

BECOMING A SCIENTIFIC OBSERVER

by Greg MacDonald

INTRODUCTION

Greg MacDonald leaves no stone unturned as he places the complexity of second-plane observation into one coherent vision that includes the fundamentals of self-construction, the essential field of observation (freedom of work within the prepared environment), the role of the human tendencies, the construction of developmental facets, and the importance of the elementary child's weekly conference with the teacher. The article reveals an integrated worldview. He suggests that we observe for progress and avoid placing obstacles in the way of the child's true self-construction, and to do this we must be humble and non-judgmental, create with the right degree of difficulty or opportunity, see the physical evidence, and understand the psychical manifestations. The comprehensive nature of this article shows us why observation is an integrating mechanism in building an understanding of human development.

Montessori emphasizes the importance of observation throughout her work. Her work is based upon personal observation of children and upon the observations carried out by her colleagues. When I was in the classroom, I observed every day. My method was *naturalistic observation*: just writing down anecdotes that described what I considered to be significant events. I then analyzed my observations and devised new approaches that might be used for a child, for a group of children, or for the class. I know now that access to a variety of observation techniques and strategies can focus our

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observation. This offers us the opportunity to achieve a great deal more with our observations.

My students observe animals in the zoo, and their final observation involves visiting a Montessori elementary classroom for a week. They observe scientifically and then plot work curves like those that you see in the *The Advanced Montessori Method*. They then analyze their curves and make recommendations for the children that they observed. It's really a powerful tool, and one I wish that I had when I was full-time in the classroom. We will begin by revisiting some Montessori theory. I believe that Montessori theory should really be called Montessori *practice*. Every chapter and every line of our Theory Albums is certainly a rich resource of Montessori philosophy and child development theory. But read between the lines, look at what Montessori says directly. Everything can be looked at from another angle: How can I use this knowledge to support the optimum development of the children?

SELF-CONSTRUCTION

The idea of self-construction is the foundation of the work that we do. *Self-construction* is the first lecture I give to the students in my training course. The idea is that the children construct themselves: They, not their parents nor anyone else, create the individual that they become.

This idea of children constructing themselves is critical for us to understand and to accept if we are to properly serve children as Dr. Montessori intended. In fact, I believe that if you can really accept this concept into your heart and act upon it, then the rest of the Montessori theory and practice just falls into place. But you have to actually accept and understand what self-construction is all about. That is vital. I am going to quote Montessori a great deal in this article, because you may not believe me, but you *have* to believe Maria Montessori.

... There must be faith that the theory is really true in order to apply it, to put it into practice. We must believe that all beings develop by themselves, of themselves, and that we cannot do better than to not interrupt that development.
(*The California Lectures of Maria Montessori*, 1915 35)

Here is one statement that she made about observation:

We must hold ourselves in humility and observe childhood, observe the individual child, with a view to discover if he himself can furnish us with a guide, or lead us to the solution of the problem. ("Progress in Education")

In Montessori's view, observation was a tool that offered us the possibility of supporting the self-construction of children, and observation could also be utilized as a technique that could guide us to appropriate responses to the particular needs (or problems) of the children in our care.

... The child should be allowed to develop freely, in liberty. Two reasons exist for this approach: first, as we have seen, the child develops himself. Secondly, because of that self-development, the child reveals to us the laws motivating his work, that is, the psychological laws of his life. So we must develop both a science and an art to respect the liberty of the child.... Above all the teacher must respect the liberty of the child. This is the teacher's real mission. (*The California Lectures of Maria Montessori, 1915 30-31*)

Montessori emphasized that the child should be permitted to develop freely. The main reason for this is that children develop (construct) themselves. If you are a parent, think about your own children. Have they turned out the way you wanted them to turn out? Do you have a shy, withdrawn child that really doesn't want to say hello to anyone and whom you wish was a little more outgoing? Or, do you have a boisterous, loud, physical child whom you wish would just settle down a bit? Have you tried to change this in your child?

Parents often admit that they do have children like this and they also often admit that they've tried to help their child to change, but with little or no success. The reason that such personality traits are resistant to change is that our children are constructing themselves. *Parents* can't build their child to their personal specifications. The architect and the builder are internal, contained within each child, out of our direct reach.

If children construct themselves, then what we have to do first of all is to accept this fact, and once we've accepted it, we are led to the conclusion that we cannot perform the construction for any

child. You can't pour information into somebody else's mind. You can't pour skill into somebody else's body. You can't shape another person's personality.

I can swim pretty well. I believe that I could give a non-swimmer very precise instructions that cover every aspect of the skill of swimming so that this person would know exactly what to do if sudden immersion in water were to occur. If you happen to be that non-swimmer, would you like me to throw you in the deep end of a swimming pool after I've finished my explanation? Would my explanation, my lecture, give you all that you need to swim to safety?

The answer of course is No. We all know that it takes more than words for us to learn. We have to take action, we have to do it ourselves. We have to practice, to make mistakes, to gradually perfect a new skill, to gradually internalize new knowledge.

This is something that Montessori emphasized continuously:

...Education is not what the teacher gives: education is a natural process spontaneously carried out by the human individual. It is acquired not by listening to words, but by experiences upon the environment. (*Education for a New World* 2)

We must understand that we cannot take an active role in the construction of anyone but ourselves, and, most importantly, we should not attempt to take over the construction of a child. Instructing someone with words alone is generally inadequate, and this is even more true when we are working with children. Activity and work is required on the part of the learner. All we can do is provide the materials and the tools for that self-construction. Then we have to get out of the way as self-construction through activity, learning from error, repetition, etc. takes place.

If you decide that you want a house built for your family, what do you typically do? Do you prepare the blueprints personally? Do you lay every brick, nail every plank, cement down every tile in your house? Probably not. Usually we hire an architect and the architect designs the house. Then we hire a builder who oversees contractors as they construct our future home. Our task is to sign checks to pay

for the services of these professionals and to pay for the tools and materials that are needed as our home is constructed.

Would you walk through the house as it was being built and say to the builder, “Those steel girders, they’re far too expensive. I want you to use wooden rafters instead. And those power screws cost a fortune. I want you to use nails instead because they’re cheaper.” The answer is of course No. We let the experts decide what materials and tools were needed for our house. To interfere in that way would court disaster.

The expert when it comes to self-construction is the child, so we have to be extremely careful that we don’t interfere with the child’s self-construction. We should learn from what we know about the construction of a building. We must be sure that we’re not constantly telling our children how to do things, changing things, removing tools from their hands. Our role is to provide the materials and the tools so that the children can construct themselves, creating those wonderful human beings whom they are destined to become.



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I also want to emphasize that this process of self-construction happens just once. You have just one chance to construct yourself from the moment you are born until you become that adult you are destined to become. I self-constructed in Australia and so (for example) I have this Australian accent that you're dealing with today. I can't bring myself to say *glass* and *class* as it's said in America. I could probably train myself to do so, but it just wouldn't feel right.

