

## Does teaching an omnibus mand preclude the development of specifying mands?

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When problem behavior is controlled by a synthesized reinforcement contingency, a simple omnibus mand that yields access to all reinforcers simultaneously has been shown to effectively replace problem behavior. The question arises as to whether teaching an omnibus mand will preclude the acquisition of specifying mands for each of the combined reinforcers. In this study, after 3 students diagnosed with autism acquired an omnibus mand (“My way, please”) that yielded all identified reinforcers simultaneously, specifying mands (e.g., “All done,” “May I have my toys?” “Play with me”) were taught to yield each individual reinforcer (e.g., escape, tangibles, attention). Problem behavior was immediately eliminated for all children, and the omnibus mand was acquired quickly. Teaching an omnibus mand did not preclude acquisition of specifying mands for any learner and instead allowed for the acquisition of specifying mands once problem behavior had been effectively reduced.

*Key words:* functional analysis, functional communication training, omnibus mand, problem behavior, shaping, synthesized contingency

When treating problem behavior of individuals diagnosed with a developmental disability, better initial effects are reported when a functional analysis (FA) informs behavioral intervention (Campbell, 2003; Herzinger & Campbell, 2007; Iwata et al., 1994). From FAs, problem behavior has been demonstrated to be controlled by single reinforcement contingencies and/or multiple reinforcement contingencies. A single reinforcement contingency suggests problem behavior is sensitive to an isolated reinforcement contingency (e.g., escape

from demands; Lalli et al., 1995). When problem behavior is shown to be controlled by multiple reinforcement contingencies, problem behavior may be sensitive to several isolated reinforcers (e.g., escape from demands as well as access to tangibles; Volkert et al., 2009) and/or a combination of reinforcers, also referred to as a synthesized reinforcement contingency (e.g., access to tangibles *and* attention; Hanley et al., 2014; escape from demands *to* tangibles; Taylor et al., 2018). Problem behavior is often suggested to be sensitive to multiple and/or synthesized reinforcement contingencies when an FA shows problem behavior to occur at differentially higher rates in several isolated reinforcement conditions or when problem behavior occurs at differentially higher rates when reinforcers are combined.

Comprehensive reviews of the FA literature have shown that published demonstrations of

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control by multiple (Beavers et al., 2013; Hanley et al., 2003) and synthesized reinforcement contingencies (SRC; Slaton & Hanley, 2018) have increased in recent years. Although the trend in published analyses showing sensitivity to SRCs sharply increased in 2014, control by SRCs was described by the authors of at least 120 published FAs, and evident, but not described, in others since 1997 (Slaton & Hanley, 2018). The extent to which the contingency influencing problem behavior consists of synthesized reinforcers has important implications for treatment. Each reinforcer included in the SRC may be more valuable when combined together or they may *only* be reinforcing when combined together (Hanley et al., 2014). If the latter is the case, then synthesizing reinforcers is imperative to treatment.

Functional communication training (FCT) is a regularly used treatment following analyses showing control by social or socially mediated reinforcement (Heath et al., 2015; Kurtz et al., 2011; Tiger et al., 2008) and involves teaching a socially acceptable response referred to often as a functional communication response (FCR). When an FA suggests problem behavior is maintained by a single reinforcer, a single response is taught to access that particular reinforcer (or a proxy of that reinforcer, such as a different type of attention or edible reinforcer). This response commonly specifies the reinforcer, presumably to increase the odds of reinforcement from others (Durand, 1999; Durand & Carr, 1991, 1992). Problem behavior may, however, be controlled by multiple reinforcers (Falcomata, Muething, et al., 2013; Lalli & Casey, 1996) or by an SRC (Hanley et al., 2014; Santiago et al., 2016; Slaton et al., 2017).

Outcomes of studies showing control by multiple reinforcers or SRCs present different ways to implement FCT, somewhat complicating an otherwise straightforward process of differential reinforcement. It is often unclear if FCRs were taught simultaneously or in separate

sessions when problem behavior is multiply controlled (Asmus et al., 2004; Volkert et al., 2009). Sometimes, it appears that different FCRs were taught for each reinforcer in separate sessions. For instance, Austin and Tiger (2015) taught a 13-year-old boy to say, "Excuse me" in *attention sessions* and "May I have the Xbox?" in *tangible sessions* but steps to integrate FCRs in a single context, an inevitable circumstance under which FCT will need to be implemented, were not described.

When several reinforcers are needed to fulfill the reinforcement contingency maintaining problem behavior, one method of implementing FCT involves teaching an omnibus mand (Falcomata, Muething, et al., 2013; Hanley et al., 2014; Jessel et al., 2018; Santiago et al., 2016). An omnibus mand is a response under control of two or more specific evocative events and is simultaneously reinforced by two or more reinforcers functionally linked to the evocative events. Whereas a mand is evoked by a particular establishing operation (EO), specifies an action to be taken by the listener, and is satisfied when a particular reinforcer is delivered; an omnibus mand is strengthened by interacting EOs, more vaguely implies actions to be taken by the listener, and is satisfied when particular reinforcers are delivered together. For instance, Hanley et al. (2014) taught one participant (i.e., Dale) to say "My way, please" which produced termination of homework, preferred activities, and compliance with mands. Similarly, Saini et al. (2018) taught two participants (i.e., Zack and Sarah) to touch a card that produced escape from parental demands and access to tangibles; Sarah's caregivers also watched the iPad with her.

Teaching an omnibus mand is consistent with the general practice in FCT of relying on a low-effort response, especially in the beginning of FCT (Tiger et al., 2008). Low-effort FCRs are often taught because they have been found to be associated with sooner and greater reductions in problem behavior compared to

high-effort FCRs (Buckley & Newchok, 2005; Horner & Day, 1991; Richman et al., 2001). An omnibus mand, therefore, is a low-effort response that produces simultaneous delivery of several reinforcers and stands in contrast to an approach that would require emission of several mands.

Potential shortcomings of teaching an omnibus mand are that novel listeners may not be able to deliver the reinforcers due to its formal lack of specificity (e.g., “My way”) and that teaching an omnibus mand initially may preclude the development of mands for individual reinforcers, henceforth referred to as “specifying mands.” Sundberg and Partington (1998) and Barbera (2007, pg. 74) have recommended against teaching general mands (e.g., “more” and “please”) early in communication training because these responses are not likely taught under evocative control and, therefore, are less likely to produce the desired reinforcer. Further, teaching specifying mands later in treatment may be problematic due to initial responses eventually being placed on extinction (Sundberg & Partington, 1998). If an omnibus mand is taught at the beginning of treatment, attempts to teach specifying mands may be unsuccessful because the relevant EOs for evoking new communication responses have been obviated in a manner similar to rich schedules of noncontingent reinforcement precluding the development of communication responses (Fritz et al., 2017; Goh et al., 2000; Marcus & Vollmer, 1996). Furthermore, the reimposition of the specific EOs to teach specifying mands after an omnibus mand has been acquired may still evoke undesirable levels of problem behavior; the issue teaching an omnibus mand is supposed to address.

Researchers have occasionally reported forgoing omnibus mand training and teaching specifying mands initially (Falcomata, Wacker, et al., 2013; Ghaemmaghami et al., 2016). Although specifying mands may be advantageous for communicating to naïve listeners

(Durand, 1999) and may be considered more socially acceptable than an omnibus mand, in efforts to teach specifying mands, problem behavior may persist (Falcomata, Wacker et al., 2013; Ghaemmaghami et al., 2016). Practitioners may benefit from a systematic process for moving from an omnibus mand to specifying mands when an SRC is shown to control problem behavior.

