Unfolding Perspective

A Theoretical and Empirical Study into the Relationship of Art and Human Development

M.Sc. Thesis

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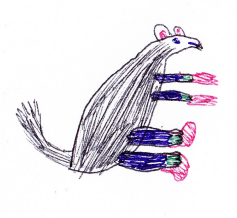

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Prologue

This thesis presented here concerns an attempt to combine the subject of the arts and child development from a scientific point of view. A coupling between artful behaviour and a scientific approach on child development is a rare combination for a research thesis. However, both studies look into the nature of reality and the ways in which the different parts of reality interact (Shlain, 1993). Both art and child development have a specialized lexicon of symbols, used in a distinct syntax. Interestingly, descriptive expressions of one subject can often be applied to the notions of the other. For example; volume, space, mass, force, light, colour, tension, and relationship are terms that can be used when looking at the qualities of an abstract painting in an art gallery, or when examining the qualities of a dynamic system, when observing mother-infant interaction cycles.

When it comes to academic ability, the importance of art and artful behaviour is often erroneously underestimated. Academia tend to be preoccupied with mathematics, science, and language skills. In the middle of this hierarchy are the humanities, and at the bottom are the arts. This emphasis is unfortunate, because creative artful behaviour and imagination is what sets human beings apart from other species on earth. All human beings are born with remarkable natural capacities for interacting with the world in a creative manner. Artful behaviour is one of those capacities in which children are amazingly engaged and confident, which provides us with information about their well-being. In my opinion, artful behaviour has mistakenly been undervalued in the humanities. In recent years, there has been an emphasis on cognitive assessment, which has put a greater emphasis on conformity and finding the “right” answers. We know, however, that many students only become engaged when they use their bodies, for example when dancing or moving in rhythm (Robinson & Aronica, 2009). In response, Howard Gardner emphasized the importance of multiple intelligences, for instance: mathematical, musical, spatial, kinaesthetic, inter-personal, and so forth.

In this thesis, I will provide evidence for the claim that a study into the nature of early artful behaviour provides us with essential information about child development. Rutten-Saris (2002) analyzed early children’s drawings. She poses that artful behaviour can be observed in infants’ behaviour through their motor movements, when captured on paper. These drawing traces provide us with valuable information about the developmental history of the artist and can be used in situations in which individuals are not able to provide verbal information about their well-being. This thesis consists of two parts, which can be read separately. The first part is a theoretical framework regarding the evolutionary origin of human artful behaviour, coupled with early child development. The adaptationist view of Ellen Dissanayake on the subject of art and early human development, together with the developmental theory of Daniel Stern, provide a common ground on which art and child development come together. The second part of this thesis regards an empirical research into the nature of drawing behaviours, analyzed with the Rutten Saris-index [RS-index], an instrument which is designed by Marijke Rutten-Saris (2002) to capture the drawing movements of individuals. The empirical section aims to provide more insight into the claim that drawing movements on paper reflect the behaviour of the artist, which can be observed on video.

Drawing from an unfolding history of human artful behaviour

Abstract - In this section of the thesis, I would like to provide evidence for the hypothesis that art has an evolutionary origin. I will develop my argument from scientific knowledge of early child development and particularly from early drawing development. It will start with a description of commonly used notions of "the arts", followed by a discussion of the valuable work of Ellen Dissanayake, an independent scholar whose research focuses on the anthropological exploration of art and culture. Dissanayake poses an ethological and "adaptationist" view on the biological origins of art. I also rely on the work of Nancy Aiken and Kathryn Coe, who, together with Dissanayake, pose that artful behaviour is not a cultural by-product, but an evolutionary adaptation inherent to human nature. I will argue that artful behaviour can be observed in the intimacy of early mother-infant interactions. Subsequently, I will describe the developmental theory of Daniel Stern, a prominent psychiatrist and psychoanalytic theorist, specializing in infant development. He dedicated his time, amongst other things, to the clinical reconstruction of an infant's early experiences and interactions with its caregivers and the world. Furthermore, I zoom in on the drawing development of young children, by examining the work of Marijke Rutten-Saris. She argues that artful motor movements can be captured on paper. These drawing traces provide information about the developmental history and early-experienced interactions of the artist.

The arts

Western notions of "the arts" versus art as behaviour

The first obstacle stumbled upon by those who wish to say something useful about art or "the arts" is one of epistemological nature: What do we mean when we refer to something as art? Art is a derivation from the Latin *ars,* which includes the meaning of "skill in working." Peculiarly, it equates with *scientia* or "knowledge", though at the present time, art and science are often contrasted (Bradshaw, 2001). Traditionally, the term art was used to refer to any skill or craftsmanship. This notion changed during the Romantic period, when art was viewed as a special faculty of the human mind to be classified with religion and science (Gombrich, 2005). Since then, the meaning of art is frequently explored from many disciplinary angles, varying from a philosophical, historical, anthropological, psychological, and even an ethological point of view, analyzing its relationship with humans and generations.

Orthodox Western notions of art commonly state that art is the rare, elite, original, significant, and individual product (*artefact*) or process of deliberately arranging symbolic elements, such as sounds, colours, movements, or other aspects, in a creative manner that influences and affects the senses, emotions, and intellect. It is closely related to concepts of *essential attributes* like beauty, skill, and costliness, and it is seen as a *cue* to something else, for example, the presence of a deity. Art can also be seen as an activity or *behaviour* (e.g., making or displaying), as a means of self-expression through imagination and representational accuracy (Dissanayake, 2008). In this view, art encompasses a diverse range of human pursuits, creations, and approaches of expression, including music, dance, literature, film, photography, and other forms of visual ornamentation and representation; for instance painting and sculpture. These artefacts are intentionally created by their makers, with a significant degree of aesthetic interest and often displaying meaning beyond simple description.