You construct yourself once. The most that you can do afterwards is remodel. I've done some remodeling to make myself comprehensible to people in America. I had to consciously and deliberately change my pronunciation of some words and sounds when I first began to speak in the US. Still, the accent remains (if softened) and is almost impossible to totally eradicate. So you might say that I've done some reconstruction of myself, but I can't totally rebuild myself. To do so, if we return to our analogy of a house, I'd need to demolish what is in place now, and this is impossible to do with human beings.

Montessori believed that obtaining optimum support for every child's self-construction should become a crusade. This is a quote from one of her articles published in *Communications* in 1935:

The child's work is nothing more or less than man-building! Day after day, hour after hour, from minute to minute, that incessant labor goes on. There must be no break in his activities, for that would mean death. He must surmount every obstacle in his path, he must vanquish every difficulty. Humanity, unaware of what it is doing, has blocked his path of development with countless difficulties; so that the child's labor through the ages has been broken by cries of lamentation and drenched in tears. Now that we know what he suffers; now that we realize the fatal consequences of frustrating this development which goes to form the man, we have been awakened to the consciousness of the need for a new kind of social crusade – a social crusade on behalf of the noblest of beings, the least protected of all workers – the child. Let humanity awake! Let her give the child such conditions of living as he requires – if he is to achieve his task – which is sacred – no longer amid strife and lamenting, but full of joy, and aided by the society in which he lives. (“A Message from Maria Montessori in December, 1935” 3)

Self-construction is the foundation of the Montessori approach, philosophically, psychologically, and practically as far as implementation is concerned. Then, once we accept self-construction, we have to say to ourselves, “How is that happening? What is driving this self-construction?”

The human tendencies are the means by which we construct ourselves. They manifest as the characteristics of the different planes of development. The human tendencies are connected to the characteristics at each plane. They are responsible together for the ongoing process of self-construction.

Consider *order*, a human tendency. The first plane manifests this tendency as a focus upon physical order. In the second plane, physical order is not as important any more. Now mental order becomes the focal point.

Consider the human tendency of *exploration*. This tendency manifests as sensorial exploration in the primary and as imaginative exploration in the elementary. So what do we do about this, now that we are aware of these human tendencies? How do we support the particular characteristics that are active in a particular child? This is important because the degree to which we successfully provide support is the extent to which the children are able to self-construct to their potential.

These questions depend upon an even more fundamental question: When we talk about self-construction, we should ask ourselves, “What exactly is being constructed?” “The child” is not a specific enough answer to guide us as we seek to support self-construction. We have to identify the details, the elements of self-construction.

As an outcome of asking myself this fundamental self-construction question, I’ve come to think of what I call *facets* or *dimensions* of self-construction. This way of thinking about self-construction was suggested to me by my work with children.

When I was in the classroom conducting regular conferences with children, I found that the children didn’t always want to talk about their work, which was what I had personally planned to do. I

would come to the conference with my plan to talk about the work a child had done and what we might do together next, and perhaps what presentation this child wanted next, yet all this child wanted to talk about was “the trouble I’m having with Alison.” Or before I could even bring up the topic of work, the child would say, “I don’t like going outside for lunch because everyone is playing cricket and I can’t hit the ball.” Over time, I recognized that there were common threads in these conversations that were “off-work.” Problem with Alison? Social. Can’t hit the ball? Physical.

I began to plan for, and to expect the children to need, conferences that focused on one or more of what I now call *facets* of self-construction. Those facets, or dimensions, of self-construction may be considered separately as we work with children, and they can be discussed separately as we report to parents, a process that gives parents a detailed picture of their child’s development. The facets of self-construction that I refer to are:

- Physical
- Intellectual
- Social
- Emotional
- Moral
- Spiritual/Philosophical
- Personality (the child’s likes/dislikes, temperament, self-control, etc.)
- Creative

The children will talk to you about, or they will manifest behaviors that direct your attention to, one or more of these facets of self-construction. They basically say to you, “This is what I’m working on right now.”

Your observations will be a powerful tool and will enable you to identify what is important to a particular child at that moment.

This child needs help or feedback based mainly upon one facet. Another child needs to talk about another facet, etc.

So when it comes to our observations, we should be on the lookout for manifestations of the human tendencies, of the second-plane characteristics, and of behaviors that indicate that a particular facet of self-construction is a focal point for a child at that time. Our observations then guide us as we plan our interactions with each child.

One of my favorite books at the moment is *Lost at School* by Ross Greene. It was recommended to me by Dr. Nora McNamara, who took her elementary training with me. Greene's first book was called *The Explosive Child* and was written for parents of behaviorally challenging children. After *The Explosive Child* was published, teachers contacted Greene and said, "Parents have these children at home—remember that we've got them in the classroom. Will you help us as well?" He wrote *Lost at School* for teachers to provide them with an approach that is suitable for explosive and at-risk children at school.

Greene observes that schools provide support for children who have underdeveloped literacy or numeracy. Schools and teachers have "Reading Recovery" and "Numeracy Recovery" programs to help these children. But there are other children who lack some proficiency in an area of social development or of emotional development. Society tends to do nothing for these children except to suspend (and sometimes expel) them from school. Greene makes it very clear that society should treat these children in the same way that it treats children who lack literacy or numeracy skills. We must provide "Social Skills Recovery" and "Emotional Skills Recovery" programs for them and help them to acquire the skills that are missing.

So why am I taking a side-trip to discuss Greene's book, other than to recommend it to you?

As I read *Lost at School*, certain passages took me back to my own time in the classroom. One thing that Greene emphasizes is that adults should allow a child who has "exploded" time to cool off, and then (rather than berate or punish the child) the adult should have

a quiet and empathetic conversation with him or her. This is an approach that I learned when I taught in traditional school, early in my career. My approach was not nearly

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as smooth and as carefully designed as Greene's, but in essence, it was the same idea, and I used it because it worked.

Greene's recommendations also reminded me of the elementary Montessori guide's regular conferences with each child in the class. He proposes that we meet with children and talk to them about the facets of their self-construction that present real challenges. Greene proposes what I had noticed in my Montessori classrooms as I met with them individually: Children don't always want or need to talk about their academic progress. Sometimes they have other priorities, and I'd learned to "follow the child" in such circumstances.

When we are talking to parents about their children, it is productive to share your observations of progress and needs in these separate facets of their child. When you provide a much more comprehensive profile of their child, parents understand that you really know their child, and that you're focusing on more than just academics. You are working to support their child's effort to become a fully realized human being who is mature in all facets of their construction.

OBSTACLES

It is striking, and somewhat depressing, that when it comes to our relationship with children, our society doesn't seem to have progressed very far since Montessori's time. The following passage comes from *The Advanced Montessori Method*. Montessori grew up in a time when parents used swaddling clothes for infants. They had boards to press down children's ears and noses so the ears wouldn't stick out and so that their noses wouldn't look like mine, they would look like Shirley Temple's nose instead. Parents used

these physical “therapies” intended to alter their child’s physical appearance. Here is what she said,

... What a constant anxiety it must have been to believe that the straightness of a child’s legs and the shape of his nose, ears and head were the direct result of your care! What a responsibility to which everyone must have felt unequal! And what a relief to say: “Nature will think of that. I will leave my baby free, and watch him grow in beauty; I will be the quiescent spectator of the miracle.

