedure was applied using conjugate-like reinforcement (Lindsley, 1962, 1964). A conjugate schedule of reinforcement includes delivery of some magnitude of reinforcement, relative to some dimension of behavior, continuously throughout the session. It is important to note that a conjugate schedule of reinforcement does not utilize extinction. Reinforcement is not removed, rather it is varied in magnitude (Lindsley, 1962, 1964).

This allowed for attention to be provided for the disturbing as well as the desired behavior. It was the magnitude of the reinforcement that changed. The magnitude of the attention changed as proximity to the goal increased, and was never removed completely. That is, the teacher was always standing in the room within John's sight. How much she talked to him and comforted him changed systematically with how close or far he was from the target behavior. Thus, one degree of freedom was provided, John could continue to engage in the disturbing behavior and obtain the same reinforcement as before, or John could engage in the targeted behavior and obtain the reinforcement, but at a greater magnitude. It is important to note that other alternative behaviors would have been reinforced with the same reinforcers had they occurred (e.g., if he would have said "hug" or "hold," the teacher would have provided that). The table below shows the progression of the shaping procedure that took place.

John's Behavior	Teacher's Behavior
Taking a breath (inhaling after a crying sound).	Says comforting statements.
Letting go of teacher's leg, longer quiet duration.	Saying more comforting statements, smiling.
Orients towards chair and desk.	Sings John's favorite songs.
No more crying, slight smile.	Stands up and offers her hand to John.
Pulls himself up, starts walking towards desk.	Singing, holding hands, and swinging her arm with his while walking towards desk and chair.
Sits in his chair at his desk.	Sits in chair next to him, smiling, rubbing his back.
Starts interacting with the instructional materials at his desk.	Gives praise and asks if it's okay if she returns to teaching the class.
Smiles, nods, and starts working on the same task as his peers.	Stands in front of class and resumes teaching.

John eventually returned to the table and began his work. John experienced at least one degree of freedom at all times, and the procedures relieved the learner's apparent distress, making this a compassionate intervention with genuine assent throughout. It is important to note that there was no requirement for the progression of behavior during the shaping procedure described to be linear as it is described in the table above. Stated otherwise, the learner's behavior

can vary in either direction (forward towards the goal, or backwards toward the starting point) and the reinforcer will still be provided at different magnitudes. Nothing the learner did would have resulted in the *complete* withholding of reinforcement (i.e., some magnitude of the reinforcement is always available, even if at its minimum level).

Case Example 2: Providing Component Repertoires

David was a 9-year-old male, diagnosed with ASD. David initiated conversations with adults and students throughout the day, and played with his peers. David struggled with academic skills in the classroom. David was sitting in the classroom at a small group table during a math lesson. The teacher called on him to vocally answer questions during the lesson. He smiled and answered each question. After the lesson, the teacher passed out a worksheet and pencil to each student and asked them to complete the writing portion of the assignment. David looked at the worksheet and began writing. The teacher came over and noticed that the fours he was writing were not written correctly and asked him to try to rewrite them. When David's writing did not meet the teacher's criteria, the teacher erased his writing and told him to try again. He began to yell at her saying they were indeed correct. She wrote a four next to his to show him how to correctly write them. He grabbed the pencil, crumbled up the paper, got up from the table and walked out of the classroom.

It is important to note that David was willingly participating during the first activity when vocal responding was required. But as the activity changed to require handwriting, assent was withdrawn. To apply the guiding questions here, first, what is the ultimate goal for the learner to be successful in the classroom? David would be sitting with his peers during math class and completing all of his work, both vocally and written which he enjoyed doing under circumstances described earlier. Where is David now in relation to the goal? He completes all work when done vocally and can scribble when coloring, can make straight marks both horizontally and vertically, and attempts to make letters and numbers.