Most of these ideas, however, are by no means universally held or practiced, since nearly all (small-scaled) human societies have no concept of "art" in the Western sense of an overarching category that includes such diverse entities as paintings, carvings, songs, dances, and literature (Dissanayake, 2008). In many traditional societies, originality and creativity are often discouraged (Aiken & Coe, 2004) and art may not necessarily be beautiful or skilled (Danto, 2003; Van Damme, 2008). Rather than one individual being the artist, an entire group may join in the making and performing of the arts. John Chernoff, an observer and practitioner of African drumming, states that artful behaviour in Africa is about participation; if not, there is no meaning (in Dissanayake, 2008). In some African cultures, it is common belief that participation in ceremony (even by the audience) can enhance potency and fertility, as shown in Figure 1 (Lawal, 1996, p. 81).

Figure 1. Milango girls performing a marriage celebration dance (Elisofon, 1959).

Whether art can be defined has been a matter of great controversy (Adajian, 2007). If there is no universally held concept of art, one might argue that it should consequently be considered as a socially constructed concept. For one who wishes to investigate art from a developmental point of view, however, there must be universal distinguishable features that have a plausible evolutionary origin and adaptive function or multiple functions.

A valuable effort to describe the characteristic, cross-cultural features of art from an ethological, bio-behavioural perspective is that of Ellen Dissanayake (1980; 2000; 2004; 2006; 2008). Instead of depicting art through recognition criteria which emphasize characteristics of specialized skill or being made in a recognizable style (as among others in work of Dutton, 2006), she conceptualizes art as a *behaviour* or craft; to describe what people do or accomplish when they engage the making of art, or, stated differently, when they "*make special*". Dissanayake claims that when humans engage in artful behaviours, their bodily experiences are transformed. In other words, their rhythmic facial, vocal, and gestural movements are generated in interaction with the world and an embodied awareness emerges, that is ruled by these rhythms of felt behaviours (Trevarthen, 2009; Trevarthen & Daniel, 2005). Engaging in artful behaviours gave rise to and continues to characterize all instances of what is called "the arts". This adaptationist point of view pertains to important instances of the arts in small-scale societies, given that it is easier to conceptualize art as behaviour if it is thought of as dancing, singing, acting, sculpting, painting, etcetera, since these activities take place in time. Art is thus seen as a process or activity, rather than the product or outcome of the craftsmanship, without necessarily being referred to as being skilled or beautiful.

Art as an adaptation in human evolution

Recent archaeological findings in Africa underscore the intimate relationship between art and human beings. The arts, and the mental processes and manual activities involved in

its form of representation, may well be as old – if not older[1] – as *Homo sapiens,* and have richly developed in multifarious directions once humans began to spread across the globe (Zijlmans & Van Damme, 2008). The arts can be seen as evolved tendencies of human nature. This is revealed from their traces from at least 100,000 years ago in the African Middle Stone Age, when they used hematite and red ochre together with subsequent material artefacts[2] (Bradshaw, 2001; Dissanayake, 2008; Watts, 2002). About 50,000 years ago, there was a marked increase in the diversity of distinctive artefacts and cave paintings. Generally known examples of these Upper Palaeolithic cave paintings can be found in the Caves of Lascaux (as shown in Figure 2).

Figure 2. Palaeolithic cave painting of a dun horse at Lascaux, estimated to be around 17,000 years old.

Throughout the history of human existence, the need to regulate and organize what is perceived as meaningful arrangements, or *making special*, has yielded an essential role in the physiological, psychological, and neurological development of early human beings. People of all known cultures and societies displayed artful behaviours, regardless of their economic or technological rank, in the past, as well as in the present (Aiken, 2010; Rutten-Saris, 1990, 2002).

The fundamental features of the arts helped human ancestors to adapt to their environment and reproduce themselves successfully over generations. According to Jung (1959/1990) there was a time that man existed, unconsciously and closely attuned to nature and his instincts. Over time, a consciousness emerged. The conveying of a sign or marking bestowed a certain empowerment upon this awareness, and could be interpreted as: "I am (here)" (Foks-Appelman, 2005). Among these modern humans all behaviour took place in the context of a web of beliefs, rules, and values of symbolic cultural meaning, emotionally reinforced by the engagement in rituals[3] (Chase, 1994). An artful culture could serve as a medium for transmitting information or enforcing cooperation through large networks of people who could be called upon to aid others in the harsh environments of Pleistocene Europe. The markings of territory or recording of clan symbols could be a means of group identification

[1] A category of carefully produced hand axes that were made by the ancestors of modern humans from around 1.6 million years ago onwards, may prove an exception to the idea that activities aimed at increasing visual appeal and attention are exclusive to *Homo sapiens* in the history of human evolution (Van Damme, 2008).

[2] People from the Middle Palaeolithic used ochre primarily to decorate their own bodies and possibly other organic materials (Knight, Power, & Watts, 1995).

[3] Rituals in early human culture demanded seemingly disproportionate energetic investments. Like their animal counterparts, human rituals can be loud, multimedia displays, illusion inducing, stereotyped and prone to massive redundancy. The difference with the individualistic and competitive animal manipulative displays is that, in traditional cultures, their most potent human counterparts are quintessentially collective performances. They distinctly separate social relations of power, identifying groups with common interests and setting them in opposition to other groups (Knight, et al., 1995). In opposition, Aiken (2010) states that also animal rituals, as is observed in bonobos, serve similar purposes, in that they reduce aggression and create strong social bonds, and they are not to be seen as solely individual acts.

or commemoration of events or of the death of notable or loved individuals (Aiken, 2010; Bradshaw, 2001).