Something analogous has been happening with regard to the inner life of the child. We are beset by such anxieties as these: it is necessary to form character, to develop the intelligence, to aid the unfolding and ordering of the emotions. And we ask ourselves how we are to do this. Here and there we touch the soul of the child, or we constrain it by special restrictions, much as mothers used to press the noses of their babies, or strap down their ears. And we conceal our anxiety beneath a certain mediocre success, for it is a fact that men do grow up possessing character, intelligence and feeling. But when all these things are lacking, we are vanquished. What are we to do then?

If it were really true that men acquire all such qualities by these fitful manipulations of their souls, it would suffice to apply a little more energy to the process when these souls are evidently feeble. But this is not sufficient.... Then we are no more the creators of spiritual than of physical forms.

... Liberty, the sole means, will lead to the maximum development of character, intelligence and sentiment; and will give to us, the educators, peace and the possibility of contemplating the miracle of growth.... This liberty will further deliver us from the painful weight of a fictitious responsibility and a dangerous illusion. (*The Advanced Montessori Method, Volume 1 5-6*)

Are we any better off today? We read about helicopter parents, of the parents who must be there, taking care of everything for their child one hundred percent of the time. They are binding their children using illusory clothes that are no less damaging than the actual swaddling clothes used for infants in Montessori’s day. Montessori also writes that the situation is no better for adolescents, observing

that adults of her time were carrying their adolescents around in their arms, and that was in her day.

Loving adults can become insurmountable obstacles to the child's self-construction. Nowadays, the assault tends to be more upon the non-physical facets of self-construction, but it is no less damaging. Children cannot construct themselves if adults litter their paths with obstacles. Adults have a terrible habit of placing obstacles when there is no reason to do so and have every reason to leave the child's path clear.

And it is so easy to place obstacles in a child's path of self-construction, and it's something that we can do with the best and most logical of intentions! As well-meaning, committed elementary Montessori guides, we can also place obstacles in the developmental paths of the children in our care.

Perhaps you have had a pencil breaker in your class? For some reason, you discover that one of your children is responsible for the plague of broken pencils that you find littering the room. What does logic say you should do with that child? Keep them away from pencils! Don't put pencils and child together in the same room! Problem solved, right?

Well, the broken pencil problem may be solved. But if there are no pencils around for the child to break, how can the child learn not to break pencils? The child's opportunity to learn a critical skill has been taken away.

Now I'm not advocating handing these children boxes of pencils so that they can break pencils to their hearts' content, but there has to be freedom in an environment where pencils are available so that these children are regularly confronted by the choice to break or not to break a pencil. You have to be there to help and coach and counsel them. You provide a "Pencil Breaking Recovery" program. And it's going to cost you some pencils, but by taking this approach, by not totally removing the freedom to break a pencil, which then becomes an obstacle to development that the child cannot overcome, you have supported the possibility of this child's self-construction in the area of inhibition of action/impulse.

This is true for all ages and for all manner of behaviors.

Montessori believed that we should be servants to the children. She talks a great deal about this idea: that as adults you are to be of service to the child, *humble servants*, not active constructors of the child. We're not in the business of building children. We're in the business of a building supplies and tools company, making sure that the tools and materials needed by our children are available. Our place is in the background, observing in awe as our children build themselves. Our role is one of removing obstacles and of practicing vigilance to ensure that neither we nor anyone else places obstacles in the children's paths to self-construction.

Throughout our time with children, it is observation that gathers pertinent data. It is observation that allows us to check for the manifestation of human tendencies and developmental characteristics. It is observation that reveals to us the facets of self-construction that are dominant aspects in a particular child's current developmental efforts. Our reflection upon the fruits of these observations enables each of us to better serve the children placed in our care.

"Data! Data! Data!" he cried impatiently. "I can't make bricks without clay." (Doyle, *The Adventure of the Copper Beeches* 322)

WORK

Why did Maria Montessori decide to develop work curves? It was because she had recognized the critical place of work in the developmental process. It was important, therefore, for adults to have a method by which they could track the work of developing children. Her insistence that the child be free to work, to be active, is striking.

I have a collection of what I call "Montessori's Trade Secrets," which I gather from her writing. Read her work and you'll find that there are many places where she seems to lean forward to whisper something in confidence to us: "Pssst! Do you want to know a secret that will make you a better Montessori teacher? Read on." She then shares a key, practical idea that enriches our practice, our work with the children. Sometimes she actually uses the word *secret*.

Other times, the word *secret* is strongly implied. Here's an example of such a passage:

We are already in possession of the secret ... The child must learn by his own individual activity, being given a mental freedom to take what he needs, and not to be questioned in his choice. Our teaching must only answer the mental needs of the child, never dictate them. (*To Educate the Human Potential* 3)

Looking for a Montessori elevator speech? I'd say that this quote does a good job. It encapsulates the Montessori method. And as a Montessori guide, if you just make certain that you do as Montessori tells you to, you will be bringing Montessori's principles and practice to life in your own prepared environment. Mario Montessori also emphasized the importance of non-interference, making it clear that we should allow the children to work on whatever they wished, as hard as they wished, for as long as they wished:

The increase of intellect and harmony comes from experiences in the environment. The young child has shown that he does not need impositions and oppressive teaching, but freedom, guides and work, work for as long as he wishes and as hard as his impulse tells him ... But he must be left free to obey his own nature and his own rhythm of work and not labor under the imposition of adults who try to fashion him to their semblance and similarity. The same approach must be given during all the phases of his development. To the young child we give guides to the world and the possibility to explore it through his own free activity; to the older child we must give not the world but the cosmos and a clear vision of how the cosmic energies act in the creation and maintenance of our globe. (*Cosmic Education*)

Notice that the increase in intellect (a good objective for any educational system) and in harmony (another admirable objective) emerges from experience (*activity* or *work*) in an environment, the Montessori prepared environment. Second-plane children also have to "do it for themselves," but now we're talking not about being able to dress unassisted or to eat unassisted. Now we're talking about *learning* unassisted, through activity with the Montessori materials. The children have to be active. They have to choose something that they are interested in.

We can do too much to support this activity, with the best of intentions, and become obstacles to self-construction. Children don't need endless collections of graded cards bearing "problems" for division, for multiplication, or for anything. Instead, show them how to create a problem for themselves:

Guide: "For the units category of our dividend, let's choose a digit between zero and nine."

Child: "Seven."

Guide: "So we write seven as our units digit. Now choose another digit for the tens category."

Child: "Nine."

Teacher: "Let's write nine in the tens category position of our dividend. Now let's keep doing this for each category until we have the dividend we want. Then we do the same to make our divisor."

