

Teaching Prerequisite Matching and Object Permanence Skills to Those who have Difficulty Communicating with Photos or Pictures ¹

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Abstract

This is a case study of the work I did with my son, Brian Chassman, as he acquired a photo communication system. Brian has a diagnosis of autistic spectrum disorder, and is very severely affected. He was, and still is, completely nonverbal. In order for Brian to learn how to communicate using photos, he needed to learn the following skills: picture to picture matching, colour matching of objects, object to photo matching, photo to object matching, photo to object "give me," object permanence skills, and pointing skills. This work was done with Brian, at home, during the time when he was between nine and eleven years old. This paper documents exactly how Brian learned each of these skills.

There is a wide range of disability within the diagnosis of autistic spectrum disorder. While all who have this diagnosis have difficulty with social and communication skills, most individuals have strong visual perceptual skills. These individuals are quick to pick up matching skills, communicating using pictures, and even reading skills. Brian, however, being more severely affected, had poor visual perception, and had been unable to master early matching skills when these skills were taught in conventional ways. In order for Brian to learn these skills, I had to come up with new ways to teach them, detailed below. The end result of learning these matching and object permanence skills was that Brian learned how to communicate using photos. First, he was able to communicate using PECS (The Picture Exchange Communication System),³ and after learning additional pointing skills, Brian was able to use a speaking communication device.

Picture to Picture Matching

Brian and I worked on picture to picture matching long before I had even heard of PECS.³ We were not working on this skill in some sort of calculated fashion for Brian to get a communication system. However, on looking back, I believe that picture to picture matching is a prerequisite skill for object to photo and photo to object matching, and Brian definitely needed to master these two skills before acquiring a photo communication system.

A speech therapist and I worked with Brian on picture to picture matching for seven months without success. We worked with picture pairs, two out at a time, trying hand over hand, and also trying all different ways to cue him. He just didn't get it. I believe that the reason he could not understand how to match pictures when taught in this conventional way was that he never got enough practice with viewing each individual picture. We would have him place one picture, and then suddenly introduce another picture, and have him place that one. Then we would repeat this. Neither picture got enough individual practice.

What did help Brian to learn this skill was to use multiples (10 of each) of the pictures, and also, to have Brian compare items that were so diverse that he had no trouble sorting between them. For example, Brian would be handed a duck picture to put on the stack of duck pictures or be handed a peg to put in a pegboard. By working on sorting items in this way, Brian got extensive practice viewing the duck picture, and also, because the objects were so easy to sort between, he was able to be successful with this task with little help from me.

I also used an idea that I learned at a Miller Method conference. In their book, *From Ritual to Repertoire*, the Millers originate the idea of interrupting a child while the child is at the height of his interest for an activity and then bringing him over to do a second activity. The child is then interrupted while at the height of his interest for the second activity and then brought back to the first activity (or brought to a third activity). This continues on and on. Their theory is that if a child is interrupted from an activity while at the height of his interest, then when he is brought back to that activity, he will resume the activity with much greater interest than he would have otherwise.⁴

I tried to use this idea with picture to picture matching. At first I had the pictures on one side of the room and the pegs on the other, but I quickly found that for Brian it was easier to put both items next to each other, as long as I kept the position of them the same (e.g. pegs always on the right).⁵ I handed Brian the items using the Miller Method "repetition, interruption" concept.⁶ First I would hand him as many duck cards as were necessary for him to start being successful with placing them, then I would "interrupt" and start handing him pegs until he was starting to be successful

with this. Again, I would "interrupt" and go back to duck cards. We continued in this manner until all of the duck cards were placed.

He could do this! And not only was he successful, he was happy. He was understanding what he was doing, and was no longer frustrated by being wrong so often.

Eventually, I could hand Brian the items randomly, rather than repetitively, and he was fine with this. Important point: I want to note that when it was obvious that it was very easy for Brian to sort a group of items, I didn't always make him go through all of items, this tended to make him bored and unhappy. I would only have Brian sort through as many as were necessary for me to see that he could do it. I wanted to keep Brian happy and successful, but also, challenged. When it was easy for Brian to sort the duck pictures versus the pegs, I switched the position of them and then worked on this. Eventually I added other items to the duck pictures and pegs: blocks to be stacked and pieces to be put in an easy inset puzzle. Again, these were always arranged in the same position until he could handle them, and then eventually moved around.

