Observational Learning and Children With Autism

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Abstract

A skill essential for successful inclusion in general education settings is the ability to learn by observing others. Research, however, has documented children with autism display significant deficits in the fundamental skills necessary for observational learning. This article outlines the skills essential for observational learning from an operant learning perspective, the research base on teaching observational learning to children with autism, and suggests practical strategies to increase these skills in children with autism so they may more fully benefit from inclusion in general education settings.

Keywords

observational learning, autism, inclusion

Learning by observing others has significant educational, economic, and social implications. If one can learn by observing the consequences delivered to another, it can reduce instructional time and financial costs related to intensive instruction, and lead to the acquisition of socially relevant behavior, thereby increasing social integration opportunities (Ledford, Gast, Luscre, & Ayres, 2008). Research has demonstrated, however, that children with autism display deficits in core skills required for observational learning. Children with autism, for example, display deficits in attending (Patten & Watson, 2011; Senju, Yaguchi, Tojo, & Hasegawa, 2003), imitating (Smith & Bryson, 1994), and in making simple and complex auditory

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discriminations (Green, 2001). Despite the importance of learning by observation, and the significant deficits displayed by children with autism, little applied research has been directed toward investigating strategies to improve the observational learning skills of these children. This article will review definitions of observational learning, the research base on teaching responses related to observational learning, and the implications of teaching these skills to children with autism who are included in typical learning environments. We will also outline practical strategies for teachers for improving the observational learning skills of children with autism.

Observational Learning

Observational learning is the acquisition of novel operants as a result of observing contingencies related to the actions of others (Catania, 1998). Observational learning was first put forth by Bandura (1977) who proposed two types of observational learning: (a) imitation, the reproduction of a modeled behavior, and (b) vicarious learning, the increase or decrease of an observer's behavior that is similar to a model based on whether the model's behavior is reinforced or punished. A distinction between imitation and vicarious learning is the demonstration of the modeled behavior long after the observer is exposed to the modeled response and its subsequent consequences. Furthermore, the observer does not necessarily have to contact the contingencies to reproduce the model. According to Bandura's (1977) proposed social learning theory, demonstration of the behavior after such a delay in time without direct contact with contingencies can be explained by *cognitive mediation*. That is, the observer forms a cognitive representation of the observed behavior and its consequence, which then influences the observer's behavior at a later point in time.

Behavior analysts have proposed different explanations for observational learning that do not imply hypothetical constructs such as those proposed by Bandura (1977); for example, the formation of cognitive representations. Rather, behavior-analytic explanations propose environmental variables that can be experimentally manipulated such as the individual's learning history related to reinforcement for imitative behavior, the stimuli that may control responding, stimulus generalization, and the demonstration of complex and conditional discriminations (Deguchi, 1984; Greer, Dudek-Singer, & Gautreaux, 2006; Masia & Chase, 1997).

According to Masia and Chase (1997), in an observational learning context, the observer attends to a complex stimulus that includes a modeled

response and the subsequent consequence. The modeled response and its consequences may serve as a complex discriminative stimulus for the demonstration of that response by the observer later in time. In addition, the likelihood that a response will be imitated may be related to the observer's history of being reinforced for imitation and the development of a generalized imitative repertoire. A generalized imitative response class is necessary to ensure the observer can imitate responses performed by others without the need to be directly or immediately reinforced for every instance of imitation (Kymissis & Poulson, 1994; Poulson, 2003).

Although imitation is essential for observational learning, not all imitative behavior is advantageous, especially when the outcome for such responding does not result in reinforcement. For example, we would not want a child with autism to imitate a peer yelling out in class especially if the peer's teacher sends her to the principal's office when she does so. Thus, direct imitation does not mean that the person has learned anything about consequences. Observational learning on the other hand implies that the observer has learned about the consequences applied to the observed behavior. This requires that the observer discriminate reinforcing and punishing consequences, and the impact these consequences have on the observed behavior (Greer et al., 2006). Discrimination is demonstrated by the observer either engaging in the modeled response that was reinforced or not engaging in the modeled response that was extinguished or punished. This type of discrimination might be considered a conditional discrimination in that reinforcement for engaging in the modeled response is dependent on the presence or absence of additional stimuli (e.g., reinforcement or punishment; Green, 2001; Masia & Chase, 1997).

