Somersaults and Spinning

The Serious Work of Children's Neurological Development

by Jan White

"It amazes me how quickly and how often we forget that we are embodied, that we see the world the way we do because we live in these bodies."
Sir Ken Robinson, TED Talk, 2012

What movement play did you engage in as a child? What movements do young children naturally engage in when adults are not controlling their behaviour? Many of these will be familiar:

- rolling down hills
- spinning on the spot until you fall over and the world carries on spinning
- endless handstands and cartwheels
- swinging as high as you can
- twisting the swing up tight so that it spins you as it unravels or simply hanging over the swing on your tummy
- doing 'apple turn-overs' (somersaults) over bars
- hanging from monkey bars or upside-down by your knees
- leaning out as you twirl around lamp posts or spinning round holding the hands of a partner
- bouncing on the bed
- skipping
- walking on walls and teetering on the edge before jumping off
- balancing along curbs
- jumping between paving stones
- rough-and-tumble play (roughhousing)
- rocking back on chairs
- wobbling on the outside of your feet
- jiggling and never being still . . .

Jan works nationally and internationally to advocate and support high-quality outdoor provision for services for children from birth to five. With 28 years experience of working in education, she is author of *Playing and Learning Outdoors: Making provision for high-quality experiences in the outdoor environment* (Routledge, 2008), and *Making a Mud Kitchen* (Muddy Faces, 2012), editor of *Outdoor Provision in the Early Years* (Sage, 2011), and collaborated with Siren Films to make the award-winning training DVDs *Babies Outdoors*, *Toddlers Outdoors*, and *Two Year Olds Outdoors* (Siren Films, 2011). Jan blogs at janwhitenaturalplay.wordpress.com

Have You Ever Asked Yourself Why?

Why did you spend so much time as a child doing these things over and over again?

- Have you ever wondered why children are so driven to engage in these kinds of movement experiences?
- What is it that they are seeking by doing them? Why can't they stay still, even when you ask it of them?

That such movement activities are so prevalent amongst young children, now and in our own memories, strongly suggests that these seemingly trivial experiences are in fact rather important. Every child experiences a strong biological drive to move as much as possible and to move especially in certain ways because these movements are so fundamentally critical — they do foundational physiological and neurological work that underlies just about everything else!

I would like to share my understandings of two exceedingly important neurological processes that explain all that enthusiastic childhood play, and give strong guidance for appropriate and effective provision both indoors and out. As I discuss these ideas with many different people, there is always a feeling of this being such common sense; it's one of those things where you wonder why you hadn't realised this before.

Developing Balance, Postural Control, and Coordination through the Vestibular Sense

So, what is going on when children spin, roll, swing, bounce, jump, and generally get dizzy? One of the most foundational requirements for good functioning in life and 'school readiness' is having a strong sense of equilibrium in relation to space and gravity. Strongly developed balance allows you to feel good in your body and able to control and manage it well. It operates automatically and uncon-

Photograph by Jan White; Setting: Children's Oasis Nurseries, Dubai, UAE

sciously so that attention is fully available for other things. When it is not working well, however, we feel very unwell and it is difficult to think or operate in daily life. This can be a common component of many special needs conditions, such as ADHD, dyspraxia, and autism.

The ability to detect motion and respond to it to provide balance operates through a sensory system called the *vestibular sense*. This system is the first sensory system to start developing (16 weeks after conception) and our other senses both operate through it and need to be strongly integrated with it.

The vestibular organ in the inner ear consists of three tiny hollow tubes oriented in each of the three planes of space. The tubes are filled with a gluey liquid, which is pulled around by gravity when we move (imagine water in a glass when we tip or swirl it). Thousands of miniscule hairs (nerve endings) protruding into this liquid are tugged by this motion, and this triggers signals along the nerves to the part of the brain that interprets what motion has just happened. Moving and being moved in the three dimensions of space through twisting, turning, spinning, rocking, swinging, rolling, sliding, jumping, bouncing, tipping, tilting, wobbling, falling, and moving fast all activate the complex neural connections needed to develop this vestibular sense, which in turn gives us the ability to feel where we are in space, to detect motion in our bodies, to respond to movement, and to regain or maintain balance.

A vast amount of movement is required for the brain to fully develop and then fine-tune its ability to interpret all the motion possibilities. This also needs to be matched with vision, hearing, and sensory information coming from inside the body (proprioception). Rather than actually balancing and staying still, it is *movement* in gravity that makes this sensory system wire up in the brain and body. It is perhaps not surprising to find that these are the very things that young children most want to do and find such pleasure in!

Does all that dizzy play that you remember, and which you see children doing so much of, make more sense now? The vestibular sensory system underpins the development of balance and coordination, which underpin so much else; this is a hugely important developmental process for all young children, taking at least seven years to develop fully (and continuing well into adolescence). Because of its fundamental role in all aspects of well being, life, and learning, young children are absolutely driven to seek the movements that best do this and find every opportunity they can to do so. It is crucial that all children find many suitable opportunities to work on this development throughout the day, every single day, from birth to seven and beyond.

The environment children play in must offer features (such as slopes, steps, slides, jumping-off points, poles, and a range of surfaces) and resources (such as crates, tyres, rockers, swings, hammocks, spinning bowls, bikes, and strips of fabric or ribbons to leap and twirl with) that offer plenty of potential for children to use in their own way. Adults can also support children through gentle and enjoyable body play, for example twirling children around while holding them, lifting them into the air, and playing active lap games. Most importantly, the play environment also needs a culture, created by adults, that allows and encourages children to maximise their access to this type of movement in their play.

