

**Infant Intentions:
The role of agency in learning with affectionate companions.**

Jonathan Delafield-Butt and Colwyn Trevarthen

AUTHORS ACCEPTED MANUSCRIPT

PREPRINT

23RD OCTOBER 2019

ACCEPTED 5TH APRIL 2020

FOR PUBLICATION IN

Encyclopedia of Teacher Education

Michael Peter (Ed.)

Online ISBN 978-981-13-1179-6

The final published version will be available at:

<https://link.springer.com/referencework/10.1007/978-981-13-1179-6>

Cite as

Delafield-Butt, J., & Trevarthen, C. (2020). Infant Intentions: The role of agency in learning with affectionate companions. In M. Peter (Ed.), *Encyclopedia of Teacher Education*. Singapore: Springer Nature.

**Infant Intentions:
The role of agency in learning with affectionate companions.**

Jonathan Delafield-Butt and Colwyn Trevarthen

PREPRINT

23RD OCTOBER 2019

“Evidence from archeology and evolutionary anthropology indicates that *Homo sapiens* are born with an imaginative and convivial brain ready for the pleasure of shared invention and with a natural sense of beauty in handmade objects and music. In short, there are *innate predispositions for culture* for practicing meaningful habits and artful performances that are playfully inventive and seductive for companionship in traditions, and soon capable of grasping the clever purpose of shared tasks and tools. This knowledge of inventive human nature with esthetic and moral sensibilities has important implications for educational policy in our schools.”
(Trevarthen, Gratier and Osborne 2014, p 173)

Abstract

A young child moves with her own agency or initiative, using a dexterous body to create experiences she enjoys and learns, enabling early development of a ‘sensorimotor intelligence’ for her own benefit. She is also born with ‘affectionate social intelligence’, wanting to share discoveries of experience and to build their meaning with parents and playmates as companions. This learning is evident in the fine control of movements before birth, in the gestures and expressions of the mid-gestation foetus that demonstrate an awareness and a curious interest in the world, and that respond to behaviours of the mother and other persons they can sense near them. They are especially receptive to rhythms of other persons’ locomotion, speech and dance or music, and they learn to recognise and prefer their mother’s voice. Innate movements, guided by anticipations of their future effects, are adapted to gain benefits from the world in cooperation with other persons’ interests and responses. Infant movements, even if they are simple and discrete, are formed as the actions of a person, an intentional social agent from the start who is seeking to share cultural habits and skills.

Self-generated movements develop in reach and capacity from early single actions with immediate proximal goals, to the complex serial ordering of actions that construct projects extended through space and time. They become described in abstract, culturally learned, and conceptually-backed stories as the infant builds knowledge and becomes a lively and curious toddler. High-precision analysis of movement at birth can detect risk of a developmental disorder that may affect all stages of learning. Children who develop with autism exhibit a subtle, but significant disruption to self-generated movement that appears evident from birth, thwarting its success, creating distress for the child and anxiety for their

care-givers. Early motor experience is a fundamental adventure of the young child that expands into social collaboration and the ability to make sense of the world with others' assistance. The enterprise of the human spirit from early and simple actions to later complex projects of serially-ordered actions confirms the existence of a primary form of intentionality that is a driver for learning and its education at all ages.

Introduction: How Movement Serves Life In Society

Animals live by activating the muscles of their bodies in adaptive ways with rhythms of expectant awareness, knowing in advance what their actions will feel like (Damasio, 2000). In the 1920s the Russian psychologist Nikolai Bernstein disproved Pavlov's theory that an animal's learning is by 'conditioning' or reshaping sensory-motor 'reflexes' (Bernstein, 1967). He found their senses of proprioception 'in the body', as well as selective uptake of information by touch, hearing and sight of the outside world, serve to inform and evaluate the imagining of an integrated 'self' in experience (Llinás, 2001). By confirming whether what they are doing will be beneficial, efficient and joyful, or harmful, inefficient and fearful, the affective consciousness of any animal with emotions communicated by motor signals guides their adaptive life (Panksepp, 1998).