After Brian could sort the first group of items well, I started a second group of items to be sorted: a new picture (a blue guitar) to be stacked versus magnets to be put on a steel board. Again, I gradually made this group more complicated by adding other items to be sorted (e.g. cars to be put down a ramp, blocks to be stacked, etc.), but note that I still didn't have Brian comparing two pictures. Eventually, I introduced two more pictures, each in separate sorting groups, for a total of four pictures. I also started introducing smaller pictures in separate sorting groups. The small pictures portrayed different objects than the large pictures; I was not attempting to work on small/large classification. The reason I introduced smaller pictures was to make the matching of pictures even easier. Brian could actually match by size and still not have to match by picture representation. The first time I had Brian compare two pictures, I had him compare a large picture (the duck picture) versus a small picture of a red apple. He could do this!

Soon after having Brian sort small versus large, I had him compare two pictures that were the same size (the first two introduced) and he could do this, too! He was actually able to correctly stack the duck pictures together and stack the blue guitar pictures together! Over the next few weeks, picture matching fell into place and Brian was able to match all of the pictures that were introduced, large and small. In another few weeks, Brian could match any picture as long as it had a plain white background, and also, he could match most letters and numbers.

The amount of time spent on working on this skill was fairly minimal: we worked on this for about 10-15 minutes each day. We went through each of the groups of items just once each day. We did NOT do intensive drills. After four weeks, Brian was able

to sort successfully between the duck pictures and the blue guitar pictures. After six weeks, Brian had generalized the skill and could match all pictures (with plain white backgrounds).

Colour Matching

I'm not 100% sure that colour matching is a necessary skill for a communication system, but I'm including it here because object to photo matching (a definite prerequisite skill) fell into place for Brian the moment he learned colour matching of objects. Of course, others may be able to learn object to photo matching without learning colour matching first, I'm sure. But it was interesting how Brian learned this skill, so I will include it here. Included in the sorting groups mentioned above were groups of objects of a single colour. Brian needed to place all of the objects of that colour in a box (of the same colour). Of course, each colour was introduced separately, as were the picture cards, above. Brian had no trouble placing the coloured items together in a box when only one colour was present in the sorting group. However, Brian was unable to master sorting between two groups of coloured items when they were presented together.

A consultant to Brian's program suggested that I try having Brian match cards made of coloured construction paper together. She suggested this because Brian was already matching pictures, at that time. Brian could match the coloured cards! So Brian could match colours in 2-D but not 3-D. Note that this happened after Brian was able to match pictures. A strategy I could have used when teaching picture matching, but didn't, because I hadn't thought of it at the time, would have been to have Brian compare a picture with a card that was a single colour. For example, in one of the sorting groups, I could have had Brian compare a solid green card versus the yellow duck picture, thus making the comparison very easy, and also starting to work on 2-D colour matching. I could also have had him compare a picture versus a black square, thus introducing shape matching.⁷ As it was, though, Brian was able to do 2-D colour matching and also, shape matching, after learning picture matching, with no additional work. Since Brian could do 2-D colour matching, but not 3-D, I wanted to make the 3-D objects resemble 2-D objects. So I bought 4 dozen small wooden spools, painted a dozen each blue, red, green and yellow. I cut out 4" round circles of construction paper (blue, red, green and yellow) and glued these circles to the bottoms of each of the painted spools, by colour. Since Brian could match the construction paper colours together, he was able to match the spools + construction paper together by colour, after about a week's work. Gradually, I cut the paper circles down to medium-size, small, extra small, and then no construction paper, just spools. This time, Brian could match the spools together by colour. And very soon, Brian was able to generalize this skill and match any group of objects together by colour.

It took two weeks of intensive work for Brian to learn colour matching of objects. We worked with the spool/paper circle matching for many, many hours each day. It was not fun. I probably should have introduced each colour of spools/paper circles separately, versus an easy object, like pegs, and proceeded as in picture to picture matching, above. If I had done this, it would have simplified the task and made it easier for Brian to understand. Overall, it might have taken a little longer for him to learn the skill, but he would have been less frustrated, and we probably would not have had to work such long hours.