Developing Body Sense through the Sense of Proprioception

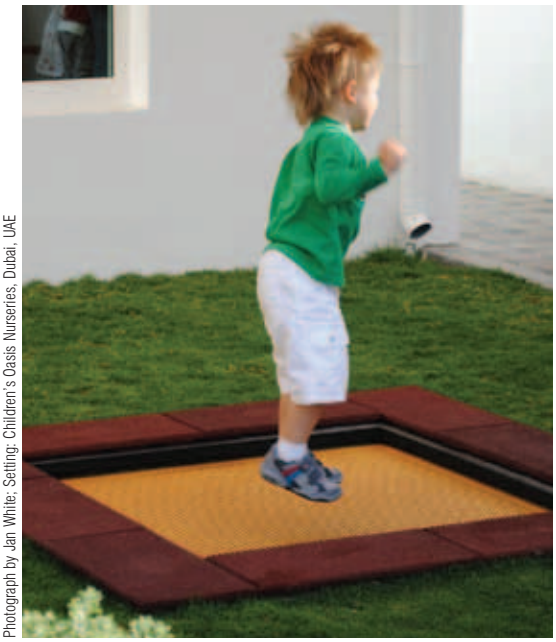
And why do young children so want to push, pull, lift, carry, and otherwise stretch their bodies? Control, coordination, functionality, and confidence also rest very heavily on the sensory system that enables us to feel our body from the inside — called *proprioception* (perception of the self). Holding your hands in front of you and with your eyes closed, try bringing the tips of your fingers together. You were probably surprisingly close. Try it again much more slowly, noticing what it was that guided your hands so well. An awareness of the body, knowing where our limbs and 'edges' are, and where our body is in space is something we take for granted. However, it is a basic developmental process that again takes hundreds of the right kinds of stimulatory movement experiences everyday. These wire up nerve-ending sensors (proprioceptors) in the muscles, tendons, and joints to the brain, so that we can sense movement and position through the subconscious sense of proprioception.

One type of proprioceptor cells are embedded in muscles and tendons to register stretch so that the brain can infer location of the various parts of the body. Another set is in the cartilage around skeletal joints, sending information to the brain about motion, speed, and direction. These sensors are activated whenever we move a limb or joint, and whenever parts of our body are stretched, under tension or experience resistance or impact.

The development of proprioception is an incredibly important process, so, not surprisingly, children enthusiastically seek out the experiences that work best at getting this sense as fully wired up as possible. A well-developed proprioceptive system gives us a strong awareness of our body, allowing us to move our bodies, limbs, fingers, and mouths in just the right way to achieve what we want to do and how we want to do it. A very well-developed and integrated system is vital for the thousands of motor skills we need to carry out daily life; and once again it is wired up *only*

through movement and action.

A surprisingly large area of our brain is dedicated to 'body maps' so that we can function well, and this takes a great deal of physical work to develop and maintain, especially when the child's body is constantly changing. A child who is inactive will therefore not have a strong awareness of his or her own body. The better the connections, the more we are able to feel and control our body, and therefore the more capable, confident, self-assured, and resilient we feel.



Photograph by Jan White; Setting: Children's Oasis Nurseries, Dubai, UAE

Even more profoundly, proprioception gives us the feeling of actually having a body and hence a physical sense of self. It is this that gives us a feeling of being 'me,' and must play a large role in building the self-identity that young children are working so hard on. On the rare occasions where proprioception has ceased to function, the sufferer reports that they have no sense of having or being *in* a body (Sachs, 1985). Conversely, stimulation of proprioception causes the production of the neurotransmitters that activate the brain, making it ready for learning and rewarding pleasure centres that make us feel good — literally feeling life in every limb and giving us 'the feeling of life itself' (Jabadao). The active child has a robust sense of self and confidence in the world.

Isn't it strange that so few of us learn about this sense along with the other 'five senses'? And isn't it also apparent that this is something we need to plan for as much as possible? Pushing, pulling, squeezing, reaching, stretching, hanging, lifting, carrying, jumping, landing, hitting, handling, and throwing are all good ways of strengthening connections in the brain for growing body awareness. These are all things that young children love to do, and it is clear that outdoor play provides a great deal of access to them. Body play and rough-and-tumble are particularly good proprioceptive activities, and much enjoyed by children from birth onwards.

All kinds of wheeled vehicles, sweeping, digging, filling baskets and buckets to lift and carry, rolling tyres, pushing wheelbarrows, pulling trucks, transporting large items, using ropes, parachute play, jumping, skipping, and hanging from branches or monkey bars are all very popular with young children, and are rich in the stretch and impact that provides the required stimulus. This shows that the child's response to his own natural urges and drives can be trusted to give him the very experiences he needs. Adults can also support children by providing floor play, getting down onto the floor with the child, and engaging in plenty of gentle and enjoyable body play together. As well as whole body stretch and impact work, consider how to support proprioceptive development in the hands and in the mouth. Again, adult understanding and behaviour is critical and needs careful, shared reflection.

What Do Young Children Need from Adults?

It is most important that all adults living and working with children understand that physical development underpins everything else about the developing child, and that it comes about through *using* the body: feeling the body and all its parts, involving the whole body, moving it in space and gravity, and pushing and challenging it. Active children will be so much more confident, able to learn, and happier.

Resource

Jabadao: The National Centre for Movement, Learning, and Health
www.jabadao.org

Further reading

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