In addition to discrimination, observational learning necessitates stimulus generalization. Stimulus generalization is the spread of effects of reinforcement for responses emitted in the presence of one stimulus to different but physically similar stimuli that are not predictive of reinforcement (Stokes & Baer, 1977). With respect to observational learning, when we observe someone else perform responses and those responses are followed by reinforcing consequences, we are more likely to perform those same responses in the presence of stimuli that are physically similar to those observed, without ever having contacted the pleasurable consequences provided to the model (Masia & Chase, 1997). For example, we may observe someone opening a box that reveals candy. The modeled behavior is opening the box and the related consequence is finding candy. Because we might have our own direct experience with opening different types of boxes and finding preferred items, both which are structurally similar to the one we observed someone else open, we might

engage in this same response following observation of the model, even though no history of reinforcement exists for opening that specific box.

Although the precise behavioral mechanisms of observational learning have yet to be empirically validated, it is clear many different skills must come together for observational learning to take place. To learn by observation, a child will need to attend to and observe the modeler, make complex discriminations of another person's actions and their outcomes, and after a delay in time, match some properties of the modeled behavior (or not). Thus, attending, delayed imitation, and the discrimination of contingencies are specific skills that seem to be required for observational learning to occur. For children with autism, these skills are often deficient or delayed, which will invariably impede learning in environments that rely heavily on observational learning.

Importance of Observational Learning and Children With Autism

Most children with autism who are receiving evidence-based instruction begin education in intensive one-to-one instruction with an adult, in a highly structured format with well-planned and repeated learning opportunities. The benefits of this type of instruction for children with autism have been well documented (e.g., Hayward, Gale, & Eikeseth, 2009; Lovaas & Smith, 2003). Unfortunately, these instructional conditions may not be economically feasible for the long haul and are rarely available in general education classrooms where group instruction is the norm. Furthermore, some children with autism who make considerable progress in early intensive behavioral intervention may master prerequisite skills enabling them to be included in general education settings. Thus, it is essential that teachers and clinicians identify strategies to shift instruction from a one-to-one context to instruction presented in a group where learning opportunities may be diminished and direct reinforcement for responding infrequent. This will require that the child with autism be taught the necessary skills to learn by observing the responses of his peers.

Observational learning also has significant social implications for children with autism. Many "social norms" that we adhere to and follow are based on the observed responses of others. For example, when entering a new social situation in which we are unsure of what to do, we look around, observe what everyone else is doing, and imitate the behavior of others to "fit in." Essentially, we learn the expected "norm" by observing others and the social consequences provided to such behavior. For children with autism who

present with significant social challenges, being able to learn social responses by observing others would undoubtedly be a useful skill to enhance social inclusion opportunities.

If we are to enhance the learning and social opportunities of children with autism, it requires attention to remediating the skill deficits associated with observational learning and identifying efficient strategies to enhance observational learning skills of these children. Children with autism must, for example, be taught to attend to others, to imitate actions after a delay, and to identify and discriminate contingencies. Although there are only a limited number of studies examining these specific skills in relationship to observational learning, there is a body of literature that examines several of these deficits in isolation and suggests ways to remediate these deficits in children with autism.

Attending and Children With Autism

Deficits in attending such as poor or inconsistent eye contact (American Psychiatric Association, 2000), an inability to follow eye gaze (Leekam, Hunnisett, & Moore, 1998), not orienting to toys or materials (Donnelly, Luyben, & Zan, 2009), and failure to engage in joint attention (Mundy & Crowson, 1997) are understood to be some of the core diagnostic indicators for autism. In addition, a recent investigation by Shic, Bradshaw, Klin, Scassellati, and Chawarska (2011) used eye-tracking technology to determine that toddlers with autism attended more to background stimuli and less to the movement of an adult and child engaged in a play interaction, than their typically developing peers. These challenges in attending unquestionably impact a child's ability to learn through observation. To learn by observing others, the child with autism will need to attend to multiple stimuli simultaneously, need to shift attention between various stimuli, and be required to sustain attention for long periods of time. For example, a child with autism observing a lesson presented by a teacher about the solar system has to attend not only to the teacher's presentation of the lesson material but also to the teacher's directive or question to other students, the student's response to the teacher's question, the teacher's consequence to the student's response, the response of the student to the teacher's consequence, and any other instructional material related to the lesson (e.g., visual display of the solar system).