In the current study, we first sought to replicate existing research by teaching an omnibus mand following an analysis showing problem behavior controlled by an SRC. This same literature was then extended by evaluating whether the strengthening of an omnibus mand precludes or allows for the development of specifying mands.

## Method

### Participants and Setting

Three children who attended a behavior analytic school for individuals with developmental disabilities served as participants. Participants were recruited by emails sent out to clinical teams in the school searching for students who engaged in problem behavior and who would benefit from FCT. Open-ended interviews (Hanley, 2012) were administered to two teachers of each participant. Each participant was reported to engage in repertoires of problem behavior (e.g., crying, property destruction, aggression, screaming, self-injurious behavior) to access a variety of reinforcers (e.g., escape from demands *to* social attention, escape from demands *to* tangibles and social attention). Functional analyses designed from the open-ended interviews (i.e., Interview Informed Synthesized Contingency Analysis, IISCA) identified problem behavior controlled by at least two reinforcers for all participants. Aggregated IISCA results for participants Raj and Cole are reported in Warner et al. (2019). A second-by-second within-session analysis of the IISCA, along with consumption of each

reinforcer included in the SRC, can be found for all participants in supporting information.

Raj was a 5-year-old boy diagnosed with ASD, who resided at home and attended a specialized behavior analytic day program. He had a history of engaging in severe problem behavior in the home and school. The interview revealed that he engaged in aggression, self-injurious behavior, and disruptive behavior when teachers (a) terminated access to preferred items, (b) did not provide preferred forms of social attention or comply with his mands to play in specific ways, and (c) presented academic work. See Table 1 for specific topographies of problem behavior and specific forms of reinforcers. Raj communicated using a combination of one-word phrases and sounds, modified sign language, and a speech-generating device (SGD). Following the open-ended interview, an IISCA was conducted. Sessions were 5 min long. During the control condition, Raj had access to preferred items, the therapist provided social attention or played with Raj in the way that he requested, and no work was presented. In the test condition, the therapist removed preferred items, discontinued playing with Raj or honoring his mands, and presented academic work. Contingent on any instance of problem behavior, the therapist stopped providing verbal instructions and removed academic stimuli, provided access to preferred items, and provided social attention based upon any bids or mands to play (i.e., provided the SRC) for approximately 30 s. The results of the IISCA showed elevated rates of problem behavior in the test condition and zero problem behavior in the control condition suggesting that Raj's problem behavior was controlled by the synthesis of escape from demands to access both preferred tangibles and social attention. Following the IISCA, Raj participated in a progressive extinction analysis in which each distinct topography of problem behavior was sequentially placed on extinction; this analysis showed that his different topographies of problem

behavior (those reported to co-occur in the same situation) were controlled by the same SRC (Warner et al., 2019).

Cole was an 8-year-old boy diagnosed with ASD, who resided at home and attended a specialized behavior analytic day program due to a history of engaging in severe problem behavior that included aggression, self-injurious behavior, disruptive behavior, as well as whining, complaining, and disruptive vocalizations. Cole was reported to engage in problem behavior when adults (a) terminated access to preferred items, (b) did not comply with his mands, and (c) presented academic work. See Table 1 for specific topographies of problem behavior and specific forms of reinforcers. Cole communicated vocally and used full sentences. Similar to Raj, an IISCA was conducted. During the control condition, Cole had access to preferred items, the therapist honored any mands, and no work was presented. In the test condition, the therapist removed preferred items, ignored any mands for therapist compliance, and presented academic work. Contingent on problem behavior, the therapist removed the work, provided access to preferred items, and complied with any mands. IISCA results suggested that Cole's problem behavior was controlled by the synthesis of escape from demands to access both tangibles and adult compliance with mands. A progressive extinction analysis was repeated for Cole and the same outcomes were obtained in that all reported topographies of problem behavior were shown to be sensitive to the same SRC (Warner et al., 2019).

Lee was a 10-year-old boy diagnosed with ASD, who attended the same specialized school but lived in a residential setting due to a history of engaging in severe problem behavior that included aggression, self-injurious behavior, and high-pitched whining and crying. Lee was reported to engage in problem behavior when (a) preferred items or snacks were denied, and (b) when he was asked to do daily living tasks

Table 1

*Participants' Topographies of Problem Behavior and Communication Modalities*

Participant	Problem Behavior	Communication Modality	Specific Forms of Reinforcers
Raj	Hitting, kicking, and biting others; stomping, flopping, screaming, and crying; head-to-object self-injury, tailbone drops to the floor	Modified sign language, 1- and 2-word approximations, and SGD device	Escape from demands (e.g., identifying attributes on flashcards, sorting tasks, stretching demands); access to tangibles (e.g., movies, trains, figurines, books, shopping cart, exercise ball); access to social attention (e.g., hugs, tickles, making faces) and adult compliance to play in particular ways (receiving piggy-back rides, playing trains with the therapist, playing catch)
Cole	Whining, complaining, swearing, screaming, threatening teachers; hitting, kicking, biting, slapping, pinching, hair-pulling, charging, and pushing others; hand-to-head and head-to-object self-injury; surface banging, throwing materials	Vocal-verbal	Escape from demands (e.g., academic work, problem-solving tasks, math worksheets, reading comprehension); access to tangibles (e.g., iPad, Legos, pictures); access to adult compliance with mands (e.g., coloring in specific ways, changing body position, standing in specific locations)
Lee	Whining, crying; biting, grabbing, and hitting others; stomping on his own feet, hand-to-head and head-to-object self-injury	SGD device	Escape from demands while the therapist's attention is diverted (e.g., packing a backpack independently, putting on socks and shoes, waiting while the therapist attended to something else); access to tangibles (Kindle, bubbles, and snacks); access to attention (e.g., therapist's orientation directed towards Lee)

*Note.* SGD = speech-generating device (iPad with TouchChat).

by himself. See Table 1 for specific topographies of problem behavior and specific forms of reinforcers. Lee was nonvocal and communicated by pointing (or guiding his teachers to the things that he wanted) and by using a SGD. An IISCA was also conducted with Lee. During the control condition, Lee had access to preferred items, the therapist remained oriented towards him, and no demands were presented. In the test condition, the therapist removed preferred items, presented a demand to complete daily living tasks, and diverted attention. Contingent on problem behavior, the therapist oriented towards Lee, stopped providing verbal instructions and

removed any instructional materials, and provided access to preferred items. Results of the IISCA suggested that Lee's problem behavior was controlled by the synthesis of escape from demands in which his teacher's attention was diverted to access both preferred tangibles and therapist orientation.

IISCA, baseline, and FCT sessions were conducted in treatment rooms at the school. Each therapy room contained a small table, chairs, toys and academic materials, and audio/video equipment. Sessions were conducted 3 to 4 days a week, three to five times per day, and lasted approximately 5 min each.