In human social life, cooperation and cultural learning of beliefs, practices and skills is made possible by special expressive movements that signal aesthetic and moral emotions of pride and shame to build a community with a growing record of its history of understandings (Reddy, 2008; Damasio, 2018). Children are born wanting to move their complex human body with their own agency and under their own power to create experiences of contact with a world that they can enjoy, remember, and share by running and dancing about, and by carefully making and using objects (Trevarthen & Delafield-Butt, 2015; 2017). Self-generated movement is identified by Jean Piaget (1953) as 'sensorimotor intelligence', which motivates learning the consequences of one's actions with 'pleasure in mastery'. But this is not sufficient for inter-personal or 'inter-subjective' awareness of the values of meanings shared (Donaldson, 1978).

This innate agency of the child and the importance of its feelings for creativity and its sharing are well-recognized in education for the early years (Scottish Government, 2008; Trevarthen, Delafield-Butt, & Dunlop, 2018). Yet, the psychobiological origins of this agency shared with others has been controversial in theories of psychology and medicine.

Infant Intentionality Evident in Creative Movement

An early 20th Century medical model of the mind treated an infant's movement as simple mindless 'reflex' responses. It was thought these actions were automatic physiological reactions in response to stimuli outside of conscious mental experience. The assumption was that infants were not aware even of feelings of pain or pleasure until the beginning of verbal language at about the eighteenth month. It was presumed infants needed to learn how experiences are defined semantically by symbols of speech. Clinical advice to parents was that by removing or reducing stimuli they could respond to the cries of their infants as 'non-conscious' reflex events. The view was part of a rationalistic model of learning for training skills that did not account for affective intelligence, embodied awareness of imaginative experience, and the emotional value of human contact in intersubjectivity for care and growth. Psychiatrists René Spitz and John Bowlby were among the first to refute this theory of mindless infant experience with their observation of the need for sensitive

social care of the infant as a human person, with a natural expression of love for reliable company (Lewis & Amini, 2001; Perry & Szalavitz, 2010).

Today, psychological knowledge recognizes the movements of the newborn infant as intentional and emotionally regulated, acting with a plan of conscious awareness of the effects of its actions, and consensual awareness of others. The revolutionary work of Bernstein (1967) used high speed movie film to measure the dynamics of use of tools of industry, and the development of walking in early childhood. He proved that the mind anticipates the forces of movement with remarkable precision, wasting no energy while experimenting with ‘degrees of freedom’ in performance.

From the beginning of life in the world, movements of a newborn infant show this prospective awareness of their future effect; they know ahead of time the consequence of their action (Delafield-Butt et al., 2018). Made in concert with a sensitive and caring adult other, simple movements of the arms, legs, head, body, and voice in the immediate ‘present moment’ become serially organized into shared ‘projects’ that altogether form compositional units with a *narrative structure* (Delafield-Butt and Trevarthen, 2015; Trevarthen and Delafield-Butt, 2015; Delafield-Butt, 2018). This early beginning of shared understanding shares the same four-part structure of imaginative performance as all the time-based arts of music, dance, drama, and poetry (Malloch and Trevarthen, 2009; Stern, 2010). Its earliest origins can be seen in the composition of movement forming a common pattern of agent-generated action and effect patterned with a characteristic contour of arousal; from *introduction* through its *development* toward its goal, to the *climax* of reaching that goal and then *concluding* the project with satisfaction. This narrative pattern of expectation and performance to conclusion remains invariant throughout life, organising knowledge within the time of creative sensorimotor experience and maintenance of well-being (Trevarthen et al., 2006).

Origins of Intentionality in Movement, With Awareness That Seeks Company

A readiness for learning is evident before birth in the fine detail of projects of action generated by a mid-gestation foetus. In sensitive ultrasound recordings, neuropsychiatrist Alessandra Piontelli (2010) has mapped the movements of the foetus in precise detail. She noted the infant explores her environment, testing the effects of her action by sensing its contingent responses. By 14 weeks gestational age, at the start of the second trimester, the foetus will move to touch parts of the present environment – the umbilical cord, placenta, uterine wall, and compare them with touches of her own body. In the case of a twin pregnancy, a young foetus may move to touch the other twin to sense company in her uterine world. Remarkably, she will do so ‘respectfully’, with a pattern of movement comparable to the way she touches sensitive parts of herself, such as her unopened eyes -- a different, more cautious movement than those actions which are made to touch the placenta and uterine walls. This has been taken as evidence of the earliest social awareness, an appreciation of a sensitive, animate other, similar to oneself (Castiello, et al., 2010).