Dissanayake (2008) argues that art is an integral and necessary adaptation[4], in opposition to a non-utilitarian by-product of other adaptations (as suggested by Pinker, 1997), given that, among others, art is generally a source of great pleasure, like other adaptive behaviours such as mating, parenting, resting, and so forth. Moreover, young children are naturally predisposed and easily and spontaneously encouraged to engage in the arts when they make marks with their fingers in the sand (Golomb, 1992) or when they move to sounds or movements in their proximate environment unpremeditated, decorate their bodies and possessions, find pleasure in rhythm and rhyme, or enjoy make believe. Generally, the arts have occurred under appropriate and adaptive conditions or circumstances, like important life concerns, and they are costly; especially in small-scale or subsistence societies, art behaviour consumes resources far beyond what one would expect for an unimportant activity. The ability to forge a weapon or build a temple presumably contributes to personal welfare and fitness, but careful decoration of these objects[5] would seem a costly, high-energetic and time-consuming activity, time which could better be used in more obviously beneficial pursuit.

Art as part of our psychobiological heritage

Since numerous scholars indicate that engaging in artful behaviour comes naturally to the human species, it is interesting to question what underlying mechanisms account for this behaviour. Human bodies, brains, and behaviour evolved to enable individual survival and reproduction. In spite of all their individual differences, human beings are much alike. The rudimentary sensations and perceptions that humans experience, including at least some general aesthetic preferences, are roughly similar, since basic human emotions are comparable from the early development of infants, regardless of the culture in which they have been born; different cultures invent similar modes of response for the most essential social purposes (Aiken, 2010; Dissanayake, 2000; Scharfstein, 2008). In the early history of our species, when human ancestors handled or manipulated the physical world with the beginnings of alertness for the changes in experience that follow these actions, moved together in synchrony or matched vocalizations and gestures, they facilitated the basis for enculturation in their life – that is, *belonging* to a social group, finding a sense of life *meaning*, developing *competence* for life, and eventually engaging in the *elaborating* of experience that we now call the arts (Dissanayake, 2000).

Cultures depend on a continuous, highly creative learning process between adults and youngsters, motivated by an innate human capacity for companionship and attachment in experience, which is mediated by an interpersonal transfer of intentions, interests, and feeling in conversations of rhythmic motor activity. All achievements of art depend upon the affections and shared enthusiasms of intersubjective relationships (Perinat & Sadurní, 1999; Trevarthen, 2009). Extensive interaction between young and old individuals provides the necessary foundation for establishing traditions and complex social behaviour. Overall,

[4] From an ethological, adaptationist point of view, all parts of a society are interrelated and individual behaviours within a society, such as art making, perform some intrinsic function specific to that society. These behaviours can be expressed in a variety of cultural and individual manifestations (Dissanayake, 2008).

[5] This phenomenon appears to be universal and not exclusively human (Rutten-Saris, 2002). A primitive aesthetic sense is also described in nonhuman primates. Westergaard and Suomi (1997) observed capuchin monkeys reshape portable forms with their hands and with stones, and decorate them with leaves and paint, when given clay, paint stones, leaves, and sticks.

emotional and social bonds maintain the integrity of the community over time[6]. During friendly interaction, these bonds are reinforced and maintained by the release of the brain chemicals neuropeptides, oxytocin in females and arginine-vasopressin for males, along with opioids such as endorphins, enkephalins, and dopamine (Aiken, 2010).

In comparison, some evolutionary scientists hold the assumption that humans are inherently selfish and competitive, serving their own survival and interests without mercy. In the social sciences, the Hobbesian proverb "*Homo homini lupus"* ("man is wolf to man") is sometimes used to characterize human nature. This is a questionable statement, however, since wolves are known for their social and cooperative behaviour towards their own kin (Macdonald, 1983). Frans de Waal, a Dutch primatologist and ethologist, argues that, instead of inevitably competing with one another, humans and animals are programmed to reach out to members of their own species and, in some cases, even to members of other species[7]. The most basal empathy is found in all mammals and presumably even in birds[8]. All group-living organisms are sensitive to collectivity and attachment[9]; group-oriented behaviour improves the quality of the social environment not just for the individuals who

[6] Coe (2003) poses a theory of maternal hierarchy, in which mothers teach their offspring their way of life, which has proved successful for themselves. It is in these children's best interest to learn from their mothers, who have successfully survived and reproduced. In addition, Steadman, Palmer, and Tilley (1996) argue that human beings use a *descendant-leaving strategy* that has parents influencing the behaviour of their offspring and, by doing so; they influence how their offspring will influence the behaviour of the next generation by ancestor worship. Religious rituals that focused on ancestor worship could strengthen kinship ties and the traditions on which they depend. Palmer and Steadman (1997) suggest that ancestor worship is the root of all religions (Aiken, 2010). In addition, Alcorta, Sosis, and Finkel (2008) state that the intimate association of music and religious ritual across all cultures, together with the cross-cultural prevalence of religious rites of passage during adolescence, suggest an important role for music in the evaluative conditioning of religious beliefs and symbols. Patel (2010) has found that musical behaviours, like playing and listening, can have lasting effects on non-musical brain functions, such as language and attention, within individual lifetimes.

[7] It is a common misconception that if our genes are supposed to be selfish (as suggested by Richard Dawkins, 2006), then humans must be selfish too. Selfish genes, however, do not explain how motives and emotions of individuals within their bodies and minds may be generated and communicated (De Waal 2009; Trevarthen, 2009).