## Measurement and Interobserver Agreement (IOA)

*Problem behavior* included all topographies that were reported by caregivers in the open-ended interview to co-occur in the same situation and those included as target responses in the IISCA (see Table 1). Problem behavior, omnibus mands, initiating responses, and specifying mands were measured across all conditions of the treatment analysis. Only independent communicative responses, those not preceded by a prompt, are reported. Communicative responses were considered prompted if the therapist provided a physical (Raj), vocal (Raj and Cole), or gestural (Lee) prompt within 5 s prior to the participant emitting the target response. The *omnibus mand* for Raj was defined as Raj emitting a modified sign that consisted of him pointing both thumbs towards his chest or emitting a vocal approximation of the phrase "My way;" the *omnibus mand* for Cole was defined as vocal emission of the phrase "My way please;" the *omnibus mand* for Lee was defined as Lee pressing a button on his SGD that output the phrase "My way." The *initiating response* entailed independently obtaining the therapist's attention (i.e., initiating an interaction) prior to emission of a mand.<sup>1</sup> The initiating response was defined as Raj tapping the therapist on the shoulder, Cole saying, "Excuse me," and Lee pressing a button on his SGD that output the phrase "Excuse me." *Specifying mands* were defined as independent mands for each putative reinforcer identified in the IISCA and were individualized for each participant. Specifying mands for Raj included the phrase "all done" (Raj placing one palm over the top of the other hand and moving his hands away from one another or a verbal approximation of the words "all done"), "stuff" (Raj placing an upward facing palm in front of his torso and moving his palm away

from his body, or Raj placing his hand, with the palm facing up, on top of the table and sliding his hand away from his body, or Raj emitting a verbal approximation of "stuff"), and "play with me" (Raj shaking both fists in front of his chest or a verbal approximation of the word "play"). Specifying mands for Cole were defined as an independent emission of the vocal response "I want to stop working," "I want \_\_\_ (present item/activity)," and requests for mand compliance (e.g., "Please stop talking," "Come watch this with me," "Stand over there"). Specifying mands for Lee were defined as Lee pressing a button on his SGD to output the mands: "I want to take a break," "Can we hang out?" "I want bubbles," "Can I have my Kindle?" and "I want a snack." IOA was assessed by having a second observer independently collect data on all targets during at least 20% of all sessions (range, 20%-50%), across all conditions, for each participant. Agreement was calculated by dividing sessions into 10-s intervals and dividing the number of agreements per 10-s interval by the number of disagreements plus agreements per 10-s interval, taking the average across intervals, and multiplying by 100. IOA, across all participants for all responses, averaged 98% (range, 81%-100%).

## Experimental Designs

A multiple baseline design across specifying mands for different classes of reinforcement was used for each participant to evaluate whether the teaching procedures were responsible for the acquisition of specifying mands.

## Procedures

### Baseline

Baseline sessions for Raj and Cole were the last three test sessions of the progressive extinction analysis described in Warner et al. (2019) and identical to the test sessions of the IISCA. One additional test session was conducted with Raj with a new therapist (the first author of this

<sup>1</sup>The initiating response is similar to a call mand (Skinner, 1956, pg. 40).

paper). Baseline sessions for Lee were the test sessions from his IISCA.

**General Functional Communication Training**

Participants were first taught an omnibus mand to access all reinforcers identified in the IISCA via prompting and differential reinforcement under progressively evocative conditions (see Table 2 for Raj, Table 3 for Cole, Table 4 for Lee). Following acquisition of the omnibus

mand, participants were taught an initiating response to recruit the attention of the therapist prior to emission of additional mands. Last, specifying mands were taught sequentially for each reinforcer included in the SRC. Sessions consisted of repeated presentations of the evocative antecedents (or EO) used in baseline sessions; prompted and independent mands resulted in 30 s reinforcement, and problem behavior resulted in the therapist prompting the expected communication response. Physical

**Table 2**

*Description of Functional Communication Responses (FCR) and Evocative Context Presentations Used Throughout Functional Communication Repertoire Shaping with Raj*

Level	FCR Criterion Changes	FCR forms	Progressive Changes to the Establishing Operation Condition
1	A vocal approximation or modified sign of omnibus mand	"My way."	Therapist turned toward client and/or reached toward preferred toys.
2			+ Therapist made contact with toys, stopped complying with mands, and simultaneously presented a vocal demand (e.g., "Time to go to the table.").
3			+ Therapist removed preferred toys from child.
4	Initiating response: tapping the therapist on the shoulder and pausing for eye contact.	"Excuse me, (pause for acknowledgement), my way."	+ Therapist diverted attention for 1-2 s; attention was diverted by the therapist walking towards the table where work would be presented with child traveling to the table.
5			+ Therapist withheld preferred attention for 3-5 s and presented a work task with child sitting at the table.
6			+ Therapist withheld preferred attention for additional 2-4 s and presented work task materials. After the child emitted the omnibus mand, the therapist asked "Sure, what do you want?"
7	A vocal approximation or modified sign of 2 specific reinforcers	"Excuse me," (wait for acknowledgment) "all done," "stuff"	+ Following delivery of the first specific reinforcer, therapist asked "What else do you want?"
8			
Final	A vocal approximation or modified sign of 3 specific reinforcers	"Excuse me," (wait for acknowledgment) "all done," "stuff," "play with me." "Excuse me," (wait for acknowledgment) "all done," "stuff," "play with me."	Therapist removed preferred toys from child, did not comply with mands, withheld preferred attention, and presented a work task at the table.

*Note.* Reinforcement was not provided unless target FCR form occurred after the entire establishing operation condition was presented.

**Table 3**

*Description of Functional Communication Responses (FCR) and Evocative Context Presentations Used Throughout Functional Communication Repertoire Shaping with Cole*

Level	FCR Criterion Changes	FCR forms	Progressive Changes to the Establishing Operation Condition
1	A vocal request	<i>"My way, please."</i>	Therapist moved toward client and/or reached toward preferred toys and simultaneously presented a vocal demand (e.g., <i>"Alright, time to clean up."</i> ).
2	A vocal request with eye contact, with prompter*		
3	A vocal request with eye contact, without prompter		+ Therapist politely interrupted activities.**
4	Autoclitic frame with eye contact	<i>"May I have my way please?"</i>	
5			+ Therapist made contact with 1 preferred toy that the child was not engaged with and waited momentarily to make eye contact with child.
6	Initiating response	<i>"Excuse me, may I have my way please?"</i>	
7			+ Therapist picked up preferred toys that the child was not engaged with.
8	Child paused current activity before emitting the omnibus mand.	<i>"Excuse me," (pause video/iPad) "may I have my way, please?"</i>	
9	Child paused current activity and put their hands on the table before emitting the omnibus mand.	<i>"Excuse me," (pause video/iPad and put hands on table) "may I have my way, please?"</i>	
10			+ Therapist removed all toys, including toys the child was engaged with. If the child was playing on the floor, they were required to sit at the desk.
11			+ Therapist presented a demand with work materials at the desk.
12	A vocal request of first specific reinforcer	<i>"Excuse me," (wait for acknowledgment with hands on table) "I want my way." "I want to stop working."</i>	+ After the child emitted the omnibus mand, the therapist asked, <i>"Sure, what would you like?"</i>
13	A vocal request of 2 specific reinforcers	<i>"Excuse me," (wait for acknowledgment with hands on table) "I want my way." "I want to stop working." "I want my ____ (present item/activity)."</i>	+ Following delivery of the first specific reinforcer, therapist asked <i>"anything else?"</i>
14			+ Therapist presented a stimulus to the child following the first <i>"Excuse me"</i> response to signal not repeating the initiating response.
Final		<i>"Excuse me," (wait for acknowledgment with hands on table) "I want my way." "I want to stop working." "I want my ____ (present item/activity)."</i>	Therapist removed all preferred toys/items from the child, required the child to sit at the table, and presented a work demand with materials. Therapist acknowledged the child after a single request for attention. Following emission of the omnibus mand, the therapist asked <i>"Sure, what would you like?"</i> .

*Note.* Reinforcement was not provided unless target FCR form occurred after the entire establishing operation condition was presented.