Although deficits in attending for children with autism have been well documented, there is a paucity of research examining interventions to improve attending related to learning during instruction (Patten & Watson,

2011). Most studies have addressed specific topographies of attention such as improving joint attention (e.g., Taylor & Hoch, 2008). A few have outlined specific reinforcement or prompting procedures to increase eye contact. For example, a study by Donnelly et al. (2009) documented increases in attending toward task materials of a toddler with autism by using a continuous reinforcement schedule of edibles plus praise. In another study, Tarbox, Ghezzi, and Wilson (2006) demonstrated that a token reinforcement system could be used to increase eye contact during discrete trial instruction. When tokens were removed and when the backup reinforcers were no longer available, however, eye contact decreased suggesting that a consistent schedule of reinforcement may be necessary to maintain eye contact. Research on teaching joint attention (see review by White et al., 2011) and the few studies focused on increasing eye contact and attending indicate that systematic prompting, prompt fading, and reinforcement procedures can be used to increase these responses. Additional research is needed, however, to identify strategies to teach children with autism to sustain attention for longer periods of time and to examine the extent to which better attending impacts observational learning.

Imitation and Children With Autism

Imitation is the ability to duplicate some properties of the behavior of a model (Catania, 1998). Deficits in imitation for children with autism were first suggested in an article by Ritvo and Provence (1953) and are now considered diagnostic features of autism (American Psychiatric Association, 2000). Empirical reviews have isolated several variables related to imitation and autism. For example, a review by Williams, Whiten, and Singh (2004), involving 21 studies totaling 281 children, concluded that imitative deficits were more apparent in younger children with autism. Furthermore, they determined that children with autism had the most difficulty imitating nonmeaningful gestures and had the least difficulty imitating actions with objects. A recent longitudinal study by Young, Roger, Hutman, Rozga, and Ozonoff (2011) revealed that children with familial risk for autism and later diagnosed with autism showed delayed imitation skills but were indistinguishable from other high-risk infants who showed other cognitive delays not related to autism. The study also showed that all groups displayed similar linear increases in imitation between 12 and 24 months, and these increases were associated with individual growth in expressive language and social engagement ratings. In another study by Young, Krantz,

McClannahan, and Poulson (1994), it was determined that learning a generalized imitative repertoire for one type of imitative response (e.g., vocal) did not necessarily result in the emergence of another type of imitative response (e.g., motor), suggesting that various topographies of imitation may be distinct response classes. Collectively, these studies confirm that children with autism have delays or deficits in imitation and that these impairments may be related to certain topographies of imitation and other skills, such as expressive language and social behavior. Furthermore, imitation seems to improve with age and may show a sequential linear progression.

Despite deficits in imitation, it has been demonstrated that children with autism can be taught to imitate a variety of responses. A number of methods to teach imitation have been investigated such as discrete trial teaching (Lovaas, 1977), the use of reciprocal imitation in play contexts (Ingersoll & Schreibman, 2006), and prompting and reinforcing imitation in a group (Garfinkle & Schwartz, 2002). Early research documented the benefits of prompting and differential reinforcement to teach imitation of motor and vocal behavior demonstrated by an adult (e.g., Baer, Peterson, & Sherman, 1967; Metz, 1965). Subsequent studies have documented that children with autism can learn to imitate an array of complex responses, including facial expressions (DeQuinzio, Townsend, Sturmey, & Poulson, 2007), gestures (Buffington, Krantz, McClannahan, & Poulson, 1998; Ingersoll, Lewis, & Kroman, 2007), play responses of peers (Garfinkle & Schwartz, 2002) and actions, and vocalizations modeled on videos (D'Ateno, Mangiapanello, & Taylor, 2003; Taylor, Levin, & Jasper, 1999).

Delayed imitation, reproducing an observed action after a period of time has elapsed (Garcia, 1976), is an essential skill related to observational learning. To learn by observation, a person will need to be able to observe a response demonstrated by a model and be able to produce that response later in time in the presence of similar stimuli. Researchers have found that typically developing 6-month-olds can imitate after a 24-hr delay, 12-month-olds after a 4-week delay, and 2-year-olds after a 4-month delay (Barr, Dowden, & Hayne, 1996). To date, there are no systematic studies examining delayed imitation in children with autism. But some researchers have documented that some children with autism can produce responses after observing a model following a period of time (Hobson & Lee, 1999). Nonetheless, additional research on teaching delayed imitation is necessary to guide practice on how best to facilitate these responses in relationship to observational learning in children with autism.