How can David get from where he is now to his goal? The plan was for him to continue vocally participating during instruction. However, during activities that required writing, an assistant was to work with David separately on building writing skills through a handwriting program that started with his current repertoire and built on his skills. During the entirety of the program, his assent was continuously monitored. No program of extinction, or making extraneous consequences contingent on compliance were used. At first, when it was ascertained that David's assent was withdrawn, he walked out of the classroom. That informed the plan to constantly provide leaving the classroom or leaving the instructional space as options for him. Of course, that was not the end, rather it was the beginning and served to indicate to the teacher how the program was going. If he walked away often, that would indicate that a program change was needed. David experienced at least one degree of freedom at all times, and the procedures relieved the learner's apparent distress, making this a compassionate intervention with genuine assent throughout.

The current case exemplifies using a program to teach David the skills needed within a classroom setting. Skills are taught through a series of steps, starting with those skills learners can already do, such as the vertical and horizontal marks. Those skills are then extended and built upon combining in different ways. To follow his progress, the accuracy of David's marks were measured, as well as his rate or count over time for all marks—and then eventually letters and numbers. The goal was accomplished when David willingly completed all parts of the lesson, in class, with his peers, or by himself.

Professional Practice with Animals: Lessons to Be Learned

It may seem difficult at times to conclude that nonverbal individuals can provide genuine assent. Behavior professionals who address the needs of nonhuman animals have, however, been able to demonstrate how an NCA informed constructional approach to intervention with animals can provide a model for achieving genuine assent in nonverbal organisms. The following two case studies demonstrate that by considering the degrees of freedom available and providing reinforcement for each available alternative, genuine assent can be obtained. Further, such procedures provide a level of continuous compassionate care hitherto thought unobtainable.

Animal caretakers often face tight deadlines and high-risk procedures that frequently sacrifice compassionate care and assent for the sake of urgency and expediency. During medical procedures, restrictive protocols are guided by those in authority positions who suggest that restraint will only last for a few seconds, the animals will not remember it, and it will only happen once a year. When statements like this are made, animal care specialists who show empathy and compassion may lose opportunities to provide voiceless learners compassion and assent.

Based in NCA and the constructional approach, the Whole Life Training Plan (Alm et al., 2009; Clifton-Bumpass, 2022) can be used to provide compassionate care that is centered around assent. In 2006, Clifton-Bumpass began teaching "Whole Life Training" to the team responsible for the care of a herd of giraffes at the Oakland Zoo, Oakland, CA. The Whole Life Training Plan focuses on building a plan for the animal to prepare them for a wide range of situations they

may encounter (e.g., separation from the group/herd, media events, meeting new people/trainers), and others they will inevitably encounter (e.g., blood draws, injections, hoof care) by shaping behaviors that recombine as needed over the course of the animal's lifetime care.

In the early stages of training, it is the most compassionate approach to identify behaviors that the learner can already do and reinforce them. The reason is twofold: (1) this limits the challenges (e.g., potential frustration in the case of the animal and trainer) that may accompany learning a new skill; and (2) provides the learner a focal point for trainers to measure the learner's assent at the beginning of a training interaction. When analyzing a learner's behavior and building their Whole Life Plan, it is vital to start training the foundation skill sets that will enable trainers to start measuring assent through degrees of freedom. Two case examples are presented next which demonstrate implementation of parts of Whole Life Training plans while accounting for learner assent throughout the implementation.

Case Example 3: The Role of Building Individual Repertoires with Compassionate Care

In traditional care of ungulates (animals with hooves) there is no standard accepted practice for providing routine hoof care by any regulatory body. The hooves are treated as an afterthought, only getting trimmed during procedures that are higher priority such as annual wellness examinations, unknown weight loss, or blood draw. The agricultural industry has started to see the correlation between hoof health and overall production of their herd (Ronk, 2016). Due to these recent findings, many agricultural managers are routinely scheduling hoof trims for their herd. The procedure used consists of having the herd go through a system of chutes to have a single animal end up in a squeeze chute so that their legs can be tied up and trimmed with power tools. This system can be used with both exotic and domesticated ungulates. For most decision makers whose critical consequence is that the hoof trims are quickly and economically done, those are the procedures used with no consideration of the experience of the animal (Ronk, 2016).