\* A second prompter was used for step 2 to prompt eye contact.

\*\* At step 3, the therapist interrupted iPad game or video at a natural stopping point. For example, the therapist allowed the child to finish the step of a game or waited until the end of a favorite scene before interrupting.



**Table 4**  
*Description of Functional Communication Responses (FCR) and Evocative Context Presentations Used Throughout Functional Communication Repertoire Shaping with Lee*

Level	FCR Criterion Changes	FCR forms	Progressive Changes to the Establishing Operation Condition
1	Omnibus mand using SGD device	"My way."	Therapist removed preferred items, cued child to sit at table and complete demand, and diverted attention for 3-5 s.
2	Omnibus mand with eye contact		+Therapist diverted attention for 5-7 s.
3	Initiating response	"Excuse me, my way."	+Therapist diverted attention for 7-10 s and waited briefly before making eye contact with the child following the initiating response.
4	Pausing for acknowledgment with hands folded before emitting the omnibus mand *SGD device set up with an additional page.	"Excuse me," (pause for acknowledgement with hands folded) "my way."	
5	Specific FCR for escape or attention using SGD device	"I want to take a break" or "Can we hang out?"	
6	Specific requests for reinforcers following a break request using SGD device	"I want bubbles." "I want a snack." "Can I have my Kindle?"	+Following a request for a break, the therapist asked, "What else do you want?"
Final		"Excuse me," (waits for acknowledgement with hands folded) "I want a break." "I want bubbles." "I want a snack." "Can I have my Kindle?" "I want to hang out."	Therapist presented a work demand, diverted attention for 7-10 s, and waited briefly before making eye contact with the child following an initiating response.

*Note.* Reinforcement was not provided unless target FCR form occurred after the entire establishing operation condition was presented.  
\* Lee's SGD device was modified at Step 4 to include a page for the initiating response. For example, after pressing the "Excuse me" icon, a second page would open with specific reinforcers.

(Raj), vocal (Raj and Cole), and gestural (Lee) prompts were used to teach all communicative responses and were individualized for each participant based on the communication responses being taught. All prompts were faded using a 2-s delay prompting procedure. Prompts were provided immediately for all participants for two consecutive sessions. Following two consecutive sessions without problem behavior and zero errors emitting the target communicative response (e.g., omnibus mand) in at least 80% of EO condition presentations within a session, a 2-s delay was inserted following presentation of the EO; if the participant did not emit the mand within 2 s, the therapist prompted the

response. Prompting was discontinued when the target response being taught occurred independently in at least 80% of EO presentations within a session and in the absence of problem behavior.  
Communicative responses were reinforced under progressively evocative conditions as described by Ghaemmaghami et al. (2018) and depicted as levels in Table 2 (Raj), Table 3 (Cole), and Table 4 (Lee). Evocative conditions (i.e., EOs) were gradually changed to emulate the contexts that caregivers reported evoked problem behavior in the natural setting and, therefore, became more challenging by including an increasing number of evocative elements.

For example, at the beginning of FCT the first EO level may have included interruption, but not removal, of a preferred activity and a demand to do work ("Let's head to the table"; "We've got to do some work"); the EO condition in the beginning of FCT was less evocative than that experienced in the IISCA. At the terminal level of FCT, the EO condition may have included the removal of the preferred activity and a demand to do work *with* the presentation of academic stimuli; the EO condition was equal to or more evocative than that experienced in the IISCA. Instructional levels included a gradual progression of shaping steps in an effort to maintain low rates of problem behavior while the instructional context, and communication expectations, became more challenging. Criteria to increase levels was at least two consecutive sessions with zero problem behavior and a minimum of 80% accurate emission of the communicative response within that shaping level.

### **Individualized Mand Training Procedures**

#### ***Raj***

Raj was taught a manual sign and vocal response for all communicative responses. Following acquisition of the omnibus mand and the initiating response, three specifying mands were taught sequentially (Table 2) using procedures similar to Ghaemmaghami et al. (2016). That is, a specifying mand for escape was taught first. Following emission of the omnibus mand, the therapist said, "Sure you can have 'My way,' what do you want?" and then prompted Raj to emit the mand "all done." Emission of the mand "all done" resulted in removal of demands and presentation of all reinforcers for which specifying mands had not yet been taught (tangibles and social attention; i.e., "all done" served as an omnibus mand). Following acquisition of the mand "all done," the specifying mand "stuff" was taught. Specifically, after Raj emitted the mand "all done,"

the therapist said, "What else do you want?" or "Do you want anything else?" and then prompted the mand "stuff." The mand "stuff" resulted in delivery of tangibles and the mand "all done" resulted in removal of demands; social attention and compliance with any requests to play were provided in the absence of a mand. Last, Raj was taught the mand "play with me" which resulted in preferred attention from the therapist and compliance with mands to play in specific ways. Mands for escape and tangibles resulted in removal of demands and preferred items, respectively. Once all specifying mands were acquired, additional cues from the therapist (e.g., "What else do you want?") were discontinued. Eight shaping levels were used throughout FCT (see Table 2). At level 6, Raj was no longer required to emit the omnibus mand to produce the SRC; any emission of the omnibus mand resulted in the therapist saying "Sure, what do you want?" or something similar.

Prior to beginning sessions each day, Raj was allowed to select one to three toy items from his classroom to bring to the treatment room, and the therapist selected an additional one to three items that were age-appropriate and commonly available in the classroom. Raj often brought new toys from home and was therefore allowed to bring additional items to treatment sessions based on his preferences for that day. Tangible items that were reported to contribute to problem behavior in the initial interview, and included in baseline sessions, remained consistent throughout FCT (e.g., train tracks, a ball, and character figurines).

#### ***Cole***

Cole was taught vocal-verbal responses for all communicative responses. Following acquisition of the omnibus mand, Cole was taught to include an autoclitic frame, to pause for eye contact following the initiating response, and two specifying mands (see Table 3). Procedures were identical to the those used with Raj;

however, only a verbal prompt was issued by the therapist to teach communicative responses. If Cole brought a novel item into the treatment room (e.g., a new Lego set from home), the therapist would model a prompt for that specific item once at the beginning of the session (e.g., "If you want the Legos, say, 'I want the Legos'"). Fourteen shaping levels were used throughout FCT (see Table 3).

### **Lee**

All communicative responses for Lee were taught on his SGD (i.e., TouchChat on his iPad) using gestural prompts. Following acquisition of the omnibus mand and initiating response, Lee was taught five specifying mands (see Table 4). Following acquisition of the initiating response, Lee's SGD was changed so that the home screen only displayed the initiating response. Pressing the initiating response opened the next page which displayed the buttons "My way," "I want to take a break," and "Can we hang out?" A third page opened following a request to take a break, in which all specifying mands were available on the screen. Tangible items remained constant throughout FCT (Kindle, bubbles, and snacks), unlike Raj and Cole, because Lee's problem behavior was reported to be sensitive to denied access to these specific items. Six shaping levels were used (Table 4). In level 6, when specifying mands for tangibles were taught, the therapist waited for Lee to reach toward a specific tangible item (i.e., bubbles, Kindle, or snacks) and then provided a gestural prompt for that item on his SGD.