What if the children create a problem that involves some difficulty that they haven't encountered yet? Something that hasn't been presented? They will do this; I can guarantee this will happen. They'll create a division problem that has zeros in the divisor for example. Is this a problem or an opportunity?

It's opportunity knocking! When children encounter difficulties like this, difficulties of their own making, they may independently solve the problem. What a triumph! Or, they may come to you to ask for assistance. That's opportunity for a new presentation knocking. And you then have before you totally motivated children. They generated the problem and they are intent upon solving it. We know that motivation comes from within, it's not something that we can generate externally and by showing children how to create their own problems, their own sentences for analysis etc., we create a tradition

To talk of "classroom management" suggests subliminally to us that we have to do a lot of managing, and that idea can easily take root and forever subvert our work in the classroom. We end up managing the classroom, and the children's opportunity to do so is taken from them.

that will continually generate new opportunities like this. When we make it possible for the children to initiate their own work, we open the floodgates to learning.

THE PREPARED ENVIRONMENT

Montessori brought the importance of the prepared environment to the world's attention. This is something that struck me when I first heard of Montessori. She said something absolutely new to me, something that made total sense, something that was obvious once it had been pointed out. She said in essence, given that children pass through different developmental stages, we should prepare different environments that match the characteristics of each stage.

I don't think that any other education system ever focused upon the critical importance of an environment that reflects and responds to the developmental needs and powers of children at different ages. This is one of Maria Montessori's foremost contributions to pedagogy. These children have these needs, these particular powers, let's match these needs and powers by paying particular attention to what we provide physically in the classroom and also in terms of how we approach the children.

As Montessori guides, we recognize the importance of the prepared environment. I believe, however, that this key component of our work is often underutilized. We know that our observation of the environment can indicate current interests of children (via our observations of what materials are currently receiving heavy use) and our observation of the environment can indicate areas that are not currently being used (via our observation of dust collecting on particular materials, for example). This certainly can provide us with guidance when it comes to planning presentations.

The prepared environment, we could say, has three major components: The adult, the child, and the physical environment itself. Notice that as Montessori adults, we can maintain a level of control of ourselves. When it comes to children, we really cannot "control" them, and we should not attempt to do so unless they are doing something harmful or bringing harm upon themselves. This fact lies at the heart of "classroom management" discussions, a term that I avoid because

“management” implies a “manager,” and that manager is by default the adult. This is not how it should work, and it’s not how we should be thinking in a Montessori prepared environment.

Aren’t we seeking to develop self-discipline in the children? Don’t we want them to manage themselves? If so, then by managing them, we become obstacles, and we prevent them from acquiring self-discipline and self-management skills. To talk of “classroom management” suggests subliminally to us that we have to do a lot of managing, and that idea can easily take root and forever subvert our work in the classroom. We end up managing the classroom, and the children’s opportunity to do so is taken from them.

I recommend that you take a look at the third component of the prepared environment: The physical environment. We have total control over the physical environment!

So, whatever the issue in your prepared environment, begin by asking yourself if some modification to that environment might usher in a change. How can you modify it to assist a child or to bring children closer toward self-construction? I think we are still scratching the surface here.

I recently heard of an elementary guide who was concerned because the children just didn’t like the mathematics materials. They didn’t take the mathematics materials out. (I think you will all agree that this is unusual.)

The guide stepped back one afternoon and observed the prepared environment, in as detached a manner as was possible. It was then observed that the mathematic materials were in the back of the room, in a corner facing the wall. You couldn’t see the materials unless you walked to the back of the room, around the cabinets, backed up against a wall, and then looked into the shelves.

So the guide rearranged the environment, repositioning the mathematics cabinets so that when the children walked into the room, the mathematics materials were facing the entry door, central to the room. The minute anyone entered the room, the first thing that they would see would be the mathematics materials.

Next day the children started to arrive. The first child who walked in, entered, put his bag down, walked straight to the mathematics cabinets, and took out some mathematics material. More children entered the room and they also took out mathematics activities. This change in the children's choices was obtained by a simple rearrangement of the environment.

From the simple to the not-so-simple, use of the environment is a very important tool that we have at our disposal. It is the primary tool of our trade, so use it! Ask yourself as you carefully observe not just the children, but your prepared environment, what might be removed, repositioned, modified, etc. in order to help children in their work of self-construction?

FREEDOM IN THE PREPARED ENVIRONMENT

What are the freedoms that children have in the classroom? They are free to choose their own work. They are free to work wherever they wish. They are free to work with whomever they wish. They are free to work on an activity for as long as they wish. When a child is firmly positioned on the path to self-construction, choosing work comes naturally. This is something that Montessori observed about the human being in general: We are workers.

Then, there are the children who don't choose work, and that's a different thing. The child is free to choose work, and we can create an obstacle to this process if we do not take care. One of the things I will sometimes hear a Montessori guide say to children is, "Put that back on the shelf, I haven't shown it to you yet."

The assumption here is that the child doesn't know how to use the material because the guide hasn't given the presentation. Is a guide's presentation the only way that a child might learn how to use a material? I believe that the answer is a resounding No.

Let's think about other ways that a child might obtain enough information to successfully use a material. These include:

- A friend gave them the presentation. (I recommend that you introduce the tradition of children teaching children as soon as possible.)

- They might have watched you present to someone else and so have received the presentation remotely.
- They observed other children working with the materials.
- Actually, the Montessori materials are so well-designed that some of them introduce themselves! The use of the material can be fairly obvious. If you know how to use the Adjective Grammar Box, then you really are capable of using any of the others. You may not know the symbol for the new part of speech (so refer to the chart in the classroom, or ask a friend) and you may not know the name of the new part of speech (but you know that this is printed on the grammar box compartment.)

So before you step in—unless someone or something is going to be harmed—“Count the beads,” as Montessori would say. Just wait



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and observe and you may learn something quite incredible. You will also avoid becoming an obstacle to the children's development:

I suggested to some teachers that they should wear a belt with beads attached. Then every time they have an impulse to interfere, they would draw a bead along. This is very useful, because when we have an impulse, we must act, and the reaction with the bead is a help. From day to day, one would make observations upon oneself in this way until one came to the point of not having to draw any more beads. We should then find that we had acquired a great calm and sense of repose. Perhaps we should have become transformed within. At any rate, we should have learnt the following: that almost all these impulses to action are unnecessary. ("Some Suggestions and Remarks Upon Observing Children" 18)

I often wonder what would have happened if Montessori had walked up to one of those three-year-olds in her first *Casa dei Bambini* and said, "Stop washing the table. You've washed it four times already, it's clean. Put it away. Do something productive." Or, "Stop playing with that cylinder block. You've done twenty repetitions – Enough is enough!"

By not doing that, she was able to identify entirely new child behaviors, and if she didn't understand them at first, she continued to observe. In this way, she learned about the importance of repetition for children. She learned about the importance of practical life for children. She learned about children by just not stepping in.