In the zoological field, there is even less data on how much hoof care affects ungulates because there is no economic factor driving the decisions. The one factor that does occasionally get attention is whether or not the animal is needed for breeding. Often there is little effort taken into consideration if the animal is comfortable standing on all four legs, let alone two legs, or even four holding the weight of another animal during breeding; hoof health is still an afterthought. Most vets will merely prescribe pain medication if animals look uncomfortable in an effort to support breeding. When hoof care demands attention, oftentimes a medical solution involving anesthetizing the animal is chosen. Although somewhat easy to implement, many ungulates post higher risks for anesthesia procedures than other animals. "General anesthesia in ruminants has inherent risks such as regurgitation of ruminal contents, excessive salivation and the possibility of pulmonary aspiration" (Olaifa & Oluranti, 2018, p. 68). With all of the above in mind, how can facilities provide compassionate care to ungulates and their hoof health?

Fig. 1 Slider standing on his station with a block present, while two trainers from the constructional team wait for him to place his leg on the block

A West Coast Association of Zoos and Aquariums accredited zoo was able to provide compassionate care to a bovine under their care. In the Children's Zoo, a rescued mixed breed steer named Slider required a hoof trim. As previously stated, typical procedures would include the use of a squeeze chute (mechanical restraint), manual restraint, or anesthesia. Using NCA and the constructional approach, the four-member team charged with his care developed a program to implement restraint-free, standing voluntary hoof trim. The team started by breaking down the hoof trim behavior into its component behaviors.

Accessing the underside of the hoof is required to provide a hoof trim, therefore it was necessary to arrange the environment with a sturdy level platform on which to stand on three legs (see Fig. 1). Once the platform was provided, the first skill set trained consisted of two parts: (1) Slider walking onto the platform when provided a cue (discriminative stimulus); and (2) Slider remaining on the platform while trainers moved around him—in and out of his corral. These are foundational skills for Slider to participate in hoof trimming, and for the trainers to assess and monitor his assent. To ensure that the behavior of getting on and staying on the platform are highly likely, two factors are put in place: (1) Slider's low risk behaviors (e.g., moving forwards or backwards slightly, targeting the trainer's hand) are maintained by a high rate of reinforcement; and (2) the platform is a comfortable place for him to stand.

Fig. 2 Slider resting his leg on block while consuming an edible

Once getting on and staying on the platform was established, the next objective was to teach Slider how to balance and shift his weight. Due to their square bodies and small limbs, cattle are not likely to stand on three legs without specific training to do so. Therefore, teaching Slider how to shift his weight back and forth depending on which hoof was being trimmed was also a foundational skill set. To teach this skill set, Slider was cued to walk onto the platform with only his front legs, and to stop there. This behavior requires Slider to shift his weight backwards and forwards in small movements. These small shifting behaviors were already present in Slider's repertoire, but needed to be transferred to occur (1) on cue, and (2) on the station. This enabled Slider to shift his weight back and be able to take weight off one whole leg so that the team could trim the underside of the hoof. Other considerations were put in place to ensure Slider's success. For example, the hoof-trimming station was placed inside Slider's corral backed up against the fence. This way, Slider could lean against the fence to further help him stabilize and balance (see Fig. 1).

The next step was to find a device, commonly called a block, for Slider to be able to rest his lifted leg upon (shown in Fig. 2). The terminal goal was lifting a leg and resting it

Fig. 3 Slider with his leg on the block while the zoo hoofstock trimming expert trims his hoof with a power grinder. A member of the constructional team is helping stabilize Slider's hoof

on the block. Because Slider was a mixed-breed steer, his body structure was fairly square. In order to get access to the underside of the hoof, Slider needs to bend at the carpal—similar to a human bending at the knee at about a 90-degree angle, parallel to the ground. At that point, Slider was able to stand on the station and lift all four of his legs (individually) onto a hoof block and assent to his hoof trims. When on the platform, Slider had one degree of freedom: he can get reinforcement for standing on the station alone, or standing on the station and lifting and resting a leg on the block. As Slider progressed through the program, a hoof trimming expert was successfully introduced to Slider. The expert used loud power tools to trim his hooves in a much faster manner than was used initially by his team (Fig. 3).