### **Conditional Probability Analysis**

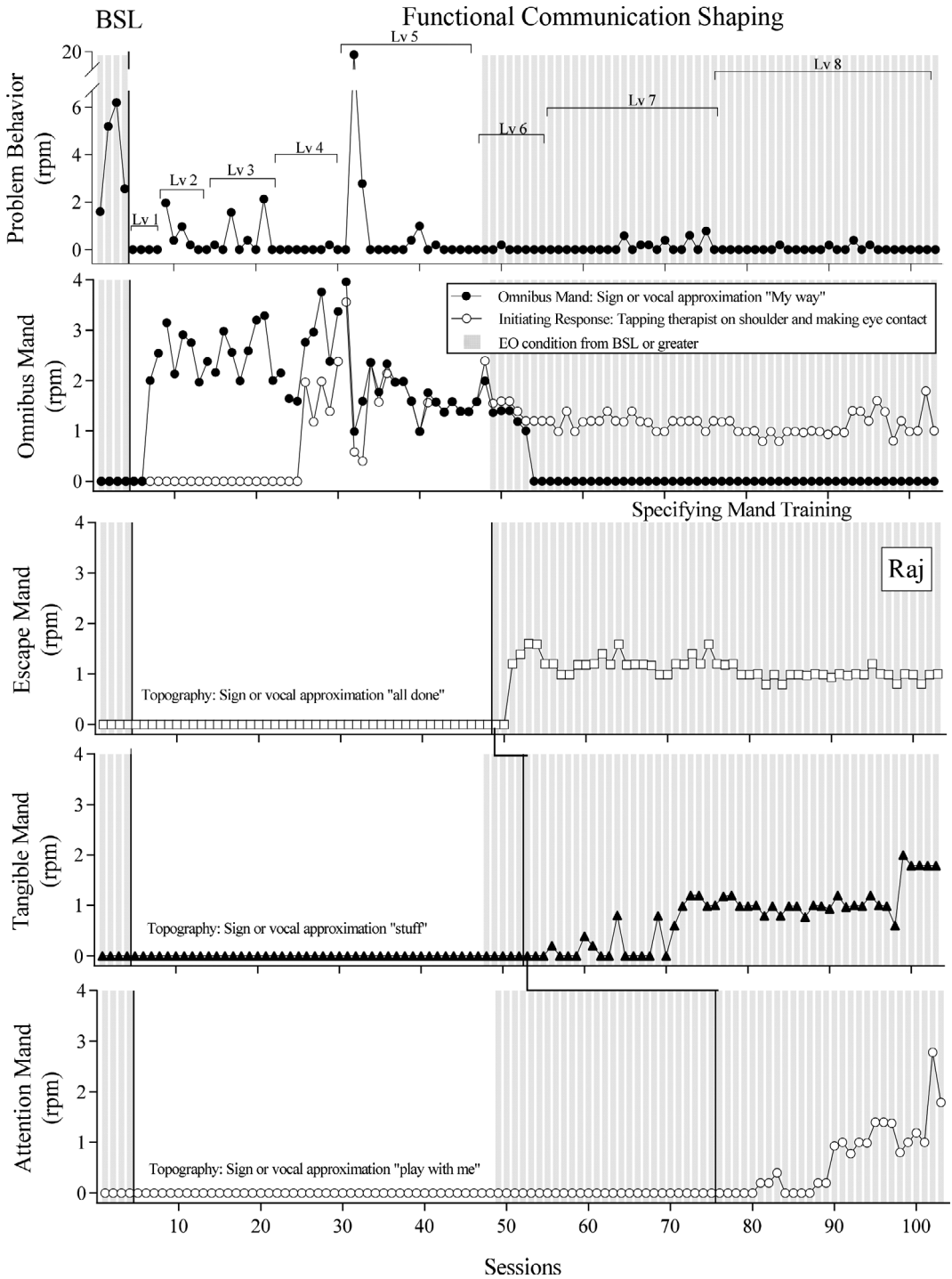
To determine if specifying mands occurred under evocative control, specifying mands were scored as occurring when a corresponding EO was present or absent once specifying mands were acquired and occurring at stable rates for each participant. These data were collected for

Raj starting at session 95, Cole starting at session 105, and Lee starting at session 50. The specifying mand for escape was scored as occurring under evocative control if the mand occurred while demands were being presented. The specifying mand for tangibles was scored as occurring under evocative control if the mand occurred in the absence of the item(s). The specifying mand for attention was scored as occurring under evocative control if the mand occurred in the absence of preferred forms of attention, and the specifying mand for mand compliance was scored as occurring under evocative control if the mand occurred in the absence of the therapist complying with the participant's mand. Specifying mands emitted following the delivery of the specific reinforcer were scored as occurring when the EO was absent. The sum of each specifying mand (e.g., break, tangibles) that occurred with the EO present was divided by the total sum of each specifying mand and calculated into a percentage.

## **Results**

### **Raj**

In baseline, problem behavior occurred at elevated rates and no communicative responses occurred. Introduction of the omnibus mand resulted in an immediate reduction of problem behavior and it was acquired within two sessions (Figure 1; see level 1). The omnibus mand occurred at steady rates, with minimal problem behavior, while the initiating response (tapping the therapist on the shoulder) was acquired (see levels 2-4). Raj acquired all specifying mands (e.g., "all done," "stuff," and "play with me") and problem behavior remained at near zero rates (average 0.07 responses per minute, rpm) while specifying mands were taught (see levels 6-8). Following acquisition of the escape and tangible mands, the omnibus mand declined and decreased to zero at session 54. Increases in shaping levels resulted in minor

**Figure 1***FCT and Shaping Procedure for Raj*

variability in problem behavior, however rates of problem behavior remained below baseline levels, and at near-zero rates, with the exception of one session (session 32) in level 5.

### **Cole**

In baseline, problem behavior occurred at high rates with zero occurrences of the omnibus mand, the initiating response, and specifying mands for tangibles and escape; mands for compliance occurred during one baseline session. Introduction of the omnibus mand led to an immediate reduction of problem behavior and fast acquisition of the omnibus mand (Figure 2; see level 1). Cole acquired an initiating response (e.g., "Excuse me") in level 6 and specifying mands for escape (e.g., "I want to stop working") and tangibles items ["I want the \_\_\_ (present item/activity)"] in levels 12 and 14, respectively. Problem behavior occurred at an average of 0.2 rpm while specifying mands were taught. Cole independently emitted mands for compliance without training (e.g., "Please stop talking," "Come look at this video"); therefore, specifying mands for compliance were not explicitly taught. It should be noted that mands for compliance occurred primarily during reinforcement intervals and were ignored by the therapist if they occurred during the EO condition. Increases in shaping levels resulted in variability in problem behavior throughout FCT and rates of problem behavior higher than baseline at level 2. Following level 2, shaping levels were modified so that changes occurred more subtly throughout the remainder of shaping.

### **Lee**

In baseline, problem behavior occurred at elevated rates and to the exclusion of communicative responses. Introduction of the omnibus mand resulted in an immediate reduction of problem behavior (Figure 3; see level 1), and problem behavior remained at

zero for the remainder of FCR shaping. Lee acquired an initiating response (e.g., "Excuse me") in level 3 and specifying mands for escape (e.g., "I want to take a break") and tangibles (e.g., "I want bubbles," "I want a snack," and "Can I have my Kindle?") in levels 5 and 6, respectively. Lee was taught a specifying mand for attention ("Can we hang out?") in level 5, however this mand was emitted only once (session 54). From sessions 60-72, Lee exclusively requested bubbles following emission of the escape mand. To evaluate if the response was occurring as part of a communicative chain rather than occurring under evocative control, and to evaluate if the other tangibles remained relevant, bubbles were removed from the pool of available items at session 73. The mand for bubbles declined and specifying mands for Kindle and snacks re-emerged; bubbles were returned to the pool of items during the final session. Increases in shaping levels did not result in any variability of problem behavior.