Object to Photo Matching

As it turned out, Brian was able to master object to photo matching immediately after learning how to match objects by colour. I didn't use any special method to teach him this. We had been working on this skill concurrently with colour matching. When Brian learned colour matching of objects, then object to photo matching suddenly "clicked" for him, without any extra work. However, after thinking back as to how Brian learned picture to picture matching, I thought of a better method of teaching object to photo matching. This method was used successfully with two boys who had both struggled with learning object to photo matching. Both boys understood picture to picture matching, but neither had been able to learn object to photo matching despite working on this skill for over a year. Also, neither child could use photos or pictures to communicate, consistently. I supplied the boys' therapists with the materials to teach this skill and explained how to use them. Very soon, I received two phone calls from the therapists: the first boy learned object to photo matching in three sessions, and the second boy learned it in one session! Both boys quickly went on to be able to communicate with the Picture Exchange Communication System (PECS). To teach object to photo matching, I used the ideas of having multiples (rather than pairs) of the objects and photos, comparing items that were very diverse, and using the "repetition, interruption" idea⁸ from the Miller Method.

As with picture to picture matching, by using multiples, the student would get extra practice viewing one particular object/photo set. He would get to work on that one set extensively before other object/photo sets were introduced. Also, by having him compare items that were very diverse, he would be successful very quickly on his own, without needing lots of hand-over-hand help.

To teach object to photo matching, put out 2-5 identical photos of, say, a clothespin. Hand the student a clothespin to be put on each of the photos. When the student has no trouble with this, try adding another element to be sorted, for example, pegs. Have the student sort between clothespins to be put on the photos and pegs to be put in a pegboard. Hand the items to the student using the "repetition, interruption" idea⁹ mentioned in the picture to picture matching section. As the student improves with this, hand him the items randomly.

Introduce a new group of 2-5 identical photos of, say, a 1" red block. Have the student practice putting a red block on each of the photos. Then add another element to be sorted, for example, magnets to be put on a steel board. Continue as mentioned with the first group. Gradually introduce a few more groups of photo-object pairs in the same manner.

When the student can easily match the objects to the photos in the separate groups, then see if the student can discriminate between two different photos. Put out just two different photos. Hand the student one of the objects that matches a photo. Hopefully, at this point, the student will easily recognize which photo it matches. Hand him the other object, and hopefully, he can place this also. Gradually work up to discriminating between three, four and five different photos.

Photos Rather than Picture Symbols

Soon after Brian understood object to photo matching, I learned about PECS, the Picture Exchange Communication System. This sounded like a fantastic system for a nonverbal child like Brian. I tried this out with him and he learned how to initiate¹⁰ almost instantly. Initiating means being able to bring a picture over to another person. However, picture discrimination¹¹ was a problem for him. He was unable to distinguish between the different pictures. I was using picture symbols rather than photos because that was what everyone else was using at the time. One day, I decided to see if Brian could match the objects to their corresponding picture symbols. He could not, despite intensive drills. So I took a photo of all the objects he was working with and when the photos arrived a week later, I tested Brian to see if he could match the objects to the photos. He could! So picture symbols had to go, and photos would be used for Brian's communication system. One problem occurred, though: Even though Brian could easily match the objects to the photos, Brian tended to only choose one photo when using the photos to communicate. He was unable to use the photos meaningfully to communicate. It became obvious to me that Brian needed to learn more skills.

Photo to Object Matching

I tried to avoid teaching Brian photo to object matching. I did not want to have to bother teaching him this skill since he already could do object to photo matching, and I figured that this was probably sufficient. However, when it became obvious that Brian was unable to do the next skill, photo to object "give me," I then had to backtrack and teach Brian photo to object matching, since this is really a simpler form of the photo to object "give me."

Again, I didn't do anything special to teach Brian this skill, except to work on the skill in the usual way. Brian was able to do this skill right away with very small objects.

He also picked this up quickly for flat objects like books and videos. For large 3-D objects, Brian had a horrible time, and it took days of work before he could master this. A better way to teach this would be to use the method mentioned above with object to photo matching. However, this time put out 2-5 identical objects and have the student place the matching photos on top of them. Proceed as above.