Because this approach was successful for Slider, a similar approach was used for two other bovines. These demonstrations may help perpetuate the idea that cattle breeds are in fact able to participate in assent-informed constructional programming. This may help to begin a shift to a more compassionate model of care in extending the life of cattle in human care.

Case Example 4: Willing Participation in Medical Care

The marine mammal training field has, for many years, been valued as a leader in the animal training community (Brando, 2010; Kuczaj & Xitco, 2002). It is tradition for linear training to allow the field to teach highly advanced behaviors ranging from protecting valuable Navy bases from underwater threats to cooperative health care such as injections, and blood draws. Although successful in training for these behaviors, the question can be asked: is the training done with compassion?

The care of marine mammals relies heavily on the delivery of a learner's diet coming directly from human interaction which can often leave little to no opportunity for assent. That is, these animals have zero degrees of freedom to obtain the

critical reinforcer—food. For example, a linear program for a voluntary injection that allows the learner to be free of restraint is typically considered to be ideal; yet, upon further investigation may be coercive. As previously stated, Azrin and Holz (1966) demonstrated when the pigeon was presented with only one way to obtain the critical consequence (food), it would work to turn on the shock. However, when provided an alternative, the pigeon would allocate responding to the shock-free contingency.

A juvenile California sea lion, Sharkbite, so named due to multiple shark attacks, was placed in human care due to permanent eye damage. Sharkbite shared an enclosure with another California sea lion named Joker. Both Sharkbite and Joker needed to receive training for a voluntary injection. Sea lions have traditionally been trained using operant conditioning (Breland & Breland, 1951). Participation in voluntary injections is a hallmark for high standard of training for animals living in human care.

Sea lion training for a voluntary injection is typically achieved by the following steps: The learner lays down behind a barrier (e.g., a fence), remains laying down while cleansing wipes are used to clean the injection site, and finally the injection is given. A fence is utilized as a barrier to protect the trainer from any occurrences of aggression. This was the process that was used to train Joker and Sharkbite to receive their injections. In this training plan, there were zero degrees of freedom for the learner. In other words, there was only one way for the learner to receive the critical consequence, fish. In addition, as a result of this approach other trainers were not successful in working with Sharkbite, hindering advancement of his skill and potentially slowing learning. Sharkbite's initial trainer utilized a pathological approach (after Goldiamond, 1974, 2002). When the initial trainers who worked Sharkbite left the institution, the trainer who took over his primary care sought a more compassionate approach. Sharkbite's new primary trainer recognized a lack of positive interactions with humans. Therefore, an emphasis was placed on constructing a foundation of skills to allow Sharkbite to thrive in human care.

The first behavior taught in building repertoires to develop a foundation of skills with an emphasis on assent was "targeting." Sea lions are naturally curious animals that investigate novel items with their nose. Trainers utilize this naturally occurring curiosity to shape the behavior of touching either the trainer's fist or a target stick. This behavior is commonly referred to and verbally cued as "target" (see Fig. 4). Once the targeting repertoire has been established, it can be utilized to assess assent within the program. For example, if the targeting behavior changes during instruction, this provides information to the trainer that something has changed. The behavior of targeting allows the trainer to measure the magnitude of force the learner uses to push into the trainer's hand. When presented with new stimuli as the target, if the learner uses additional force to touch the target, as if to push the target away, or does not touch the target, this may be an indication to stop and reevaluate the training sequence (see Fig. 5).