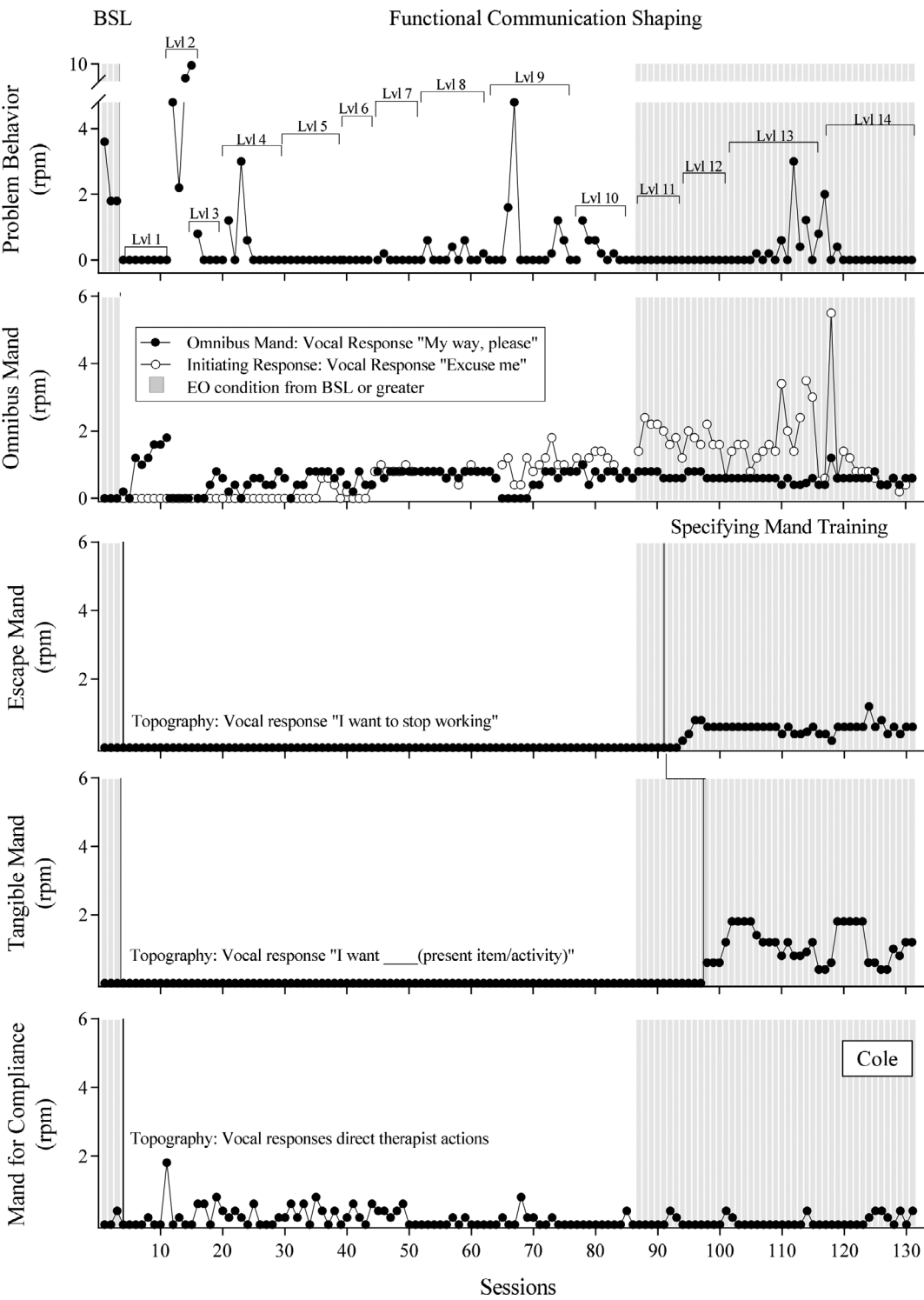
### **Conditional Probability Analysis**

Results of the conditional probability analysis suggests that specifying mands occurred under appropriate establishing events at the conclusion of treatment for all participants (Figure 4). Specifically, Raj emitted mands for escape, tangibles, and attention when the corresponding EO was present in 100%, 71%, and 78% of occurrences, respectively. Cole emitted 100% of specifying mands when the EO was present. Lee emitted mands for escape and the Kindle when the EO was present in 99% and 96% of occurrences, and in 100% of occurrences for bubbles, snacks, and attention.

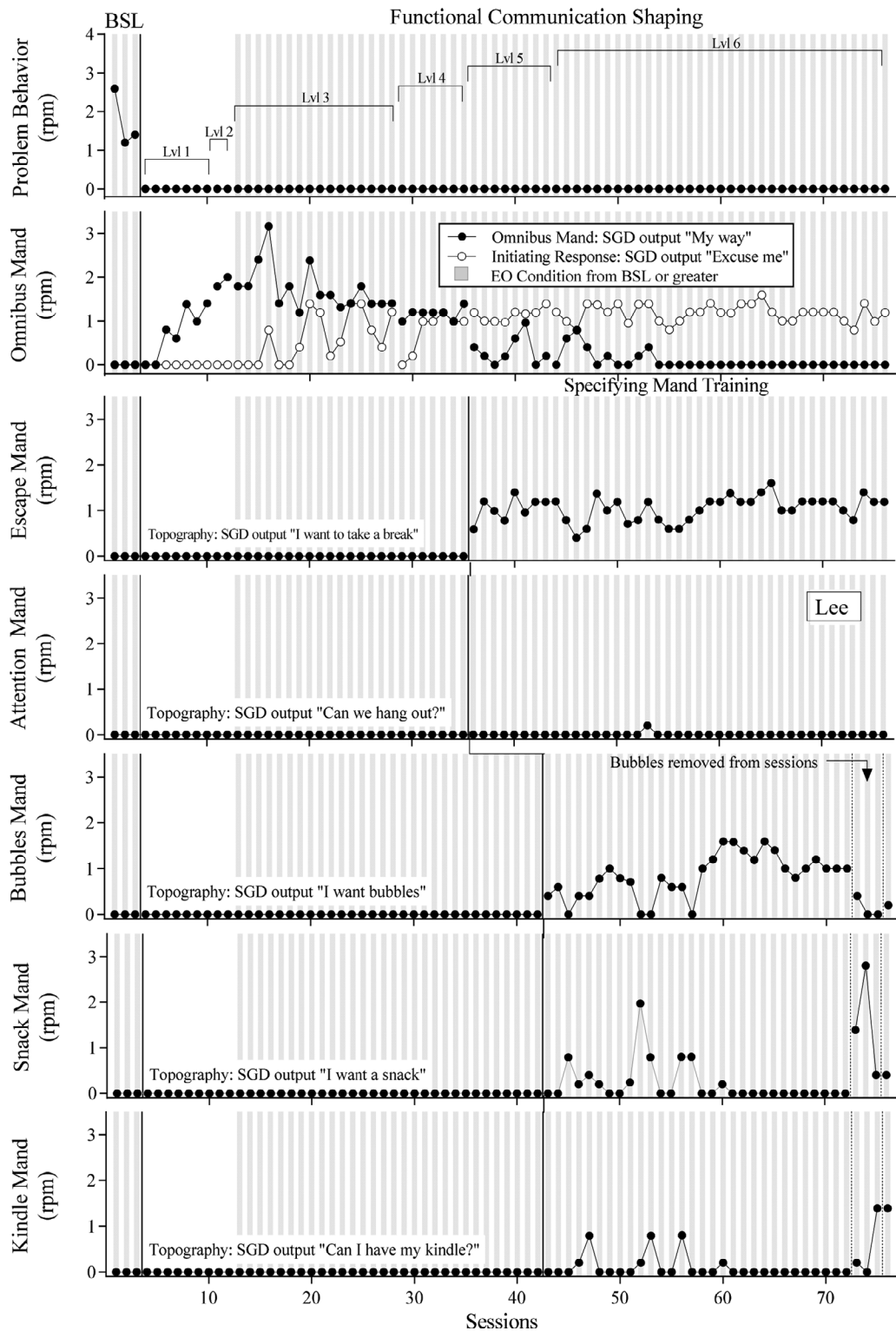
### **Discussion**

An omnibus mand was acquired quickly and problem behavior immediately reduced to zero