In singleton pregnancies, a growing foetus will reach to touch her own head and face. Interestingly, when these movements begin at the start of the second trimester the head and face is not innervated with sensory fibres. These grow later and spread across the surface of the head toward the face. As they do so, they respond to touch, but when the parts of the skin are touched that are not innervated, there are no sensory signals. This creates an interesting boundary between response and no-response. Foetuses in the second trimester have been observed to explore this boundary, touching either side of it, intentionally

exploring the change in sense of ‘self’ and ‘not-self’ as development and growth proceeds, until full innervation completes.

Anticipation of what sensation will come as a consequence of body movement is the foundation of all knowledge. Our brains are ‘anticipatory organs’. They are designed to learn and to predict how the awareness of the world responds to actions that engage selectively with its parts, and they attend to the effects produced both by self-generated actions and by the actions others make to select and use objects. This enables one’s own actions to be tailored to sculpt the outcomes one desires, and the actions of others to give information about their interests and feelings. We are enabled to self-create and co-create the world in which we live. And the first evidence of the power of this self-creating agency-with-intelligence for learning is in the intentional movements of the second trimester foetus (Delafield-Butt and Gangopadhyay, 2013).

From Intention-Actions to Intentions-to-Act

In the beginning of life, it is thought these intentions are part-and-parcel of the action itself. The intention is wrapped up in the action, and there is not much thought developed ‘on top of’ this action. The philosopher John Searle calls these ‘intention-actions’, which accurately describes the kinds of anticipatory action observed in the second trimester foetus (*ibid*). At this early age, the cerebral cortex is largely ‘off-line’. It has not yet developed fully and the neural connections to the brainstem and sensorimotor neurons that emanate from the brainstem and spinal column have made connections with the cortex. The intentional control is very basic and concerned with the immediate space and moment of time, a subjective experience that practices learning by the developing infant’s intentions to move in particular ways.

Franz Brentano identified these intentions as the core structure of mind, "Every mental phenomena is characterised by... the intentional". (Brentano, 1874, p. 88). This core aspect of human experience becomes elaborated in infancy and early childhood, but they retain their primary generative impulses. Basic motor intentions, formed in the immediate moment and within a direct, anticipatory awareness of the world actually present, later become abstract elements in the life story of that person. Experiences of living are held as memories that can be reflected upon and reevaluated. The cognitive tools of identifying, conceptualizing, and planning come to the foreground in childhood to enable an ‘off-line’ development of an abstract ‘intention to act’, which may be experimented with and enjoyed in the fantasy of play. The desire to repeat an experience may not be immediately acted out in movement, but it is generated in that mental space that we as adults come to identify as of ‘primary’ importance. But in fact, this abstract creation of experience in imaginative mental space grows on top of a more ontogenetically primary, and evolutionarily primitive subjective experience with its own direct intentions made evident in actions to achieve practical goals.

Sensorimotor Satisfaction in Company: Pride and Shame

Each of advance in development of purposeful or ‘ambitious’ life, whether the primary, immediately expressed ‘intention-action’ of a plan of movement to gain from the affordances of the present world, or a high-order, reflective ‘intention to act’ that serves a remembered goal and a search for more skill, feed another fundamental aspect of psychological experience: the generation of a feeling of *satisfaction*. This is what Jean Piaget in his theory of the development and education of practical intelligence called

“pleasure in mastery”. Human agents -- fetuses, infants, children, and adults -- seek to accomplish their intentions with pleasure. Accomplishment of an intention-action or meeting the expectations generated in off-line abstract reasoning, become ‘satisfied’ on their successful completion, which means generating the affect, or feeling of *satisfaction*, communicated as ‘pride’. If one’s intentions are not realized with this pleasure of completion, distress or frustration of ‘shame’ may confuse further achievements. Expressions of shame record a feeling of failure in gaining abilities that others will share with admiration.