That's a freedom: If no harm is being done, why am I as an adult interfering? That's really the question.

Freedom is a critical requirement if we are to obtain meaningful and valid observation data. If a child's freedom to behave as nature directs is limited, then the behaviors that the child will manifest will be correspondingly limited and likely distorted, as an added "bonus." This is as true in our Montessori prepared environments as it is true in any other environment. It is why Montessori stresses the importance of preserving the freedom of children in our Montessori prepared environments. If we fail to do this, then any observational data that we obtain will be flawed.

WORK

In *The Advanced Montessori Method*, Montessori includes a section titled “Guides for Psychological Observation.” She provides eighteen different focal points for our observation of children. Many of these guidelines emphasize the importance of work. In fact, throughout her published works, time and again, Montessori emphasizes the importance of work to the process of self-construction. One example:

Man builds himself through working. (*The Secret of Childhood* 195)

So it shouldn't surprise us to find that Montessori's first group of observation guidelines all address work. The first of these:

Note when a child begins to occupy himself for any length of time upon a task. (*The Advanced Montessori Method, Volume 1* 96)

Eight additional observation guidelines just for work follow, before Montessori moves to consider guidelines for observation of “conduct” and then “obedience” (where two guidelines refer also to work). The same book includes examples of what Montessori called *work curves*. It's important to recognize that Montessori might have chosen to create “friendship/socialization curves” or “movement curves” or “communication curves,” or any manner of other curves. She chose, it is important to note, to closely examine and to graphically represent the children's work.

Work in a Montessori environment engages the body and the mind, which work together. This alone is a powerful experience. Montessori materials are also attractive to children because they reflect the needs and powers that they manifest at their particular developmental plane.

In a Montessori prepared environment, the ideas of work and play merge, becoming one. The activities are challenging and the children may well not be successful at their first attempts, making errors that can be corrected independently of the adult. In fact, if we present a Montessori material to children at any level and then find that they can repeat the presentation flawlessly, we must understand



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that we have presented too late! Yet for the child, these activities do not represent work in the way that many adults think of this activity: as a necessary evil. Work in a Montessori environment is fun, it is captivating, and it is compelling! It is developmental. It is self-constructive.

The open shelves in which our Montessori materials are openly displayed invite the children to take materials and to work with them. Children will come to their guide and request a presentation of a material, and sometimes the presentation that they request seems beyond their knowledge and capabilities. I'll give an example. A six-year-old child straight out of the primary, first week in the elementary, comes and says to you, "Will you show me how to use that funny colored trinomial cube to do cube root?" Early in my career, I would have said to that child, "There are a few things that I need to show you before you can do that." Later, I learned to say something else: I would say, "Yes!"

Now I know that this six-year-old is unlikely to be able to understand the presentation, let alone to repeat it independently. I also know, however, that there will be a six-year-old here and there who has a

precocious ability in mathematics and so will be able to comprehend. For all that I know, *this* could be one of those rare six-year olds! More likely, I know, he's just seen his best friend or his hero (who is eleven or twelve) doing this work and he wants to emulate that person.

As my work with children unfolded, I concluded that when you say, "Well, I need to show you a few other things first," they don't hear that. They hear: "You're not smart enough." Or, "You're not big enough." Or, "You're not enough (in some way) to do that." I'd rather say, "You are enough to do that." ("Yes!" makes the same statement more succinctly.)

Here's what happens when you obtain the hierarchical trinomial cube and begin the presentation. At some point, usually not too far into the presentation, the child will begin to look puzzled and may say something like, "I don't quite understand this. It's a bit confusing." That's when we say, "Oh, well there's another material I can show you that will help you then. Come with me. We are going to get the cubing material." And that's probably going to be too much also. At some point the child will reveal that the work/understanding is still elusive. So we repeat the above process: "Hmmm. Well let's take a look at something else that might make this a little more clear. Let's get the two centimeter cubes."

I call this "backing into the presentation." I might have to back even further back, into the bead cubes and the first cube root presentation. But by taking this route, I've validated that child's request, I've honored that child's personality, and I've buttressed the child's self-esteem. As a bonus, I've helped the child to find the place where there *is* an acceptable, motivating challenge so that real, concentrated work can begin. And I may well have saved both myself and the child from the introduction of an unnecessary, too simple of a step if I haven't found it necessary to "back down" the very first presentation in the sequence.

How soon should we present new work, a new step, in a sequence of presentations? I think that we move too slowly in general. How many times have you sat down to present something to children and realized that two of those children would have been ready three months ago? (This was my experience too, more often than I

care to recall!) As teachers, educators, and those perfectionists that we are, we want to make sure that the children understand, that they are competent. That's not a bad objective at all in principle, but in practice it can present obstacles to the children's work and development if we are not very careful.

The checkerboard is a good example. There are a series of presentations for the checkerboard, and it is tempting to wait for our children to attain a very high degree of accuracy at the first before we move to the next. Or, as an inducement for the children to internalize their multiplication facts, we tell them that we'll show them that next (number facts needed) presentation when they know their facts.

If we leave the children treading water like this, holding back the next presentation until they achieve "mastery" of this step or



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of some piece of knowledge, they get bored and they lose interest. (And we should also recognize that “mastery” is a slippery and transitory concept at best!)

We have to ask ourselves if the children have to know their number facts to be successful with this next activity with the checkerboard. In fact, the answer is No! What the children need is some way to identify the correct multiplication facts required for each problem. Some of these are no doubt automatic. There will be others that the children won't know, but all that they need is some resource that will give them the required number facts in short order. Think of this second checkerboard activity in the sequence not so much as one *requiring* number facts but as an activity that encourages *practicing* of number facts! And at the same time, it takes the children farther down the path towards the long multiplication algorithm.

Let the children have some number fact reference beside them, face down, and they use it when they need a number fact that they don't know automatically. For every step in presentation sequences, keep in mind that in general, the “next” step reinforces the previous steps. As interest flags, or as the children achieve an acceptable accuracy, consider moving forward. You'll soon know if you've been premature, but in my experience, I more often found that the children welcomed the next step, and their interest became even more intense. Their work was deeper and more focused.

We have covered a great deal of ground here as we revisited some fundamental Montessori principles, and as we explored their impact upon our practice. Let us turn now to observation, the key to Montessori's discoveries, and what I also consider to be the key to our success in our Montessori prepared environments.

OBSERVATION

Observation is a tendency that all human beings possess, but as Sherlock Holmes would tell us, we tend to not be very capable observers:

You see, but you do not observe. The distinction is clear.
(Doyle, *A Scandal in Bohemia* 162)

Observation requires practice:

It is obvious that the possession of senses and of knowledge is not sufficient to enable a person to observe. It is a habit that must be developed by practice. Such a preparation should generate in our consciousness a conception of life capable of transforming us or calling for the special activity and an attitude that shall make us efficient for our class. (Montessori, *The Advanced Montessori Method, Volume 1* 102).