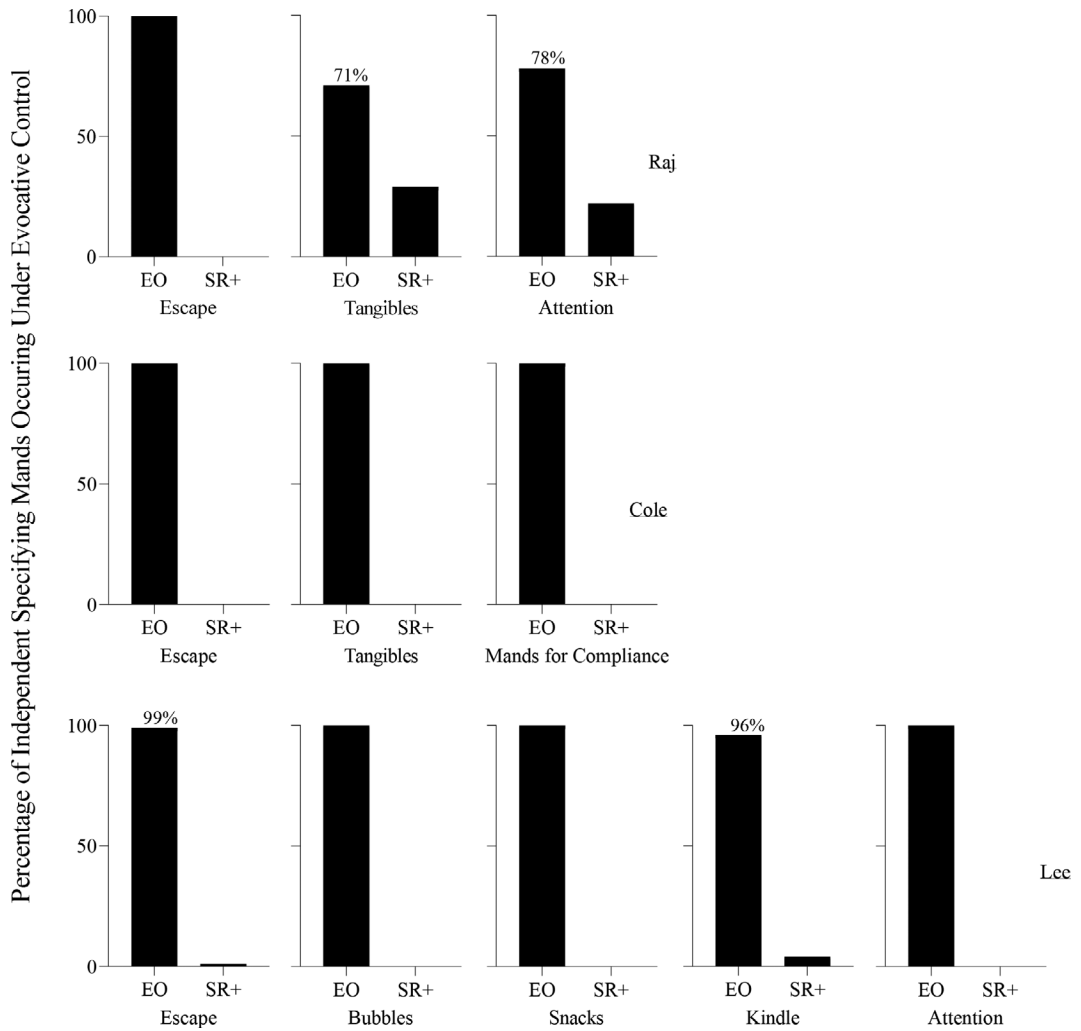
**Figure 2**  
*FCT and Shaping Procedure for Cole*



**Figure 3**  
*FCT and Shaping Procedure for Lee*



*Note.* Bubbles were removed from sessions 72-75, indicated by the dotted phase line.

**Figure 4***Conditional Probability Analysis for Raj, Cole, and Lee*

for all three participants. These fast effects are comparable to those reported by others who have taught an omnibus mand when problem behavior was controlled by an SRC (e.g., Hanley et al., 2014; Taylor et al., 2018). Specifying mands for putative reinforcers included in the SRC were then acquired by all participants, providing preliminary evidence that teaching an omnibus mand does not preclude the acquisition of specifying mands (nor

deter emission of specifying mands already in one participant's repertoire; see Cole). Whether to teach an omnibus mand or specifying mands following analyses suggesting control by more than one reinforcer does not seem to be an important question. Rather, it appears that both may be important to teach, with order of omnibus mand first followed by specifying or complex mands (Ghaemmaghami et al., 2018) when treating problem behavior.



Rather than attempting to teach specifying mands for each reinforcer at the initial stage of FCT, practitioners may opt for teaching an omnibus mand due to the speed with which problem behavior is eliminated. These findings are consistent with those of Slaton et al. (2017), who found that teaching an omnibus mand was effective in reducing problem behavior in all applications following synthesized analyses compared to applications when only a single FCR was taught and problem behavior reduced in only half of applications. Once problem behavior is eliminated, practitioners can then go on to teach robust communicative repertoires (see Sundberg & Partington, 1998, and Barbera, 2007, for specific recommendations).

Problem behavior may have remained near-zero in the current study because of the progressive shaping procedure used to teach communicative responses. The current study replicated the systematic shaping procedure used by Ghaemmaghami et al. (2018) to increase complexity of communication. The EO conditions were also progressively increased to emulate the problematic contexts reported by caregivers and expose participants to minor delays to reinforcement. The initial shaping step was determined by observing the temporal and qualitative features of the programmed EO condition that evoked problem behavior in the FA. For example, the latency to problem behavior was approximately 7 s during Raj's FA with three qualitative features present (e.g., toys were removed from Raj's hands, preferred attention was terminated, and a demand to go to the table was presented); the initial shaping step was designed so that the EO condition lasted approximately 3 s with only two qualitative features present (the therapist reached towards preferred items and signaled Raj to the table). These tactics probably allow for the FCR to be acquired in the absence of problem behavior (e.g., Fisher et al., 2018), but future research might better describe and compare different tactics for informing shaping steps when

complex communication repertoires are to be developed.

Teaching an omnibus mand is not necessary for all children with an intellectual disability or ASD for whom mand training is relevant (Partington, 2010; Sundberg & Partington 1998). An omnibus mand is probably unnecessary if problem behavior is not a concern or if an FA does not reveal sensitivity to an SRC. Under these conditions, beginning the mand development process with specifying mands probably holds advantage. Furthermore, when problem behavior appears to be maintained by several reinforcers *within* a single generic class of reinforcement, such as tangibles, forgoing the omnibus mand and teaching specifying mands (for various tangibles) has been shown efficacious (Rose & Beaulieu, 2019) and is likely more efficient than teaching an omnibus mand first.