Discriminating Contingencies and Children With Autism

As noted above, behavior analysts have argued that observational learning requires complex discriminations, often characterized as conditional discriminations (Masia & Chase, 1997). One such discrimination necessary for observational learning is identifying and responding accordingly to a reinforcing and a punishing consequence delivered to another. Making these discriminations can be challenging for a child with autism who may have difficulty responding to vocal verbal behavior related to positive consequences (e.g., someone saying, "Good job!") and punishing consequences (e.g., someone saying, "No, that's incorrect."), and in responding to nonvocal responses such as displays of emotion (e.g., someone grimacing or frowning). For example, if a child observes a peer playing with a door by swinging it open and closed, and the peer accidently gets his finger caught in the door and grimaces and whines, the observing child has to infer, based on the peer's reaction (i.e., facial grimacing and whining), that the consequence of playing with the door (i.e., getting his finger caught) is unpleasant and as a result he should not play with a door by swinging it open and closed. This inference will no doubt be difficult for the child with autism who has deficits in discriminating and responding to emotional reactions of others (Baron-Cohen, Leslie, & Frith, 1985; Weeks & Hobson, 1987).

The challenges that children with autism have with respect to learning conditional discriminations are reflected by a vast body of research dedicated to evaluating the best strategies for teaching these repertoires (Fisher, Kodak, & Moore, 2007; Green, 2001; Pérez-González & Williams, 2002; Williams, Pérez-González, & Queiroz, 2005). Although prior research has demonstrated that children with autism can learn to discriminate both between and among classes of stimuli such as colors, people, and common objects, few studies have attempted to apply these strategies to teach children with autism to respond to the complex stimulus relations involved in observational learning.

Of notable exception is a study conducted by Pereira-Delgado and Greer (2009) in which two 5-year-old children with autism were taught to discriminate between correct and incorrect responses of a peer by monitoring both the responses of the peer and the consequences delivered by the teacher. Specifically, participants with autism were taught to choose a green block when a peer's correct response was reinforced by the teacher and a red block when a peer's response was corrected by the teacher. The researchers argued that learning to discriminate the responses of the peer and the consequences

related to those responses facilitated the acquisition of novel sight words. This study holds promise that children with autism may be able to learn to discriminate these consequence and as a result learn novel responses. More research is needed, however, to examine the effects of learning these discriminations related to more complex responses and to clarify best practice procedures to enhance these skills in children with autism.

Studies Evaluating Observational Learning and Children With Autism

Most research on observational learning has been conducted with typically developing children or children with general developmental disabilities. Few have included children with autism. Observational learning with children with other disabilities has been assessed to teach a variety of skills, including reading of sight words (Schoen & Ogden, 1995), completing long response chains (Werts, Caldwell, & Wolery, 1996), seeking assistance following injury (Christensen, Lignugaris-Kraft, & Fiechtl, 1996), preparing food (Griffin, 1992), and completing language tasks (Goldstein & Mousetis, 1989). Research on observational learning, specifically with children with autism, reveals inconsistent findings both within and across studies. Some children with autism acquired new responses by observing a model, whereas others did not. In addition, most studies examined the effects of the child with autism observing a competent model perform the responses accurately as opposed to watching the model learn a new response. In addition, only a few have addressed teaching components of observational learning such as attention to the modeled response (Taylor, DeQuinzio, & Stine, in review) and teaching discrimination of contingencies (Pereira-Delgado & Greer, 2009). Nonetheless, existing studies offer some support that some children can learn by observing responses demonstrated by others.

One of the first studies examining observational learning and children with autism was a study by Varni, Lovaas, Koegel, and Everett (1979). In this study, children with autism observed an adult model perform responses and receive reinforcement by another adult for performing the responses accurately. It was found that children with autism performed similarly to the youngest age group. This was different for the children without autism whose observational learning progressed with the children's chronological age. For the participants with autism in this study, chronological age did not determine how much information they acquired as a result of observing a model. Rather, responding was idiosyncratic. The authors concluded that failure to learn by

observation may be related to stimulus over selectivity, and as a result, the children with autism were unable to attend to the relevant features of the task.