[8] Hofer (1987) researched biological processes in early social relationships in relatively simple animal model systems. In spite of the resistance in that time among fellow developmental psychologists to the idea that we could learn anything from the study of early social relationships in other animals, Hofer described how 2-week-old infant rats show social isolation distress and other responses to maternal separation. As was concluded from earlier research, it was thought to be unlikely that infant rats had evolved attachment systems similar to kittens, primates, and human infants. Psychological attachment is usually inferred from the strong tendency of the infant to maintain proximity to familiar social companions and from the infant's immediate responses to separation, which generally consist of an intensification of attachment behaviours indicative of distress. Hofer, however, found that infant rats responded to separation from familiar social companions with high levels of vocalization, locomotion, and self-grooming, even in their own home cage. An unfamiliar environment intensified the response to isolation. Young rats employ a strategy of adding cues in different sense modalities in the alleviation of separation distress. Moreover, Hofer suggests that, differences created in the nature and quality of behavioural interaction within the dyad can have marked effects on the infant's response after separation and suggest the presence of regulators within the interaction that determine the form of the response after withdrawal by separation. The organization of nursing in rats revealed a degree of synchrony and reciprocity. Regulatory sensory interactions seemed to depend upon the stimulation being delivered in a periodic or rhythmic pattern, suggesting a role for timing in addition to intensity and modality. Hofer concludes that mother-infant interactions that proceed from attachment are regulators of different physiological and behavioural systems in the young.

[9] For more information on empathic understanding and the importance of artful behaviour, see Hagman and Press (2010).

show it, but for everyone else as well (De Waal, 2009). This phenomenon might even be observable in brain size, as suggested by Dunbar and Schultz (2007)[10].

Evolutionary psychologists have attributed significant social functions to art, such as augmenting the impact of ritual ceremony, thereby strengthening religion's power to cement group cohesion, indicating cultural group membership and identifying descendants with dress or badges[11] (Aiken, 2001, 2010), enabling behavioural coordination and neural entrainment through rhythmic movement and ritualized participation in temporally-organized performances (Dissanayake, 1992, 2000). The arts provided humans with unique cognitive and emotional satisfactions that require the cooperation of others and may supersede the narrow self-interest that characterizes so many behaviours of humans and other animals.

According to Carroll (2004), Darwin perceived human beings to be social animals and their whole motivational and emotional organization to be geared towards interaction with other humans. Over evolutionary time, apathetic and unsociable babies would not have developed as well as their more interactive age-mates, who would leave more of their genes to future generations. This strongly supports the hypothesis that artful behaviour is important in reinforcing sociality, by enhancing attachment and cooperation, and contributing to social cohesion and continuity (Aiken, 2010; Dissanayake, 2000). Each human being is born with senses and emotions that move us to seek and engage in intimacy with others before we do anything else.

Early infant behaviour

Universal features in interactions

Although distinct conditions produce different outcomes in individuals, all subjects have underlying embodied psychobiological needs, such as *intimacy*[12]. From the moment of birth,

[10] Dunbar and Schultz (2007) describe how the brains of certain animals (such as primates) have grown substantially larger than the minimum size required for staying alive. Although evidence favours the suggestion that the computational demands of living in large, complex societies select for large brains, recent explanations also tend to emphasize that it may have been the particular demands of more intense forms of pair bonding that triggered this evolutionary development.

[11] *Badging* can include differences in language, dialect, or slang, costume, hairstyle, body decoration, dress, gender, friendliness, status, wealth, art style, symbols, customs, rituals, and accepting religious beliefs. Art itself can bind individuals together into a cooperating group (Aiken, 2010; Coe, 2003).

[12] Because of its spontaneous nature and widespread occurrence, mother-infant interaction as described is assumed to be an evolved, adaptive part of human nature. Evolutionary scientists, however, like many other members of society, often seem uncomfortable with intimacy, emotion, and what cannot be verbalized, and the sentiment of empathy together with maternal love is sometimes ridiculed as being sentimental (De Waal, 2009; Dissanayake, 2000). A century ago, John Watson (1928), a follower of the nonrepresentational school of behaviourism, argued that humans as well as animals are controlled by the reductive power of conditioning. Behaviourists uphold the belief that behaviour is all that science can observe and know, and that the mind, if such a thing even exists, remains a black box, and emotions are largely irrelevant. Human action is described as the product of simple, observable stimulus-response contingencies in which all learning depended on events such as "reinforcement" or "punishment" (Morsella, 2009; Skinner, 1953). From Watson's point of view, children should not be cooed at, held or tickled, and they only ought to be slightly touched, if they have behaved incredibly well. These environments have proven to be deadly for these infants, as has been observed in orphanages in Romania in 1989, together with the experiments of John Bowlby and Mary Ainsworth on maternal deprivation and attachment theory (Barnett & Vondra, 1999), as well as in the famous series of experiments with baby rhesus monkeys, conducted by Harry Harlow between 1957 and 1963 (Harlow, Harlow, Dodsworth. & Arling, 1966; Van Elk & Hunnius, 2010).

human beings share the innate and uniquely need for companionship. Because human infants are helpless for a far longer time after birth than newborns of any other species[13], they require prolonged attention and care. Therefore, mothers and infants found ways to develop and sustain intensive bonds (see Figure 3[14]). Research on how infants communicate with parents has revealed the natural, universal process by which this learning grows (Dissanayake, 2000; Trevarthen, 2009).

Figure 3. *Maternidad* or Maternity, by Cristóbal Moreno Toledo, 1995, Spain

From birth, infants are physically predisposed to emotionally encourage adults to care for them; they have, for instance, big heads, big eyes, and soft skin. However, no other cooperative breeding animal needs to care for their offspring as long as human beings do, so a stronger social attachment is necessary for survival. Several authors on the subject of developmental psychology describe certain universal characteristics in the interactions of mothers and infants, which provide the foundation for this stronger attachment (Aiken, 2010; Dissanayake, 2000; Rutten-Saris, 2002; Stern, 2000; Trevarthen, 2009).