Fig. 4 Sharkbite laying down and targeting the target buoy while a member of the constructional team touches him with an object. Note the two doors open behind Sharkbite

During the program, there are a variety of methods used to increase degrees of freedom. Targeting provides the learner a reliable alternative behavior that will always be consequated with the critical reinforcer (food)—adding an additional degree of freedom. That is, when presented with a cue to engage in a trained behavior, the learner can complete the cued behavior or target—both will allow access to the critical reinforcer. In addition, Sharkbite's enclosure always

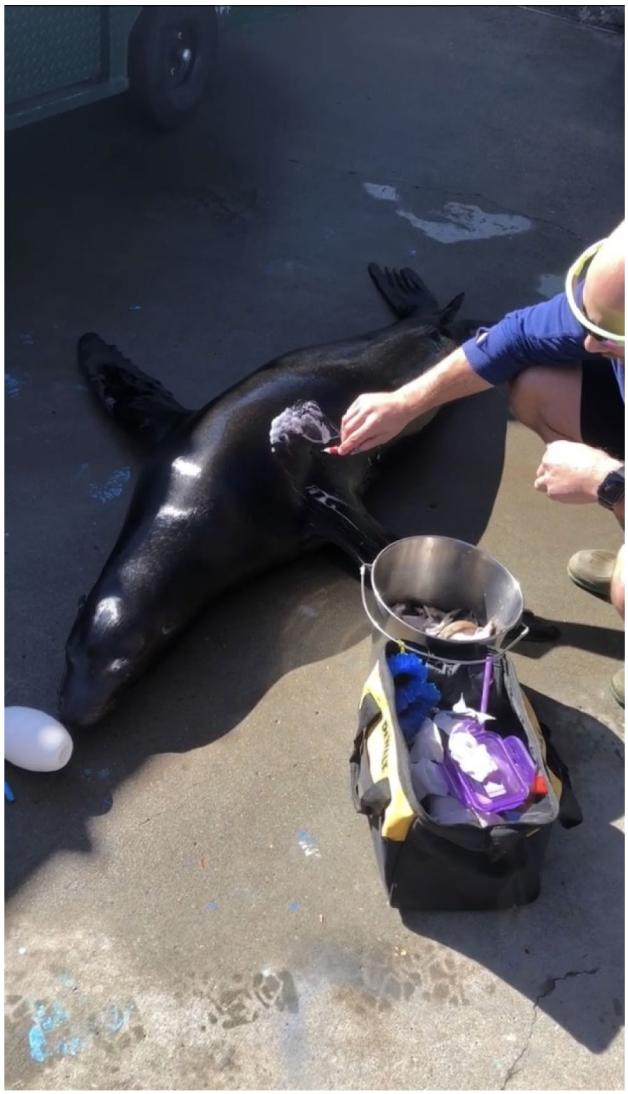

Fig. 5 Sharkbite laying down and targeting the target buoy. Note the bucket of fish used as reinforcers, and the bag of objects used to keep the assortments of objects that Sharkbite will be touched with

remained open so at any point during the training session, Sharkbite could leave the session. Each occurrence of returning to the enclosure also provided reinforcement (see Fig. 4). At this point in the training, Sharkbite is always operating with at least two degrees of freedom, occasioning contingencies in which assent is available: stay and participate in training, target, or walk away back to his enclosure—all of which are consequated with food.

The next behavior taught in the injection procedure was allowing the trainer to touch the learner's body while remaining in the same position (e.g., laying down on the stomach/prone). This position is ideal to administer an injection. This can be achieved by utilizing the target in one of two ways: ask the learner to target then move the target towards the trainer's stationary hand, or to have the learner target on the trainer's hand and the trainer moves their hand toward the learner. In either example, there is a clear indicator to the trainer working with the learner that the learner can disengage from the target to prevent the tactiles from initiating or continuing.

Next, tactile acclimation using various implements to create sensations of taps, pokes, or brushes was embedded in the program. This allowed Sharkbite to expand accepted tactile sensation beyond the touch of human hands to numerous other sensations such as syringe pokes, ultrasound probes, and brushes to simulate other possible sensations that may be felt in the future. With the skills of targeting, laying prone, and various tactile sensations, Sharkbite acquired skills to prepare him not just for a voluntary injection, but also a life in human care.