Photo to Object "Give Me"

If I held up an object, I wanted Brian to be able to select from two or three different photos in front of him the one that matched the object I held. I then wanted him to be able to hand me the photo in exchange for the object. I figured that when Brian could do this, he would be able to use photos to communicate his wants and needs.

Again, I didn't do anything special to teach this; just drills for hours a day for several weeks! One thing I did that helped Brian when he was being unsuccessful with this "give me" skill was to backtrack and practice object to photo and photo to object matching using the same materials. After being successful with these skills using the same objects, I would resume working on the photo to object "give me" skill; usually, he would then understand what he needed to do. After almost a month of working on this skill, Brian could do this well with over a dozen photos and objects. He could easily generalize this skill to understanding new photo-object pairs. He could even use these photos in a PECS system to communicate his needs and wants! However, he could only do this if all of the objects were in view. As soon as the objects were hidden away, out of sight, Brian reverted to selecting just one photo to communicate all of his intentions.

Object Permanence Cues

Brian appeared to have a problem with the concept of object permanence. If I held up an object that Brian wanted and then placed it behind a piece of furniture, Brian would not continue to look for the object. He would forget about it. Similarly, when the objects associated with the communication photos were hidden away, the photos lost their meaning. Brian couldn't hold on to the idea that he could retrieve an object with a photo when the object was not in view. And the objects had to be hidden away, or Brian would just grab them when I left the room, and not bother to use his communication photos. To help Brian understand that the objects still existed when hidden away, I placed all of the objects in large, hinged, locked boxes and taped large photos of each of the items on top of the boxes. Food and drink items were kept in the refrigerator, of course, and I taped large photos of the food and drink items on the front of the refrigerator door.

We did a number of drills to help Brian remember that the objects were in the boxes (and the food and drink were in the refrigerator). First, I would open a box and have

Brian practice giving me the corresponding photos in exchange for the objects in that box.

When I felt Brian was familiar with the contents of the box, I kept the box closed and pointed to each photo on the lid and had him practice giving me the matching photo, and then I would open the box and give him the corresponding object.

After Brian could do this well, I began to cue him by gesturing towards one of the boxes and having him select the photo of any object that was on the box. I would then give him that item. I did this incidentally throughout the day, rather than as drill work.

One last thing I did was to (temporarily) add a step to the communication process: When Brian would hand me a photo, I would not take it from him, but would have him go over to the box that the object was in, have Brian match his communication photo to the large photo on the box, and then let him give me his photo in exchange for the object. This helped to eliminate the time lapse between when he gave me his photo and when he got the object. I suspected that during this time lapse, Brian was forgetting what he had asked me for. This step went a long way to reinforcing the meaning of the photo that he handed me. In time, I was able to fade out this step.

Understanding Pointing

Actually, Brian was not able to do the second drill mentioned in the section above (Object Permanence Cues). When I pointed to the photos on the boxes, this had no meaning for Brian. He had to learn one more skill. He had to learn that pointing was meaningful.

I taught Brian this skill by having him learn to copy me pointing to pictures. We used picture card pairs, rather than the communication photos, for this drill. I placed three different pictures in front of Brian. Then I held up a match for one of those pictures and pointed to it. I helped Brian point to the matching picture.

Brian was able to learn this skill very rapidly. After doing these drills a few times for several days, Brian was able to correctly interpret my pointing to the large photos on the boxes and continue his work with object permanence concepts.

Success with PECS

After Brian mastered the object permanence drills mentioned above (these took about a month), he was able to use photos with PECS to successfully communicate his needs and wants. At that time he could use 27 mini-photos in a wallet notebook. He had generalized the concept and could easily add more photos. As a result of being able to communicate his needs and wants, Brian's aggression level decreased

dramatically. I would hypothesize that people who are having trouble learning PECS or other photo/picture communication systems may be having a problem in one of three areas. These are: (1) lack of ability to understand abstract picture symbols, (2) not having the underlying matching skills, and (3) not having a concept of object permanence. An individual may have a problem in just one of these areas, in any two, or in all three, like Brian.