Daniel Stern (2000), a prominent psychiatrist and psychoanalytic theorist, specializing in infant development, states that the infant's major development task is the creation of ties with others, that is, to increase relatedness with its caregivers. The newborn infant wants to interact with a parent who responds contingently and intuitively. The caregiver elaborates and varies his or her movements and gestures maximally into synchronized, rhythmic vocalizations and movements, in order to fit in with or gently direct the baby's emotional state. The baby in turn responds to the caregiver's signals with coherent, self-regulated head

[13] Unlike other species, human infants are much more immature at birth. A human infant's brain continues to grow and mature outside the womb: between birth and age four, its size triples. In our ancestral past, extended immaturity and long life spans provided a foundation for establishing emotional ties, for learning and for practicing necessary complex social skills (Aiken, 2010). Furthermore, the costs of losing an offspring became rather high. Knight, et al. (1995) state that, as a response to the rapid phase of encephalization, females experienced increasing levels of reproductive stress, which supposedly led to the development of symbolism. Since menstrual bleeding was the only cue offering males positive information on the fertility of possible female partners, and, pronounced menstrual bleeding was valuable for extracting mating effort from males, even non-cycling females deceived males by joining in with menstruating relatives whenever blood was flowing, painting up with red ochre pigments to signal their fertility. Dance and associated body painting long preceded the production of representational imagery on inanimate surfaces. Moreover, human beings are cooperative breeders, that is, dependent on group cooperation to produce and raise costly slow-maturing infants (Hrdy, 2001). Engaging in group-bonds with other females enhanced the chance of survival for themselves and their offspring.

[14] Born with progressive muscular dystrophy, Cristóbal Moreno Toledo was not able to use his arms or feet. At the age of thirteen, he started to write and illustrate romantic poems with his mouth to communicate and to express his feelings.

movements, facial expressions[15], hand, arm, and leg movements, and vocalizations of its own, as if mother and infant are participating in a jointly cooperated rhythmic pulse (Damasio, 1994). Human infants are born with specialized brain pathways for seeking out and responding to these emphasized and elaborated rhythmic and modal signals from other humans. Stern (2000) states that the infant is actively forming a *sense of an emergent self* in the first two months of its life. This is a sense of organization in the process of formation, as well as the result of this process, and it is a sense of self that will remain active for the rest of an infant's life; an experiencing being alive while encountering ones self or the world at a given moment[16]. Both the child and its caregiver find this engagement to be pleasurable and completely absorbing[17] (Aiken, 2010).

Analysis of the emotional exchanges between the infant and its partner demonstrate turn taking, that is, behavioural periodicities of social interactive rhythms underlie this interaction and provide a temporal structure for the organization of cognitive and affective experience (Beebe, Alson, Jaffe, Feldstein, & Crown, 1988; Lester, Hofman, & Brazelton, 1985). Cycles of attention and non-attention are part of the development of social interaction (Stern, 2000). During mother-infant interaction, cycles of attention are thought to indicate social engagement whereas non-attention indicates disengagement[18]. Microanalysis of videotaped interactions of mothers and infants show that infants have a capacity and intrinsic motivation to detect and control contingent events and build up expectancies (Papousek, 2007). They play an active role in their interactions with adults, and, they are able to show by means of coordinated acts that purposes are being regulated responsively (Murray and Trevarthen, 1986; Trevarthen, 1979).

Furthermore, despite slight cultural variations, caregivers intuitively talk to babies in a typically soft, high-pitched, melodic voice[19], known as *motherese*, or baby-talk, which babies

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[15] Infants are known to imitate facial expressions to a certain extent, as was found by Meltzoff and Borton (1988). Furthermore, infants appear to vary their facial expressions depending on the sex of the parent (Falk, 2004).

[16] In this respect, Clark (1998) provides insight into the nature of a primary consciousness that is applicable in infancy. Primary consciousness is neither self-reflective nor verbalized, and it lasts only during a present moment that corresponds to 'now'.

[17] Neuroscientist Jaak Panksepp (1998) demonstrates that social bonding for both men and women is observable in brain chemistries, which are activated by friendly social interactions, such as mother-infant interaction. Neuropeptides are implicated, such as oxytocin and prolactin, and opioids such as endorphins and enkephalins. Dopamine is also supposed to play an important role. In mammals, oxytocin is associated with maternal behaviour and birth. Oxytocin predominates in female sexual behaviour and it is also important for social affiliation, trusting behaviour, and reduction in anxiety and aggression. The release of arginine-vasopressin in males is suggested to drive their sexual behaviour, and, is also of primary importance for behaviours of, among others, territorial marking, social recognition and anxiety, pair-bonding and paternal care (Aiken, 2010). The opioids have morphine-like actions. Dopamine is related to focussing attention, energizing the body, motivation to retain an award, and it is responsible for the euphoric effects associated with drug-use, for instance, amphetamine and cocaine. Panksepp (1998) notes that touching and holding or rocking a baby rhythmically appears to activate this opioid system, providing the infant and caretaker with feelings of pleasure and well-being. In the same way, engaging in artful behaviours by singing and clapping hands in time flood participants with similar positive feelings. Furthermore, these brain chemicals seem to deactivate critical assessment of the situation and negative feelings and play a crucial role in attachment (Aiken, 2010).

[18] Starting from birth, infants frequently occupy a state of so-called alert inactivity, in which they are physically quiet and alert and are taking in external events (Stern, 2000).