We see this in the everyday actions and interactions of infants and children. Great satisfaction elated to joy results when a toddler accomplishes standing, then running forward to grab a loving father. The intention to stand and to run is felt with satisfaction, and this may be amplified to joyous celebration shared with others. On the other hand, if the toddler falls down and fails in his stand-and-run, great distress results, and this negative affect can become amplified, too, and the feeling of shame is shared with cries of distress and frustration. Such a traumatic experience in school can result from bullying by other children in play, or by too strict, unsympathetic insistence of rules of behaviour and response to questions by a teacher who is seeking prescribed curricular levels of response from a child who may have lost self-confidence in acting with experience. The successful, comfortable, completion of intentional acts is fundamental to an infant’s learning and development, and is reinforced in a child-centred pedagogy that attends to the experience of the infant or child to develop their capacity for pleasure in successful engagement with the world and successful learning of consequences (Richardson, 1964; Trevarthen, Delafield-Butt and Dunlop, 2018).

Generation of repeated successful intentional acts, and taking risks in how to perform them, testing the ‘degrees of freedom’ in the combinations of forces of body movement (Bernstein, 1967), builds the child’s confidence and joy in accomplishing tasks. This sharing of imagination in action is the essential motivation for all cultural beliefs, practices and industry, as well the flourishing of arts and languages that record achievements through generations over many centuries (Frank and Trevarthen, 2012). Children with developmental disorders have weakened impulses for forming projects of activity and perception of resources available in their world. For example, descriptive research of the development of children identified with autism shows that both their motives for elaboration of body movements in play, and their expressions of affective appraisal of what they do, are weakened in ways that cause confusion in cooperative activity with playmates and teachers (Trevarthen and Delafield-Butt, 2013).

The spontaneous enjoyment of learning in companionship from birth gives children a responsibility for assisting generation and transmission of cultural practices. They animate the Culture of Education and its ‘story-making’ (Bruner, 1996, 2003). They take an active role in school, collaborating with teachers who wish to give them new experiences and the practice of new skills which are considered important for a productive and valued life in their society.

References

- Bernstein, N. A. (1967). *The Coordination and Regulation of Movements*. New York: Pergamon.

- Brentano, F. (1874). *Psychologie vom Empirischen Standpunkte [Psychology from an Empirical Standpoint]*. London: Routledge and Kegan Paul Humanities Press.
- Bruner, J. S. (1996). *The Culture of Education*. Cambridge, MA.: Harvard University Press.
- Bruner, J. S. (2003). *Making Stories: Law, Literature, Life*. Cambridge MA: Harvard University Press
- Castiello, U., Becchio, C., Zoia, S., Nelini, C., Sartori, L., Blason, L., D'Ottavio, G., Bulgheroni, M., and Gallese, V. (2010). Wired to be social: The ontogeny of human interaction. *PLoS ONE* 5(10): e13199.
- Damasio, A. R. (2000). *The Feeling Of What Happens: Body, Emotion and the Making of Consciousness*. London: Heinemann
- Damasio, A. R. (2018). *The Strange Order of Things: Life, Feeling, and the Making of Cultures*. New York: Pantheon
- Delafield-Butt, J. T., and Gangopadhyay, N. (2013). Sensorimotor intentionality: The origins of intentionality in prospective agent action. *Developmental Review*, 33(4), 399-425.
- Delafield-Butt, J. T., & Trevarthen, C. (2015). The Ontogenesis of Narrative: From moving to meaning. *Frontiers in Psychology*, 6. doi:10.3389/fpsyg.2015.01157
- Delafield-Butt, J. T., Freer, Y., Perkins, J., Skulina, D., Schögler, B., & Lee, D. N. (2018). Prospective organization of neonatal arm movements: A motor foundation of embodied agency, disrupted in premature birth. *Developmental Science*, 21(6), e12693. doi:doi:10.1111/desc.12693
- Delafield-Butt, J. (2018). The Emotional and Embodied Nature of Human Understanding: Sharing narratives of meaning. In C. Trevarthen, J. Delafield-Butt, & A.-W. Dunlop (Eds.), *The Child's Curriculum: Working with the natural voices of young children*. Oxford: Oxford University Press.
- Donaldson, M. (1978). *Children's Minds*. Glasgow: Fontana/Collins.
- Frank, B., & Trevarthen, C. (2012). Intuitive meaning: Supporting impulses for interpersonal life in the sociosphere of human knowledge, practice, and language. In A. Foolen, U. Lüdtke, T. P. Racine, & J. Zlatev (Eds.), *Moving Ourselves, Moving Others: Motion and emotion in intersubjectivity, consciousness, and language*. (pp. 261-303). Amsterdam/Philadelphia: John Benjamins.
- Lewis, T., & Amini, F. (2001). *A General Theory of Love* (Reprint edition ed.): Vintage Books.
- Llinás, R. (2001). *I of the Vortex: From Neurons to Self*. Cambridge MA: MIT Press.
- Malloch, S., & Trevarthen, C. (2009). Musicality: Communicating the vitality and interests of life. In S. Malloch & C. Trevarthen (Eds.), *Communicative Musicality: Exploring the basis of human companionship* (pp. 1-12). Oxford: Oxford University Press.
- Panksepp, J. (1998). *Affective Neuroscience.: The Foundations of Human and Animal Emotions*. New York: Oxford University Press.
- Perry, B. D., & Szalavitz, M. (2010). *Born for Love: Why Empathy is Essential -- and Endangered*. New York: Harper.
- Piaget, J. (1953). *The Origin of Intelligence in the Child*. London: Routledge & Paul.