The effectiveness of our observations, and the data that they provide, may also be enhanced by a scientific approach that provides a variety of strategies from which we may select according to our purpose. Montessori professionals are not the only group for whom observation is important. Many professions require developed and specialized powers of observation.

Medical laboratory technicians are able to immediately identify and diagnose a variety of illnesses by peering briefly into a microscope at a blood sample that to the uninitiated is just a mélange of shapes and colors. Farmers will, at a glance, find a sheep or cow that is sickening, where most of us would just see a milling flock or herd. An automobile mechanic may pinpoint the source of our car trouble by studying its exhaust, or by listening to the sound of its motor, where we can only see a gray cloud and hear a throaty rumble.

It is important for each of us to develop a personal approach to observation, and it should be one that works for us, enabling us to observe consistently and efficiently. The system that I used when I was working with children full time allowed me to observe during a number of different activities:

- As is the case with anyone working in an educational setting, I would sit in a place that allowed me to observe all that occurred in the room, as much as possible, while I was presenting. At the end of the presentation, I would pause before the next presentation to record any observations I'd made.
- I would also focus on the group of children with whom I was working. I was close to them, and I could

watch their expressions and listen to them as they talked. Their movements were something that I could observe closely. At the end of the presentation, after I'd recorded observations made of the class during the presentation, I would record observations made of children who had attended the presentation.

- Then, and again before moving on to the next presentation, I would spend a minute or two observing the class again, recording my observations. (Any particular children that I had chosen to observe, any particular events or behaviors that I was targeting, were the focus at this time.)

Analyze the data that your observations yield, and do this consistently, every week. Use your analyses to modify the environment, or to modify your approaches to the children in your care, (or both) so that their self-construction is optimized. Observations without analysis followed by action, which is then followed by evaluation, are useless.

When you're having a "bad" day or week, take a look back at your observations from months ago, or from last year. You'll likely find that you've made real progress. It has occurred incrementally, so you haven't noticed the gradual improvements that have been occurring. Things are better than they used to be. You don't notice those transitional changes. (So brighten up – You're doing fine!)

Observing yourself, or having someone observe you, using these methods is also incredibly valuable. I think it's an element of the observation process that we don't focus on enough. We're observing the children, which we must do, but who's watching the watcher? We can be very charitable to ourselves. A trained observer who provides us with feedback can enable each of us to make continued progress in our own professional development!

It is most illuminating to look more closely at some of the observation techniques and strategies used by two groups: naturalists and educators/psychologists. Think of the following collection of techniques as a toolkit, which contains as many tools as possible.

If you have a particular child or situation or a particular purpose, you can determine which of these (or what combination of these) you could use to obtain accurate, hard data.

Learning from Naturalists

When I began to revisit this keystone Montessori concept of observation, my mind immediately went to naturalists. I knew that Montessori wrote about Hugo de Vries and Jean Henri Fabre, so it was logical to conclude that their work had influenced her thinking. When we examine how naturalists observe, we find there is not just one story but many. Naturalists have developed many observation strategies and techniques that they utilize according to their objectives.

I want to look at some of these approaches to observation and then to reflect upon how they may be useful to us in our work with children. Many, I propose, may be adapted to our work as Montessori professionals for whom observation is a critical factor.

It is interesting to discover that naturalists and Montessori had more in common than just a belief in the importance of observation.

Fabre, for example, wrote:

I obtained a bit of the land the solitude of a little village, it was a province, an unlimited pebbly expanse which hardly any plant by time can grow. My own particular home had a small quantity of red earth mixed with stones and had been roughly cultivated. I was told that vines once grew there and I was sorry for the original vegetation driven out by the three-pronged fork. There was not thyme left, not lavender, nor a single clump of dwarf oak. As thyme and lavender are useful to me as a hunting ground for bees and wasps I was obliged to plant them again. (6-7)

Fabre prepared the environment. He evidently recognized that he could not learn about insects in an unnatural environment. He had to reestablish the vegetation that had been present in the beginning to create the original, natural environment, in order to observe these creatures and their natural behaviors.

One of my favorite authors is Gerald Durrell. His book *My Family and Other Animals* I think is the funniest book ever written. It is

the story of a ten-year-old boy (Gerald Durrell), growing up on the Greek island of Corfu with his very eccentric family. Durrell was fascinated with animals from the very beginning of his life. He is a good example of a fixation of interest in a child that becomes a lifelong pursuit. His family thought this interest in animals was a phase, but this particular phase lasted his whole life. He didn't go to school for much of his time in Corfu, but instead was blessed with tutors from time to time. Otherwise, he was free to wander the wilds of Corfu and to engage in what he wanted to do most: To watch and to learn about animals. Here is what he had to say about observation. (Roger was his dog and constant companion.)

If I found something that interested me, an ants' nest, a caterpillar on a leaf, a spider wrapping up a fly in swaddling clothes of silk, Roger sat down and waited until I had finished examining it. If he thought I was taking too long he shifted nearer, gave a gently whining yawn, and then sighed deeply and started to wag his tail. If the matter was of no great importance we would move on, but if it was something absorbing that had to be pored over I had only to frown at Roger and he would realize it was going to be a long, long job. His ears would droop, his tail slow down and stop, and he would slouch down to the nearest bush, fling himself down in the shade giving me a martyred look as he did so. (Durrell 42-43)

Even as a boy, Durrell spent countless hours observing, teaching us (and Roger) that successful observation comes when one invests the necessary time. There's no short cut. You have to spend time observing.

Another naturalist, George Schaller, confirms Fabre's conviction that a natural environment was required if an observer was to obtain reliable data concerning natural behavior:

Many books have been written about the African lion most of them by hunters and game wardens who either shot the animals or made the casual observation because of other duties. Lions have been raised as pets and then returned to the wild.... Many of these books contained interesting anecdotes and life history notes but none provides an accurate picture for example of the lion's social behavior and its predatory behavior. (5-6)

Schaller also teaches us that if you wish to be an effective observer, you must not disturb whatever (or whomever) you may be observing. You must be that wallpaper that the animals (or the children) whom you are observing don't notice. They go on about their business unaffected by your presence:

Lions are active primarily at night. To observe behavior at this time, all nights of numerous parts were spent with them. All observations were made from the Land Rover as lions pay little attention to a motor car. (22-23)

He goes on, by the way, to say that lions flee human beings on foot. Not a discovery I would take the chance to discover personally. He states, however, that in the Land Rover he could sometimes move to within ten meters of the lions and they were undisturbed as far as he could tell. By observing lions in their natural environment, and by taking care not to disturb them in any way by his presence, Schaller was able to identify lion behaviors that had been unsuspected previously.

Some Observation Techniques of Naturalists

What follows are some examples of common observation techniques utilized by naturalists in the field. I have added a suggested use for each technique for Montessori guides. It must be emphasized that there are no doubt many more uses for these techniques. Their utility is limited only by the imagination of the guide and by the objectives of the proposed observation.