[19] Universal human pitch preferences and an innate sensitivity to consonance and dissonance set the stage for developing speech and musical expectancy. It is observed that, throughout the world, infants prefer song to speech, particularly songs that are slower, higher-pitched, and exaggerated in rhythm (Alcorta, Sosis, & Finkel, 2008). The singing of lullabies is also universal, and it conveys meaning that is emotional rather than linguistic.

prefer to typical adult conversational speech (Falk, 2004). A caregiver contingently slows down, simplifies, exaggerates intonation contours around phrases, as well as stress patterns within words and sentences[20], and repeats his or her body movements in a way that complements the infant's sensory, perceptual, integrative, and motor capacities, and constraints and facilitates perception of and familiarization with the caregiver's sympathetic behaviour, within a quarter of a second (Stern, 1995). Along with this special vocal behaviour, adults engage infants' attention by the use of rhythmic head and body movements, gestures, and unusual facial expressions such as widened eyes and sustained smiles, as well as vocal sounds, in a dynamic and an almost ritualized way[21]. Since both caregiver and infant recognize these behavioural patterns, they provide a common language, and special moments of connection (Meltzoff & Borton, 1979). Parents attribute their infants with intentions, motives, and autonomy, which make the behaviour of the infant understandable; as if they were communicating with the individuals the infants are *going to be* (Stern, 2000). The caregiver's intention to participate in these exchanges can be seen as selective, interpretive, and creative; an essential part of *parental scaffolding*[22] (Wood, Bruner, & Ross, 1976), in following of what Lev Vygotsky named the concept of proximal development (Vygotsky, 1996).

Over much of the first year of the infant's life, mother and infant engage and disengage, synchronize[23] and alternate, practice and differentiate their physical, physiological, and

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Furthermore, musical speech provides a temporary framework or scaffold that, among other functions, facilitates the eventual comprehension and production of speech in the infant (Falk, 2004). Bickerton (2004) states that senseless, soothing sounds work far better at calming a fractious baby, than the most persuasive of verbal arguments.

[20] Aboitiz and Schröter (2004) focus on the neural substrates for the development of reciprocal, vocal interaction between mother and infant. Early human mothers are thought to have engaged in reciprocal vocal interactions with their infants in which their parietotemporal-prefrontal circuits became "locked" in such a way that the infant incorporated the exaggerated gestures and vocalizations of the mother, generated a template and rehearsed these in the presence of the mother, who then produced new vocalizations or repeated the same ones. Moreover, this locking of parietotemporal-prefrontal circuits probably serves as the basis for the development of more complex reciprocal interactions between older individuals, which may be the precursors of true conversations.

[21] These vocalizations, expressions, and movements are repeated, often with rhythmic variations. Variations in rhythmic behaviour are, for instance: loud and soft vocalizations, large and small expressions, fast and slow movements, and so forth.

[22] Vygotsky (1996) believed that children are active explorers of the world, seeking to test their ideas and expand their knowledge. He was strongly committed to the idea that the child's social environment actively influences their development. In his view, cognitive development occurs as a function of the child's interaction with partners who are more skilled than the child. Vygotsky stated that the interactions between caregivers and infants took place according to the concept of the zone of proximal development. He defined this concept as the difference between the child's actual developmental level as determined by independent problem solving, and, their potential development as determined through problem solving under adult guidance or in collaboration with more capable peers. The zone of proximal development represents a specific way in which more capable members assist the child's development at a level slightly beyond the child's own capabilities. In addition, scaffolding is an interactive process in which adults or more capable peers adjust both the amount and the type of support they offer to the child gradually, leading to the eventual mastery of the skill being taught. Caregivers initially try to encourage the child to operate at the limit of their ability. If the child does not respond, the adult will use more specific behaviours to direct the child, and they may vary the type of instruction offered. As the child begins to experience success, the adult intervenes in more indirect ways, reducing the level of instruction and encouraging the child to move forward. Vygotsky believed that all human cognitive activity, both social and individual, is mediated by the use of symbolic tools, such as language, art, numbers and other culturally derived products (Keenan, 2002; Vygotsky, 1996).

[23] Bosman (2008) states that ticking objects tend to synchronize in each other's rhythm, as was observed by

emotional synchrony and reciprocity[24] by means of these dynamic, cross-modal, expressive signals (Dissanayake, 2008; Tronick, Heidelise, & Brazelton, 1977). These synchronized behaviours give rise to artful behaviour later in life. As the mother sings, dances, paints, and moves together in time with her baby, feelings of cohesion are amplified through emotionality. An infant learns to recognize these patterns over time, and repeats these artful behaviours, not only with its mother, but also with others and with artful materials in his environment, as he or she grows older. Through the experienced rhythms and modes in mother-infant interaction, engaging in and experiencing of the arts is further developed into adult manifestations of artful behaviour. Artful behaviour provides similar pleasure and mutuality as what has previously been experienced in mother-interaction (Aiken, 2010; Dissanayake, 2000). In sum, art provides us with a pleasurable experience through interaction, which resembles the mother-interaction we experience since birth, including the rhythmic gestures and vocalizations, the singing, chanting, and dancing, because the social bond between humans is needed to bind adults together in order to elicit cooperation. The feeling of oneness with the others who are marching or chanting together overcomes reason and makes for the experience of emotional bonding with others (Aiken, 2010). In the following paragraphs, certain qualities of this mother-infant interaction are further explained. These qualities are also implicated in our perception and experience of the arts or artful behaviour.

Physiognomic perception

Art evokes emotions in distinct ways and can bind individuals emotionally. In this context, the notion of aesthetic perception can be used, suggesting a special form of perception for art and artful behaviour. Theodor Lipps explained expressive qualities in art and music in terms of empathic apperception or aesthetic empathy: *Einfühlung* or 'feeling into', as he named it. Lipps saw expressive qualities in art objects to be illusions resulting from the projection of the perceiver's internal bodily or affective states onto the work of art, through the psychological mechanism of projection (Montag, Gallinat & Heinz, 2008; Rosar, 1994). Furthermore, Lipps pointed out that the perception of expression involves the activity of forces[25] (Arnheim, 1954).

In addition, Heinz Werner coined the term physiognomic perception as playing a central

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Christiaan Huygens. This physical law is observed in two clocks hanging on the same wall. Over time, they will tend to synchronize, that is, tick in each other's rhythm. This theorem applies to human beings as well, because they have a heart beat and breathing rhythm. The concept of synchronization will be further explained in the paragraph "*synchronization of movements"* (p.18 of this section).