Specifying mands are important because they are more precise forms of communication capable of specifying momentarily valuable objects, events, and interactions (Hanley et al., 1997; Kahng et al., 2000), especially to naïve listeners (Durand, 1999; Durand & Carr, 1991). EOs fluctuate, especially when function-based treatments are implemented over extended periods of time; several reinforcers may be valuable at certain times (see also the relevant concept of complementary reinforcers; e.g., Hursh, 1978) and only one or some potentiated at other times. Variable consumption of reinforcers during a synthesized analysis may help determine the importance of teaching specifying mands sooner or later in the progressive development of skill-based repertoires (Hanley et al., 2014). If reinforcer consumption varies considerably, then teaching specifying mands prior to development of toleration skills and contextually appropriate behavior seems important. By contrast, if consumption of reinforcers varies minimally (e.g., the client consumes escape and iPad exclusively), then teaching an omnibus mand is likely sufficient and specifying mands can be taught later in treatment.

When teaching several specifying mands, it is important they occur under evocative control and not as part of a communicative chain in which responses simply occur in succession. Participants in the current study emitted specifying mands at variable rates within sessions and throughout FCT, aside from a few sessions with Lee.<sup>2</sup> For example, Raj sometimes requested a break and attention, sometimes requested a break and toys, and sometimes requested a break with toys *and* attention. Visual inspection of the data for specifying mands may provide one way to evaluate if mands occurred as part of a chain. If mands occurred simply as part of a chain, one might expect emission of all communicative responses, in succession, on each opportunity; there would be little variability in the data and all mands would occur at the same rate. By contrast, variability in specifying mands suggests that mands may have occurred not as part of a communicative chain but possibly under evocative control. Additionally, the omnibus mand decreased to zero for Raj and Lee without explicit programming. These findings suggest that mands may have occurred under the appropriate EOs.

The conditional probability data, however, provide better evidence that specifying mands occurred under evocative control (Figure 4). Raj occasionally emitted mands for attention and tangibles when the EO was programmed to be absent. For example, Raj would emit the mand “play” a second time following delivery of the reinforcer. Upon observation, these mands appeared to be sensitive to specific forms of attention (e.g., being chased a *second*

time by the therapist) or toys out of reach. In these scenarios, the specifying mand was simply not specific enough. Practitioners should consider manipulating EOs to verify that mands occur under evocative control (see Gutierrez et al., 2007), especially when multiple specifying mands are taught. For example, after specifying mands have been established, specific reinforcers within the SRC may be provided noncontingently (e.g., no demands presented; tangibles freely available). Alternatively, specific reinforcers might be withheld for entire sessions, similar to how bubbles were removed from sessions for Lee. If specifying mands persist, in either case, this might suggest that mands are not under evocative control and additional training is required. Of course, in the latter example, it is possible there is an EO in the absence of the stimulus, and further investigation is warranted.

There are several areas that should be considered for future research. First, it cannot be ruled out that specifying mands in the current study were not occurring due to other sources of control. Specifying mands were taught in the same order for all participants; a mand for escape was taught first and subsequent specifying mands were then taught in a consistent order. It is possible that mands occurred due to the order in which they were taught. Similarly, the setup of Lee’s SGD could have exerted some control over his communicative responses. Future research should consider teaching specifying mands in different orders, along with employing additional measures for evaluating EO control as described above, to further rule out alternative sources of control. Future research might also investigate if an omnibus mand is indeed necessary to eliminate problem behavior quickly. The results of the current study found that an omnibus mand resulted in reduction of problem behavior and did not preclude acquisition of specifying mands, and this order of teaching is recommended due to the immediacy in which

<sup>2</sup>Lee exclusively requested a break and bubbles for several consecutive sessions. To evaluate if these mands occurred as part of a communicative chain, as well to determine if the other reinforcers were still relevant, we removed bubbles from the pool of available items. When bubbles were removed at session 72, mands for bubbles decreased and mands for Kindle and snacks increased (this particular finding is similar to Pizarro & Borrero, 2017, who found that some clients may not request items in their absence).

problem behavior was eliminated. However, future research might further investigate if this order of omnibus to specific mand training is advantageous and compare to an alternative in which all specifying mands are taught simultaneously. Further, in the current study, each specifying mand first served as an omnibus mand for all reinforcers for which a response had not yet been taught. This was done so that all reinforcers from the SRC were provided following communication and decrease the likelihood of problem behavior due to EOs for reinforcers not delivered. Future research might also evaluate teaching specifying mands simultaneously (similar to how specifying mands for tangibles were taught for Lee), following acquisition of an omnibus mand, to evaluate if efficiency could be increased.

In addition to their importance in the skill set of the client, an additional advantage of teaching specifying mands is that the relevance of each reinforcer<sup>3</sup> included in the SRC can be inferred by evaluating the extent to which each mand is acquired and the extent to which rates of problem behavior are affected by acquisition of each specifying mand (e.g., Ghaemmaghami et al., 2016; Slaton et al., 2017). When questions remain about the relevance of each individual reinforcement contingency within an SRC, researchers may choose to use inferential tactics<sup>4</sup> in treatment rather than in pretreatment analyses. For example, if an acquired specifying mand

persists and there is a concomitant reduction in problem behavior (or continued elimination of problem behavior), researchers and practitioners may use this observation as evidence of the relevance of that particular reinforcer to the SRC. This method of evaluating the relevance of reinforcers included in an SRC is somewhat indirect but it is advantageous to conducting FAs with both synthesized and single isolated reinforcement contingencies (e.g., Fisher et al., 2016; Slaton et al., 2017) primarily because FCT affirmation allows for treatment to be experienced more immediately. The results of the current study affirmed the relevance of all synthesized reinforcers for Raj and Cole by acquisition and persistence of all specifying mands taught in treatment and continued elimination or reduction of problem behavior, replicating the results of Ghaemmaghami et al. (2016) and Slaton et al. (2017). Specifying mands only partially affirmed the relevance of the components of the SRC for Lee. Lee independently emitted the mand for social attention only once (session 53), suggesting attention may have been irrelevant to the maintenance of his problem behavior.

Future research should investigate the relevance of individual reinforcers within an SRC by, for instance, measuring reinforcer consumption and engagement during reinforcement periods and determining the extent to which mands for individual reinforcers are acquired. Researchers should also investigate implications for including an irrelevant reinforcer within the contingency. Were it to occur, perhaps the worst outcome may be that the client will be taught a communicative response they won't frequently use (Lee in the present study) or that control of problem behavior by that reinforcer in the future might be mitigated (see the prevention work by Luczynski & Hanley, 2013).

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<sup>3</sup>When a combination of reinforcers makes up an SRC, researchers and clinicians may question whether or not each reinforcer is part of the consequence controlling the operant class of behavior (i.e., problem behavior). Similarly, when multiple topographies of problem behavior are eligible for reinforcement in an FA (e.g., Warner et al., 2019) clinicians may question if the observed topographies in the analysis are indeed controlled by the EO manipulated by the experimenter. Relevance, in terms of identifying contingencies controlling problem behavior, refers to the implication that the specific consequence following problem behavior does contribute to the maintenance of the operant class.

<sup>4</sup>See Sidman (1960, p. 127) for a description of using indirect evidence as a means for affirming a hypothesis.

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