Think in terms of how the technique as described might work for a particular situation, but also be ready to adapt it to the situation that you find. Naturalists have rules, but rules can be bent or broken if it increases the usefulness of our observations.

Ad libitum Sampling

The naturalist observes an individual or group for a predetermined amount of time, writing down all behaviors observed and the time that they were observed. How does the naturalist choose the behaviors worthy of recording? "Anything that seems interesting" is one piece of advice given by a naturalist. So it's subjective and up to the observer. Naturalists tell us that this approach is useful for

initial observations and for determining possible research questions, but the quantity and quality of useful data is limited.

A Montessori guide taking over a new class could utilize this approach in the first days to determine in a broad-brush way how to move forward with the group and with individuals.

Focal Animal Sampling

In focal-animal sampling, the behaviors of the focal animal are observed and recorded over a predetermined time period. Depending upon the desired results, the naturalist may record all behaviors of the individual or just specific, prechosen behaviors are recorded. Choice of the individual animal may be random, or it may be according to a particular criterion (age, status in the group, sex, etc.).

This approach is similar to the work curve observation technique pioneered by Montessori. It may also be applied to particular children and situations, where the guide wishes to obtain specific information about a particular child.



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Sequence Sampling

The observer focuses upon an interaction sequence rather than upon a particular individual or group. The observation of a sequence begins when a certain defined event occurs (e.g., a new animal approaches a group) and it documents all behaviors observed until the sequence ends as defined by the study (e.g., the new animal is accepted into the group, or it is rejected).

The Montessori guide may consider employing such an approach to examine social interactions that occur within the community of children. Sequence sampling is a useful method for gaining insight into more complex behaviors.

All-Occurrences Sampling

The naturalist selects one or a limited small number of specific behavioral events and records every occurrence of the behaviors within the animal group (every occurrence of grooming, chasing, etc.). This approach allows the naturalist to determine the rate and frequency of the occurrence of particular behaviors.

This approach might be used to identify the increase or decrease in frequency of particular behaviors in the elementary prepared environment. It could be adapted to obtain the same data about a small number of children or even about one child.

One-Zero Sampling

The naturalist records the occurrence (scored as a 1) or non-occurrence (scored as a zero) of specific behaviors for each specified time interval. Individuals or groups may be observed using this approach. The time interval selected is generally short (sometimes just fifteen seconds in animal studies). The method limits the richness of data because only specific behaviors are recorded. It does, however, reduce observer bias.

One-Zero sampling may be useful when unbiased confirmation of a suspected behavior pattern is desired.

Scan/Group/Instantaneous Sampling

The naturalist records the behavior of every animal in the group at predetermined time intervals (every five minutes, for

example). A checklist or rapid recording system is necessary for this technique to be successful. Although it is impossible to record the behavior of every animal in the group at the same instant, the naturalist concentrates on doing so in a minimum amount of time. This method provides the naturalist with a better understanding of the frequency with which animals in the group manifest certain behaviors. It is likely that the observer will tire as this process of intense observations takes place. It is therefore often recommended that data using this technique is collected in short recording sessions (e.g., record every thirty seconds for ten minutes) and then rest for a period of time (e.g., five minutes) before repeating the process.

The Montessori elementary guide may utilize this approach in order to gauge the frequency of occurrence of specific behaviors in the prepared environment.

Learning from Educators and Psychologists

Naturalistic Observation

A naturalistic observer records behavior in the child's natural setting. Naturalistic observers take care to observe objectively, reporting the facts, while using only the senses. No opinions are recorded. No judgments are made. The observer avoids qualifiers such as "very, extremely, probably," etc.

Whatever is written during the observation period may not be edited later. Any attempt to edit later indicates that the observer's mind is already reinterpreting what was observed.

"Simone was upset" is not an objective observation, but "Tears trickled down Simone's cheeks" is more objective.

Naturalistic observation tends to be the approach taken by Montessori adults. It is more typically the type of observation that Montessori guides perform in their elementary children's communities.

Target Child Observation

This approach provides a detailed child profile with built in predetermined intervals of time. Observations are precoded, and the behaviors have been previously defined so that they may be iden-

tified more accurately. This method reduces the time required for observation, but it also requires knowledge of the codes utilized.

This approach closely matches the work curves observation approach. It may also be utilized to create other types of child profiles.

Tavistock Observation

The Tavistock method requires the observer to visit a newborn infant and family weekly, for two years. Observations may include emotions felt by the observer and observed in the family and infant.

This observation technique more closely matches the observations required for AMI 0-3 training. I think that what we can also learn from this method is that inclusion of emotions observed and of emotions felt may be useful and therefore can be valid. How we felt during an interaction with a child (sad, angry, uncomfortable, afraid) may be important as we consider all of the data at our disposal. The same may be said for the emotional states that we believe we are observing in our subjects. Something to take away from this technique is that recording of emotional states may be useful when we consciously incorporate it for a particular purpose into some other observation strategy.

Time Sampling

When time sampling, the observer records the number of times a particular behavior is observed during a predetermined time interval. (e.g., aggressive behavior manifested in ten-minute intervals). Data is collected over multiple intervals in order to increase accuracy of the data. This method is best used to gather data on behaviors that have a clear start and end (shouting, wandering, etc.). Patterns of behavior can thus be identified as data is accumulated. This approach is useful to gain a more clear understanding of specific behaviors.

Whole Interval Time Sampling can be used to collect data on behaviors that continue without interruption for longer periods of time (time engaged in an activity, for example).

Partial Interval Time Sampling is used to monitor behaviors that are short-lived, such as smiling, eye contact, etc.

A form is used for time sampling. For each time period, a plus mark is recorded if the behavior is continuous throughout the in-

terval (for whole interval time sampling) or if there was at least one manifestation of the behavior (for partial interval time sampling).

Time sampling may be useful for identification of frequency and patterns in specific behaviors.

Antecedent-Behavior-Consequence (ABC) Observation

ABC observation collects data on the conditions that surround a child's (generally challenging) behavior. When the predetermined behavior is observed, it is recorded in the behavior column of a prepared form. The observer then reflects on what happened immediately prior to manifestation of the behavior (the antecedent) and records this in the antecedent column. The final column (consequence) is used to record what happened immediately after the behavior occurred.

This approach offers us a great deal when we seek to identify "triggers" (antecedents) that affect particular behaviors. Removal of the trigger can significantly reduce the frequency with which the behavior occurs. In other situations, the consequence may be what is most important to understand. What result does this behavior obtain for the child? Why might the child's behavior be directed towards such a result? How should I deal with this? Do I need to deal with it?

Checklist Observation

Checklist observation records the presence or absence of some behavior or skill. Checklists may record progress in number facts, physical coordination abilities, etc.

Montessori adults use checklists to track presentations delivered, progress in particular skills, etc.

Selective Verbatim Observation

This method requires the observer to record verbal utterances of a specific nature (e.g., positive/neutral/negative remarks, utterances that trigger a response in an adult, off-topic remarks, and statements that reveal abstraction or imagination at work).