[24] Emotional synchrony and reciprocity are ingredients of what is referred to as *attunement* (Hofer, 1987; Stern, 2000). A parent attunes with the baby's needs by understanding its emotional needs through its spatial movements and by reacting on these movements in the same modus (reacting on vocalizations with vocalizations) or in another modus (reacting on vocalizations with touch or rocking the baby), see Smeijsters, 2003.

[25] Arnheim (1954) states that the expression of an object is inherent in the visual pattern itself. What we see provide clues for whatever knowledge and feelings we may mobilize from memory and project upon the object. The delicate balance of all these dynamic factors produces the complex and unified expression of the whole. The impact of the forces transmitted by a visual pattern is an intrinsic part of the percept, just as shape or colour. Arnheim sees a visual object as a stimulating action upon the organism that results in action within the nervous system. Any visual object is a dynamic event and an object at rest is one in which forces are not absent, but in balance. The difference between the immobile shape of a painting or statue and the body of a dancer in motion becomes of less importance.

role in the experience of art and music[26]. Physiognomic perception (Rosar, 1994; Werner, 1978) refers to a mode of perception attuned to the expression of expressive attributes of, for instance, faces, gestures, intonation, mood, and, also to inanimate objects[27]. The term distinguishes perceptual experience from an emotional response. Rosar (1994) states that the phenomenology of the experience of a work of art reveals that art is expressive, whether or not the observer of art responds to it emotionally. Although a piece of music sounds cheerful, the listener does not necessarily experience joyful feelings in that moment[28]. In the instance of listening to music, the physiognomic quality, characteristic for the temperament of this piece of music, is based on the way the interrelated musical features –the components of the tones, melody and rhythm- are expressed[29].

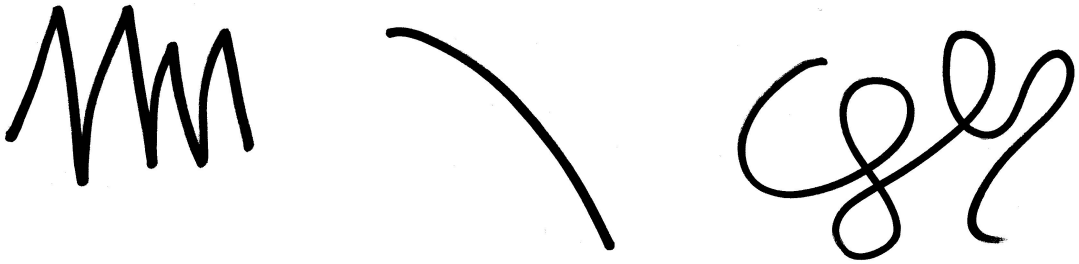

Figure 4. The physiognomic qualities of drawn lines, as described by Bosman (2010). Individuals experience these lines unanimous as angry, sad, and happy, respectively.

Physiognomic perception is an intrinsic quality of perceptual experience and coexists with objective-technical perception. The latter is oriented to a different class of perceptual attributes; that is, those corresponding to the traditional primary and secondary qualities of Galileo and Locke[30]. Faces and bodily gestures are ordinarily perceived as being expressive. When an observer perceives a face, one cannot totally define it by objective characteristics such as facial angle, blue eyes, etc. The face also has physiognomic properties. A face can be tense, energetic, tired, etcetera. These qualities are not feelings, but, rather, perceptions[31]. As mentioned earlier, this phenomenon also applies to artful behaviour, as is shown in

[26] Werner explained physiognomic perception in terms of his holistic organismic theory of perception in which the perceiver's body participates in perceptual-motor activity as a totality (Rosar, 1994).

[27] Physiognomic qualities can be readily attributed to lifeless objects, as can be seen in objects of art or in landscapes, which may suddenly be seen as expressing a certain mood. Aesthetic perception is simply a special case of physiognomic perception, dominated by the particular orientation toward the artistic (Rosar, 1994). Physiognomic properties of art objects are, for example: A calm or agitated piece of music, a cheerful or sad painting, and so forth.

[28] It is possible, however, that one can perceive the physiognomic qualities of a piece of music in combination with a corresponding emotion, yet have no emotional response to it on another hearing.

[29] Infants experience these dynamic relationships in what they observe, whether it is in a person or an object. Smeijsters (2003) refers in this context to the *embodied meaning* of music. The perception of a musical piece comes into being from the musical structure of the piece; from the way the interlocking pieces are put together. It is the structure of this musical piece that is emotionally charged.

[30] Primary qualities are, for instance, object size, shape, motion, and number, whereas secondary qualities are, among others, sensory attributes like colour, sound, or taste.

[31] Werner stressed that, while correlated with shapes, configurations, colours, or sounds, physiognomic qualities are not reducible to them (Rosar, 1994).

Figure 4.

With respect to child development, Werner (1978) and others have shown that physiognomic perception precedes the perception of objects in terms of objective-technical properties. Even in adults, there is evidence of the priority of physiognomic perception; in the perception of faces, adults tend to see the expression, for instance, a cheerful face, long before they can tell what exact features account for this expression[32]. This priority of expression, although somewhat modified in adults by a scientifically oriented education, is striking in children and tribal people (Arnheim, 1954).

Modal and amodal perception

Infants perceive the world through their senses. They can see, hear, smell, taste, and touch, whether it is a feeling on their skin or proprioceptively, what happens around them. Perceivable stimuli can contain *modal* and *amodal* qualities. The *modal qualities* of a stimulus are certain non-transferrable sensible characteristics, as is the case with colour, tone, or sweetness, for example; an infant cannot perceive colour with its tongue. Amodal qualities of a stimulus consist of non-specific information, which seems to be perceived and transferred intersensory, as is the case with, among others, intensity, speed, duration, space, rhythm, and form (Bosman, 2010).