In another study, Egel, Richman, and Koegel (1981) found performance on five discrimination tasks improved for four children with autism as a result of watching typically developing peers model the responses. In this study, the children observed the peer models perform the responses accurately and receive reinforcement for doing do so. As a result, accuracy of the discrimination task improved for all four children with autism. Tryon and Keane (1986) found that "autistic like" children learned to engage appropriately with a novel toy by observing a peer model appropriate play with the toy. Similarly, Charlop, Schreibman, and Tryon (1983) found that four children with autism learned new receptive language tasks as a result of observing competent learners with autism demonstrate those responses with an adult. A study by Kamps, Walker, Locke, Delquardia, and Hall (1990) on the other hand showed varied rates of acquisition of a sight word reading task presented in a group observational learning context.

A more recent study by Rehfeldt, Latimore, and Stromer (2003) examined the formation of stimulus classes of reading skills, in three individuals with developmental disabilities (one of whom had autism), as a result of observing a model demonstrate conditional discriminations. They found that all participants subsequently demonstrated full stimulus classes with the stimuli involved in direct training; on the other hand, based on the observed model, none of the participants demonstrated full stimulus classes. In a second experiment, however, participants demonstrated full stimulus classes with at least one of the model's set of training stimuli.

Taylor, DeQuinzio, and Stine (in review), investigated teaching three children with autism to monitor the responses of a peer model during a site word reading task. The monitoring response consisted of imitating the peer's response when asked by the teacher, "What did (peer's name) say?" (after the peer read the word), and matching a plastic chip to the word that was read on a word-matching grid to indicate the child was looking at the instructional stimuli. In one condition, the monitoring response was required and in another other condition, with a different set of words, the monitoring response was not required. Separate tests of the two sets of words revealed that accuracy for reading was better for the words where the monitoring response was required. Eventually, for two participants, accuracy for the words in the nonmonitoring condition also increased, indicating that there may have been generalization of the monitoring response to the conditions where monitoring stimuli were not present. For the third participant, accuracy of reading the site words did not improve until the monitoring response was required, indicating that for this

participant, consistent prompts of visually monitoring and imitating the responses of the peer were necessary to learn the new words. This study supports the notion that children with autism may not acquire novel information by simply being exposed to models performing responses and receiving reinforcement for those responses. Instead, children with autism may require prompting to visually attend to instructional stimuli and to imitate the response of their peers.

Collectively, these studies indicate that some children with autism will learn new responses as a result of observing proficient models perform those responses. Unknown, however, is why some children with autism are able to do so and why some are not. It stands to reason that competent observational learners likely demonstrate specific prerequisite skills that facilitate learning through observation. It may be the case, for example, that the skilled observational learners attend to models and instructional stimuli for appropriate durations, engage in delayed imitation, and can discriminate contingencies. Additional research is needed to identify the conditions under which children with autism learn through observation and the essential skills required to do so.

Strategies for Increasing Observational Learning

As reviewed above, there are a number of potential skills which when deficient may preclude learning through observation. Although more research is needed to demonstrate the particular prerequisite skills and the most efficient strategies to teach them, we offer practical strategies that may increase attending, imitation, and the discrimination of contingencies. Some of the strategies we offer are based on empirical research and others on clinical practice. Although a benefit of observational learning is to increase new responses without the direct instruction of each individual learner, building the prerequisite responses will initially require individualized instruction. General classroom strategies can also be used to facilitate these skills in a group instruction format.

Teach sustained attention to peer models. The child with autism must first demonstrate proficiency in looking at, or orienting toward, a model for an extended duration so that he may observe the entire response performed by the model and subsequent consequences. To date, there is no research specifically evaluating strategies for increasing sustained attention by children with autism. Shaping, a procedure in which successive approximations of a target response are differentially reinforced (Cooper, Heron, & Heward, 2007), could