Here a Montessori adult may gather data that reflects the effects of the child's verbalizations on others, or it may provide insight into the child's knowledge, beliefs, feelings, self-concept, etc. in particular situations.

Traffic Flow

The observer uses a map of the classroom and at predetermined intervals, notes where selected children are located. This process continues for an hour or more thus obtaining a clearer picture of the “traffic flow” in the prepared environment.

Traffic flow observation provides data on a single child who may be of some concern, or it allows the guide to determine social grouping patterns and high/low activity areas in the prepared environment.

At Task Observation

This method records degree of focus on an activity. It may involve observation of a particular child or a full community of children.

At task observation is a component of work curve observation.

Global Scan/Continuous Observation/Anecdotal Record/Spontaneous Notes

The observer finds a position that allows observation of the complete space and records anything significant or that catches the attention. Data is recorded as short anecdotes. A broad view of what is happening in the space is obtained by utilization of a global scan. Data is recorded in a running, dated, timed record as they occur.

This approach is utilized to develop whole community work curves, and it is typically used by Montessori guides to ascertain the current state of a community of children.

Spider Web Observation

This type of documented observation is good for identifying a child’s likes and dislikes. The child is observed for a predetermined length of time. Observations are recorded on a prepared form that shows all major areas of the prepared environment. As the child moves from one area to another, the observer records this with an arrow in the direction of movement, and then the time that the child remained (along arrow). A final summary is then recorded on a second form that is circular in nature with the areas around the circumference (figure 1).

In her book *From Childhood to Adolescence*, Maria Montessori compares the mind of the child to the web of a spider, pointing out

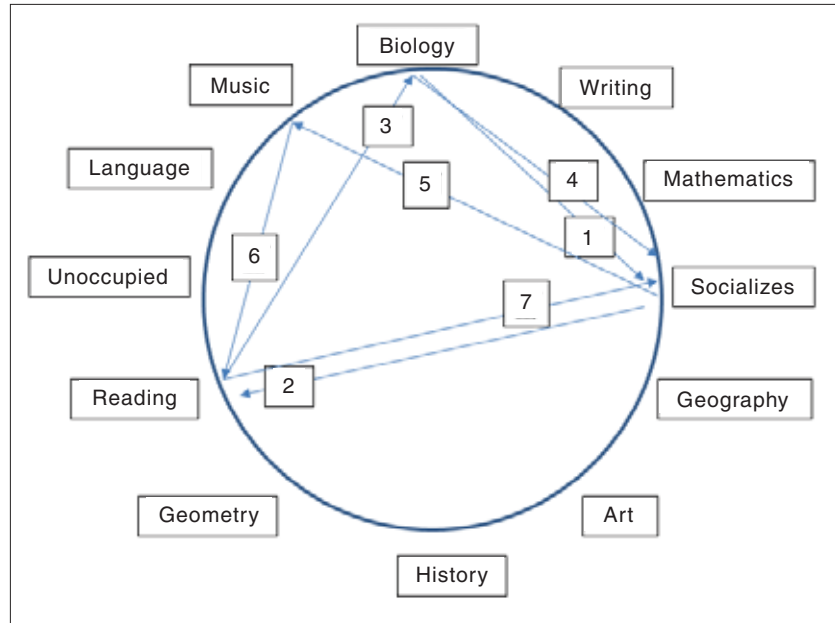


Figure 1. Example of a spiderweb chart.

that both are constructed “to an exact plan.” The web of the spider, she notes, represents its “field of action,” enabling the animal to reach out beyond the limitations of its physical body. Ideas and understanding are captured by the “web” of the child’s mind in a similar way. Imagination and intellect, the new powers of the second plane that have now become prominent, are critical tools with which the child self-constructs:

As is the web, so is the mind of the child constructed ... The abstract construction enables him to grasp what happens in his field, which was out of his range heretofore. (4-5)

As Montessori adults, we must continually enrich our observational powers, constructing our own observational “web” upon which we might capture new information about the children in our care. We have many resources at our disposal. All that is required is that we harness those resources consistently and in a manner that best serves the needs of the children.

CONCLUSION

So what may we conclude from this presentation? I would focus upon the following:

- Regular and targeted observation is a critical piece in the work of any Montessori educator.
- We may observe a single child, groups of children, or the complete learning community of children in our care.
- We may direct our observations towards manifestations of human tendencies of the developmental characteristics of a particular plane or of the many facets of self-construction. We may also note that some of these are *not* observed in an individual child, a group, or a full community of children, which is vitally important data. Observation guides us and informs us, and as we develop our observational abilities, it enables us to better support the work of self-construction that is being undertaken by the children in our care.
- We may elect to harness observational tools borrowed from naturalists, psychologists, or educators.
- We must recognize that observational data is useless if it is not analyzed and if no action on our part ever occurs. Observation should lead to outcome, to new ways of responding to the needs of the children in our care.

By becoming consistent, effective, scientific observers, we will be continuing the work of Dr. Montessori, and as we refine our observational powers, we will discover new ways to support self-construction, the great work of the world's children. This approach can guide us on two levels: What are the child's interests? What are areas that the child might not even have explored (suggesting possible presentations)? Our job is to present the child with the different places they can go. That's Cosmic Education and our work.

REFERENCES

- Doyle, Arthur Conan. "The Adventure of the Copper Beeches." *The Penguin Complete Sherlock Holmes*. New York: Viking Press, 1981.
- Doyle, Arthur Conan. A Scandal in Bohemia. *The Penguin Complete Sherlock Holmes*. New York: Viking Press, 1981.
- Durrel, Gerald. *My Family and Other Animals*. London: Penguin, 1980.
- Fabre, Jean Henri. *Book of Insects*. New York: Dodd, Meade & Company, 1921.
- Montessori, Maria. *The Advanced Montessori Method, Volume 1*. 1918. Laren, The Netherlands: Montessori-Pierson Publishing Company, 2007.
- . *The California Lectures of Maria Montessori, 1915*. Amsterdam: Montessori-Pierson Publishing Company, 2008.
- . *Education for a New World*. 1946. Laren, The Netherlands: Montessori-Pierson Publishing Company, 2007.
- . *From Childhood to Adolescence*. 1948. Laren, The Netherlands: Montessori-Pierson Publishing Company, 2007.
- . "A Message from Maria Montessori in December, 1935." *AMI Communications 4* (1995): 3.
- . "Progress in Education." *The Montessori Magazine 4.1/2* (1950): 4-11.
- . *The Secret of Childhood*. 1936. Hyderabad, India: Orient Longman, 1978.
- . "Some Suggestions and Remarks Upon Observing Children." *AMI Communications 2* (2008): 16-24.
- Montessori, Mario. "Cosmic Education." *AMI Communications, Special Issue* (1976): 1-7.
- Schaller, George. *The Serengeti Lion*. Chicago, IL: University of Chicago Press, 1976.