In contrast, the linear injection to program required the entire sequence to be completed, lay prone, wipe the injection area, and receive the injection. If the learner, for example, sat up prior to completion of the cleaning of the injection site, the entire sequence was repeated, delaying the opportunity for reinforcement and limiting degrees of freedom. In addition, the skill is learned only in the context of receiving an injection. In the nonlinear program, the wipes were administered while the learner is sitting up right as well as laying down. Therefore, Sharkbite could accept cleaning and disinfecting of the skin not only during an injection but also if tissue damage occurred in a different context. Ultimately, the nonlinear program increases the stimulus control and degrees of freedom.

Shortly after Sharkbite's primary trainer left, Sharkbite was able to assent to his vaccination while working with another trainer because the skills were not contingent on the past primary trainer's presence. A previous history in which Sharkbite was restrained during injection procedures, did not preclude him from establishing new repertoires through the use of a nonlinear constructional approach. Training Sharkbite utilizing a nonlinear approach allowed for a more compassionate training system, which equipped him with the skills that can be utilized his whole life.

Conclusion

We have demonstrated that genuine assent can be obtained from both humans and animals in behavior analysis practice. Further, we have attempted to demonstrate that compassionate care relies on obtaining genuine assent. The mere willingness to participate, even requesting such participation does not necessarily indicate genuine assent. Such apparent assent may in fact be the product of using a critical reinforcer that can only be obtained by meeting the contingency requirements imposed by the teacher or trainer. Such arrangements may be

considered as coerced, that is, there is no alternative but to comply if the reinforcer is to be obtained. By not withholding reinforcers maintaining a disturbing behavior, and by providing the same critical reinforcer for alternative behaviors, we can probe for genuine assent. The activity specific reinforcers that may not be directly programmed can have their effect.

In short, we can disambiguate the effects of the critical consequence from the effects of the activity specific consequences only by providing alternatives that have the *same* critical consequences, but *different* activity specific consequences. That is, the learner has access to more than one program each with its own activity specific consequences embedded, while providing access to the same critical consequence across the programs. Doing so pays off in three main ways: (1) it provides useful information that should be utilized in future programming (i.e., what is it about the program itself that the learner enjoyed); (2) it provides a starting point for maximizing degrees of freedom and decreasing coercion; and, (3) it ensures apparent assent is not mistaken for genuine assent.

The emphasis can then be on the program used to teach or train our learners.[2] The critical reinforcer maintains behavior through the program. If assent is withdrawn, and the reinforcer is obtained otherwise, it is an occasion to examine the program and make the necessary changes that will occasion assent. By not coercing our learners through a program, we learn how to build better programs and how to address the individual needs of our learners. By being sensitive to the requirements of genuine assent, we can ourselves engage in genuine compassion.

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Data Availability No additional data and materials are available.

Declarations

Ethical Approval and Assent Cases reported here were conducted as part of treatment for the individuals involved. Consent to treat was provided in all cases. Assent was monitored and honored throughout.

Conflict of Interest There are no conflicts of interest to declare.

References

Alm, V., Dougall, A., Clifton-Bumpass, L.,Goodnight, A., Phelps, A., & Holub, S. (2009). The future is now: Geriatric animal husbandry and training. *The International Zoo News, 56*(3).

Ayllon, T., & Azrin, N. H. (1966). Punishment as a discriminative stimulus and conditioned reinforcer with humans. *Journal of the Experimental Analysis of Behavior, 9*(4), 411–419.

Azrin, N. H., & Holz, W. C. (1966). Punishment. In W. K. Honig (Ed.), *Operant behavior: Areas of research and application* (pp. 213–270). Appleton-Century-Crofts.

Baer, D. M., Wolf, M. M., & Risley, T. R. (1968). Some current dimensions of applied behavior analysis. *Journal of Applied Behavior Analysis, 1*(1), 91.

Baer, D. M., Wolf, M. M., & Risley, T. R. (1987). Some still-current dimensions of applied behavior analysis. *Journal of Applied Behavior Analysis, 20*(4), 313–327.

Brando, S. I. (2010). Advances in husbandry training in marine mammal care programs. *International Journal of Comparative Psychology, 23*(4), 777–791.