The easiest problem to fix is the first, especially if that is the only problem: just exchange photos for the abstract picture symbols and things should go fine. If there are problems with matching or object permanence, then try working through the matching skills or object permanence drills mentioned above.

While I might guess that Brian's case was a worst-case scenario for learning PECS (having problems in all three areas listed above), there may be other children/adults who need to learn even more skills than Brian needed to learn: it may be that Brian came into this with a number of very useful skills that I have just taken for granted. I want to mention that I don't want to give the impression that these skills need to be worked on before attempting PECS or any other photo/picture communication system. The majority of individuals with autism are excellent visual learners and will not need this extra work. But for those who cannot figure out how to use photos or pictures to communicate, then I hope these ideas may be of some help.

More pointing work leads to success with speaking communication device

Brian needed to practice more pointing skills in order to be able to use a communication device. On the communication device were one-inch mini-photos of the items that Brian might want. When Brian pressed on a mini-photo, the device would speak the name of that item.

Brian was unable to use the device at first. He just repetitively pressed anything. After trying to use it for a few days, I decided to put it away for awhile and work on more pointing skills.

Rather than having Brian use his wallet notebook or the device to communicate, I had Brian point to the large photo (the large photos were still on the boxes and on the refrigerator) representing the item he wanted. This activity got him used to pointing to photos to communicate. I also did drills where I would hold up an object, and Brian would have to find and point to the photo to get it. After doing this for two weeks, I brought the device back out and Brian was able to use it to communicate meaningfully. In order for Brian to learn the location of every mini-photo on the device we also had to do drills (a few times a day for about a month) where I would hold up an object, and Brian would have to find the mini-photo on the device and press it to get the object.

And Beyond...

After understanding the photo-object relationship, Brian has been able to learn how to use a TEACCH work schedule¹², follow an activity schedule¹³ for playing and working independently in his room, and use photo booklets for everyday routines like getting dressed, getting ready to go out, putting away the dishes, etc. In addition, I've been able to use some of the strategies in the two books by Linda A. Hodgdon: *Visual Strategies for Improving Communication* and *Solving Behavior Problems in Autism*. Lastly, and of great importance, Brian's previous high level of aggression has dramatically reduced now that he can use photos to communicate his needs.

Endnotes

- ¹ Presented at the Twin Cities Autism Society 2001 Conference in Bloomington, Minnesota on May 4, 2001. Materials from this presentation were also demonstrated at the Surrey Place Centre Eclipse Conference in Toronto, Ontario on January 25, 2001.
- ² Author of the book and video, *One-on-One: Working with Low-Functioning Children with Autism & Other Developmental Disabilities*.
- ³ PECS is a communication system developed by Lori Frost and Andrew Bondy. With this system, the user hands a picture or photo to another person. That person then gives the user the item that is on the picture or photo.
- ⁴ From *Ritual to Repertoire*, by Arnold Miller and Eileen Eller-Miller, 1989, John Wiley & Sons, Inc., pg. 30-31, 65.
- ⁵ While we eventually did most of this work at Brian's desk, Brian also learned to work on the floor. I would put the duck cards and the pegboard (or whatever items he was sorting) on a piece of white poster board: the poster board served to emphasize that this was a work area, rather than that these were just random items on the floor. After a year or so, Brian could do many work activities on the floor without needing a piece of poster board to show him the work area.
- ⁶ Miller and Eller-Miller, pg. 30-31, 65.
- ⁷ The idea of using black shapes for comparison (rather than coloured ones) is mentioned in: *Teaching Developmentally Disabled Children: The ME Book*, by Ivar Lovaas, 1981, PRO-ED, Inc., pg. 78.
- ⁸ Miller and Eller-Miller, pg. 30-31, 65.
- ⁹ Ibid.
- ¹⁰ PECS Training Manual, by Lori A. Frost and Andrew S. Bondy, 1994, Pyramid Educational Consultants, Inc., pg. 5-11.
- ¹¹ Frost and Bondy, pg. 12-14.
- ¹² TEACCH is the autism program for the state of North Carolina. This program makes abundant use of visual supports for students with autism.

- ¹³ Activity Schedules for Children with Autism: Teaching Independent Behavior, by Lynn E. McClannahan & Patricia J. Krantz, 1999, Woodbine House, Inc.

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