- Piontelli, A. (2010). *Development of Normal Fetal Movements: The First 25 Weeks of Gestation*. Milan: Springer
- Reddy, V. (2008). *How Infants Know Minds*. Cambridge MA: Harvard University Press.
- Richardson, E. S. (1964). *In the Early World*. New Zealand Council for Educational Research, 1964, 1971 (2nd ed.), 2001, 2012 (3rd ed.).
- Scottish Government. (2008). *Curriculum for Excellence: A framework for learning and teaching*. Edinburgh: The Scottish Government.
- Stern, D. N. (2010). *Forms of Vitality: Exploring Dynamic Experience in Psychology, the Arts, Psychotherapy and Development*. Oxford: Oxford University Press.
- Trevarthen, C. and Delafield-Butt, J. T. (2013). Autism as a developmental disorder in intentional movement and affective engagement. *Frontiers in Integrative Neuroscience*, July 2013, Volume 7, Article 49: 1-16. doi: 10.3389/fnint.2013.00049.
- Trevarthen, C., and Delafield-Butt, J. T. (2015). The Infant's Creative Vitality, In Projects of Self-Discovery and Shared Meaning: How They Anticipate School, and Make It Fruitful. In S. Robson & S. F. Quinn (Eds.), *International Handbook of Young Children's Thinking and Understanding* (pp. 3-18). Abingdon, Oxfordshire & New York: Routledge.
- Trevarthen, C., and Delafield-Butt, J. T. (2017). Intersubjectivity in the Imagination and Feelings of the Infant: Implications for Education in the Early Years. In E. J. White & C. Dall'i (Eds.), *Under-three Year Olds in Policy and Practice* (pp. 17-39). New York: Springer.
- Trevarthen, C., Delafield-Butt, J., and Dunlop, A.-W. (Eds.). (2018). *The Child's Curriculum: Working with the natural values of young children*. Oxford: Oxford University Press.
- Trevarthen, C., Gratier, M. and Osborne, N. (2014). The human nature of culture and education. *Wiley Interdisciplinary Reviews: Cognitive Science*, vol. 5, March/April 2014, 173-192 (WIREs Cogn Sci, 5: 173–192. doi: 10.1002/wcs.1276)
- Trevarthen C., Aitken, K. J., Vandekerckhove, M., Delafield-Butt, J., and Nagy, E. (2006). Collaborative regulations of vitality in early childhood: Stress in intimate relationships and postnatal psychopathology. In D. Cicchetti and D. J. Cohen, eds, *Developmental Psychopathology, volume 2, Developmental Neuroscience*, pp. 65–126, 2nd edn. Wiley, New York.