Breland, K., & Breland, M. (1951). A field of applied animal psychology. *American Psychologist, 6*(6), 202–204. https://doi.org/10.1037/h0063451

Clifton-Bumpass, L. (2022). Constructional team building: What we can learn from four institutions over 14 years and hundreds of human and animal competency assessments [Symposium presentation]. 48th Annual Conference of the Association for Behavior Analysis International, Boston, MA.

de Fernandes, R. C., & Dittrich, A. (2018). Expanding the behavior-analytic meanings of "freedom": The contributions of Israel Goldiamond. *Behavior & Social Issues, 27*(1), 4–19.

Goldiamond, I. (1974). Toward a constructional approach to social problems: Ethical and constitutional issues raised by applied behavior analysis. *Behaviorism, 2*(1), 1–84.

Goldiamond, I. (1976). Protection of human subjects and patients: A social contingency analysis of distinctions between research and practice, and its implications. *Behaviorism, 4*(1), 1–41.

Goldiamond, I. (1984). Training parent trainers and ethicists in nonlinear analysis of behavior. In R. F. Dangel, & R. A. Polster (Eds.), *Parent training: Foundations of research & practice* (pp. 504–546). Guilford Press.

Goldiamond, I. (2002). Ethical and constitutional issues raised by applied behavior analysis. *Behavior and Social Issues, 11*(2), 108–197.

Kuczaj, S. A., & Xitco, M. J., Jr. (2002). It takes more than fish: The psychology of marine mammal training. *International Journal of Comparative Psychology, 15*(2), 186–200.

Layng, T. J., Andronis, P. T., Codd, R. T., & Abdel-Jalil, A. (2022). *Nonlinear contingency analysis: Going beyond cognition and behavior in clinical practice*. Routledge.

Lindsley, O. R. (1962). A behavioral measure of television viewing. *Journal of Advertising Research, 2*(3), 2–12.

Lindsley, O. R. (1964). Direct measurement and prosthesis of retarded behavior. *Journal of Education, 147*(1), 62–81.

Linnehan, A. M., Abdel-Jalil, A., Klick, S., Amey, J., Yeich, S., & Hetzel., K. (2023). Foundations of preemptive compassion: A behavioral concept analysis of compulsion, consent, and assent. [Submitted for publication].

Mager, R. E., & Pipe, R. (1997). *Analyzing performance problems or you really oughta wanna* (3rd ed.). Center for Effective Performance.

Morris, C., Detrick, J. J., & Peterson, S. M. (2021). Participant assent in behavior analytic research: Considerations for participants with autism and developmental disabilities. *Journal of Applied Behavior Analysis, 54*(4), 1300–1316.

Olaifa, A. K., & Oluranti, O. I. (2018). The use of epidural anaesthesia over general anaesthesia in ruminants. *Concepts of Dairy & Veterinary Sciences, 1*(3), 68–71.

Ronk, E. (2016). *Economics of dairy cattle hoof health. Walking strong series* (pp. 1–3). University of Wisconsin-Extension Dairy Team.

[2] For other case examples utilizing a constructional nonlinear approach with additional populations (e.g., clinical cases, gerontology), see Layng et al. (2022).

Scallan, C. M., & Rosales-Ruiz, J. (2023). The constructional approach: A compassionate approach to behavior change. *Behavior Analysis in Practice*, 1–10. https://doi.org/10.1007/s40617-023-00811-2

Skinner, B. F. (1975). The ethics of helping people. *Criminal Law Bulletin, 11*(5), 623–636.

Taylor, B. A., LeBlanc, L. A., & Nosik, M. R. (2019). Compassionate care in behavior analytic treatment: Can outcomes be enhanced by attending to relationships with caregivers? *Behavior Analysis in Practice, 12*(3), 654–666.

Wolf, M. M. (1978). Social validity: The case for subjective measurement or how applied behavior analysis is finding its heart. *Journal of Applied Behavior Analysis, 11*(2), 203–214.