be an effective strategy for increasing sustained attention. Teachers, at first, may reinforce short instances of looking at, or orienting toward, a model and then systematically increase the duration required for reinforcement. Initially, to shape attention toward a model, the teacher could have the child with autism sit across from a peer and provide an instruction to the child to look at the peer model (e.g., the teacher could say, "Look at John") and use a gesture prompt of pointing in the direction of the peer. When the child looks in the direction of the peer, the teacher would provide praise and a preferred snack or toy to reinforce his response of looking toward the peer. To ensure the child is actually looking at the peer, the teacher could ask the child questions about the peer's responses or behavior (e.g., ask, "What is John doing?"). The child's correct answer ensures that he has looked at the peer. To increase the likelihood that the child will look at the peer, the teacher could have the peer model fun or interesting actions or activities (such as demonstrating play with a fun toy). Over time, to shape longer durations of looking at the peer model, the teacher could have the peer model perform a sequence of actions out of the chair and with other peers or teachers. The teacher could use a timer to cue the expected duration of attending, which can be systematically increased over time. As the child is able to sustain attention to the peer for longer periods of time, the teacher could add distractor stimuli, such as other students or toys, that may divert the child's attention and teach the child to sustain attention to the model even when these distracting stimuli are present.

Promote generalized imitation of peer's vocal and motor responses. Imitation is when the child's behavior is contiguous to the behavior of a model and is topographically similar to that of the model (Baer et al., 1967). As described earlier, research has illustrated that prompting and reinforcement procedures can be used to shape imitative repertoires in children with autism using *adult* models. Arguably, *peer* imitation is an essential prerequisite skill for observational learning. Studies published using peers as models are less abundant; however, they do provide a framework for developing peer imitation training procedures (Carr & Darcy, 1990; Ganz, Bourgeois, Flores, & Campos, 2008; Garfinkle & Schwartz, 2002). To teach imitation of peer responses, a teacher may initially have the child sit across from a peer at a table or in a play area. The teacher would then ask the peer to demonstrate actions (e.g., the peer is instructed to push a car back and forth) and would present an instruction to direct the child to imitate the peer (e.g., the teacher would say, "Do what John is doing"). If necessary, the teacher could guide the child to imitate the peer's action. When the child does, the teacher would provide praise and a preferred snack or toy, to reinforce the imitative response. To promote generalization, the teacher would have the peer model different actions each time, until the

child can imitate novel actions without any prompting or reinforcement. To increase the likelihood that the child with autism will imitate the peer, the teacher could have the peer model actions associated with preferred toys that the child may not know how to operate. Or the teacher can have the peer model actions that lead to a desired outcome for the child with autism. For example, the teacher may present a new toy to the child and when the child shows interest in the toy, but is unable to operate it, the teacher could have the child observe the peer manipulate the toy to know how it works. The teacher would then provide the child with autism an opportunity to imitate the action with the toy.

In addition to this structured imitation training with peers, Brown, Brown, and Poulson (2008) argued that it is also important to teach children with autism to imitate the responses of peers without a verbal instruction. The authors reasoned that in more "ordinary" learning environments, such as general education classrooms, verbal instructions to imitate peers and programmed consequences for doing so are not likely to occur. Thus, structured imitation training should attempt to establish imitation of peers under conditions that are similar to those involved in observational learning. This can be promoted by eventually teaching imitation of peers in a variety of contexts and eventually fading or no longer using directives for imitation, such as "Do what John is doing."

Finally, the child with autism will have to demonstrate a response modeled by a peer following some delay (Garcia, 1976). To teach this, the teacher could present novel actions for the child to imitate and impose a delay of time between the modeled action and the opportunity for the child to display the response. For example, the teacher could have the child observe the peer demonstrating a specific action with a novel toy and wait 15 minutes before giving the toy to the child with autism to assess whether the child demonstrates the responses modeled by the peer. This same sequence can be conducted to teach the child with autism to imitate vocal behavior. For example, the child could observe a peer answering a teacher's question (e.g., the peer says, "four" in response to the teacher's question, "How much is two plus two?"), and the teacher could wait a few minutes and then present the question to the child with autism to see whether he imitates what was modeled by the peer (i.e., says, "four").

Teach discrimination of consequences. Finally, and arguably, the most complex component response of observational learning is discriminating the consequences of the responses of others. This requires that the learner can respond differentially to complex stimuli, that is, the modeled response (e.g., a correct answer) as well as the consequences associated with each

modeled response (e.g., teacher praise). Within the observational learning paradigm, learners must match the responses of the model that were reinforced and refrain from engaging in responses that were not. Because of the complexity of the discrimination, it might be helpful to first teach learners to discriminate reinforced from nonreinforced responses by engaging in an arbitrary response (e.g., pointing to a red card versus pointing to a green card; see Pereira-Delgado & Greer, 2009). Requiring a simple response, such as pointing, initially will help teachers determine whether the learner with autism can discriminate among the complex stimuli without requiring additional verbal behavior. For example, initially, the teacher could seat the child in view of a peer modeling both correct and incorrect responses to a lesson. When the model engages in a correct response as indicated by teacher praise (e.g., "Excellent, you are correct!"), the teacher could prompt the child to point to the green card. When the model engages in an incorrect response, as indicated by the teacher's corrective statement (e.g., "No, that's not correct"), the teacher would not provide praise and would prompt the child to point to the red card. Eventually, the teacher would remove all prompts until the child accurately points to the green card when the model is correct and the red card when the model is incorrect.

Have the child practice the skills to learn new information. Following mastery of the above prerequisites, teachers may consider implementing the following observational learning sequence: The teacher would first identify a skill the child cannot demonstrate but a peer can (e.g., reading of sight words, new vocabulary, answers to general knowledge questions, etc.). The child would be prompted to observe a peer engaged in an instructional session with a teacher related to the novel response (e.g., the teacher asks the peer to read sight words). The child should be able to observe the instructional stimuli that the peer sees (e.g., the child should see the sight words). After each correct response demonstrated by the model, the teacher could turn to the child with autism and ask him to repeat what the peer just said or to imitate what the peer just did. When the child responds correctly, the teacher could provide praise and preferred stimuli (e.g., toys, stickers, tokens). Later (e.g., 15 min to a half-hour later), the teacher could test the child on the responses modeled by the peer (e.g., the teacher asks the child to read the sight words) to determine whether he is learning the new responses as a result of observing the peer demonstrate the responses (Taylor et al., 2012). Assessing the response in the absence of the model tests the extent to which the observer has acquired novel responses as a result of observing the model.

Implement general classroom strategies. In addition to teaching the skills individually, teachers can promote the skills during group lessons throughout

the school day (Taylor, 2013). For example, to increase attending of the child with autism toward peers, during a group lesson, the teacher could monitor the child's attention and provide directives to the child to look at peers performing actions. The teacher could present the instructions directly to the child with autism (e.g., by saying, "Billy, look at what Peter is doing") or to the entire group (e.g., by saying, "Everyone look up here"). In addition, to ensure the child with autism is attending to the peer, the teacher might ask the child to recall or name actions performed by the peer immediately after the peer performs the response. For example, if a peer is called to the front of the room to complete a math problem, the teacher could ask the child with autism to say what the peer did (e.g., by saying, "Billy, what problem did Peter just complete?").

To encourage imitation of peer responses, if the child is unable to answer a question correctly, the teacher should call on a peer to model the correct answer, reinforce the peer, and then call on the child again to see whether he imitates the correct response of the peer. In addition, to encourage the child with autism to attend to the consequences provided to the peer, teachers should be explicit when providing consequences to the peer's response (e.g., when the peer is correct, say, "You are right! The capital of New York is Albany" and when the peer is incorrect, say, "No that's not correct. The Capital of New York is not Trenton"). The teacher can then assess whether the child with autism is discriminating the consequences by asking the child if the peer was correct or not. To promote generalization, the teacher could implement these strategies with a variety of lesson types and instructional stimuli.

Learning by observing others is an essential skill, but one that may not come so easily for children with autism. Behavior-analytic explanations of observational learning provide a framework for experimental evaluation of the mechanisms associated with observational learning (Deguchi, 1984; Masia & Chase, 1997) and for the remediation of observational learning deficits in individuals with severe developmental disabilities, such as autism (Greer et al., 2006; Taylor et al., 2012). If we are to increase the learning opportunities of children with autism in typical learning environments, clinical practice must incorporate learning objectives and instructional strategies to develop the skills necessary to learn by observation. More research is certainly necessary to identify all of the responses required for observational learning as well as efficient methodologies. Nevertheless, an emerging body of literature is available that outlines strategies to improve the observational learning skills of children with autism. By improving such skills, we will undoubtedly enhance the educational and social opportunities for children with autism.

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