Infants appear to be predesigned to be able to perform a cross-modal transfer of information that permits them to recognize a correspondence across, for example, touch and vision (Stern, 2000)[33]. In the late 1970s, an experiment of Meltzoff and Borton (1979) provided new insights in the capacity of human infants to transfer perceptual experience from one sensory modality to another. Meltzoff and Borton blindfolded three-week-old infants and gave them one of two different pacifiers to suck on[34]. One pacifier had a spherical-shaped nipple and the other had a nipple with buds sticking out from different positions around its surface. After the baby had had some experience feeling the nipple with only its mouth, the pacifiers were removed and placed side by side with the other kind of pacifier. When the blindfold was taken off, after a quick visual comparison, infants looked more at the nipple they had just sucked, suggesting a cross-modal transference of touch through vision (Stern, 2000). This seems to work just as well with the ability to perform audio-visual cross-modal matching.

In this respect, Stern concludes that infants experience communication with their

[32] Arnheim (1954) states that our senses are not self-contained recording devices operating for their own sake. They have been developed by the organism as an aid in properly reacting to the environment. The organism is primarily interested in the forces that are around it – their place, strength, and direction. Hostility and friendliness are attributes of forces. And the perceived impact of forces makes for what we call expression.

[33] It is in the capacity of the infant to detect correspondences between his own actions and those of a participant. This is possible through the mechanism of cross-modal correspondence, as Meltzoff defines. An infant's perception of correspondence between his own behaviour and that of his partner provides the infant with a fundamental relatedness between self and other it (Beebe, Sorter, Rustin, & Knoblauch, 2003). The infant maps the visually, proprioceptively or otherwise perceived behaviour of the caregiver onto its own motor plans.

[34] When not occupied with nutritive sucking, infants engage in a great deal of non-nutritive sucking on anything they can get a hold of, including their own tongues (Stern, 2000). By observing this frequently performed behaviour, infant's preferences can be monitored, for example, according to their sucking rate or speed. Furthermore, infants' visual preferences can be monitored by their looking patterns as well. It has been found that infants respond to new stimuli by attending to it longer visually, and, moreover, if the same thing is presented to infants repeatedly, they will respond to it progressively less; the so-called phenomenon of habituation. These procedures, however, only tell if infants can make a discrimination or not.

caregivers in a perceptual unity, that is, they perceive amodal qualities in any modality from any form of human expressive behaviour, and they represent these qualities abstractly in more global qualities of experience, as shapes, intensities and temporal patterns, transferring them to other modalities[35].

Vitality Affects

As Werner (1978) suggested, some qualities of inanimate objects, individuals and their behaviour, will be experienced directly as categorical, physiognomic affects – such as cheerful, angry, and so forth. In addition, the experiments on cross-modal capacities suggest that some properties of people and things, such as shape, level of intensity, motion, number, and rhythm, are experienced directly as global, *amodal* perceptual qualities. In this respect, Stern (2000) poses a third quality of perception that can arise directly from encounters with these people or things, namely; *vitality affects*[36]. Vitality affects are the dynamic, kinetic qualities of feelings or dynamic shifts, that can be attributed to the perceptual qualities of people or objects, for instance: An extinguishing sound, a fading light, a fleeting line, an explosive movement, and so forth. These qualities of experience are most certainly sensible to infants and of great daily and momentary importance[37]. Vitality affects are not identical to the so-called categorical emotions[38] (happy, sad, angry, and so forth), but they are a characteristic quality of behaviour, or objects, and can be observed together with emotions[39], though not necessarily with emotions alone, as was mentioned earlier.

The Dutch psychologist, philosopher, and medic, specialized in movements, Frederik Buytendijk (1974), employed a phenomenological approach to human movement, in which he demonstrated the need for including a 'subject', which behaves in a world at which the behaviour is directed. Observers do not observe movements as displacements of different parts of the body, but, instead, they perceive people as moving subjects, as 'going', 'staying', 'approaching', and so forth. Hence, bodily expressions or movements and posture are forms

[35] Because communication with infants involves tactile and visual as well as auditory stimuli, interest is growing in multimodal *motherese* that involves gesture, facial expressions, and touching of infants in addition to vocal utterances (Dissanayake, 2000; Falk, 2004; Fogel, 1993).

[36] Antonio Damasio (1994) introduced a similar term for this phenomenon, namely, "background-feelings".

[37] Vitality affects are perceived as sudden, in intensity increasing or decreasing, and short-term in duration, in opposition to moods. In artful behaviour, a flow or rush of a feeling can come into being, or expresses itself in a given moment, through a flow experienced in the medium –while painting, sculpting, and so forth. An individual can experience these sudden and intensive affects in, for instance, behaviour, sounds, images, and other movements (Smeijsters, 2003).

[38] In this respect, Ryle (1978) describes the distinction between emotions and feelings. By feelings, he refers to a class of things, which people often describe as thrills, twinges, pangs, throbs, itches, chills, glows, tensions, and so forth. Ordinarily, when people report the occurrence of a feeling, they might name it to be "a throb of passion", "a shock of surprise", or "a thrill of anticipation". These names for specific feelings, such as "itch", and "pang" are also used as names of specific bodily sensations. In some cases, people are able to locate, for example, the sinking feeling of despair in the pit of the stomach or the tense feeling of anger in the muscles of the jaw and fists. Other feelings are not as readily located in any particular part of the body, like glows of pride. These feelings seem to pervade the whole body in much the same way, as do glows of warmth. Furthermore, perceiving involves having sensations. We use 'to feel' and 'sensation' for a special family of perceptions, namely, tactual, and kinaesthetic perceptions and perceptions of temperatures.

[39] Stern (2000) poses the term *affect attunement* for the attuning (or as Rutten-Saris describes it: "moving with") to an aspect of the behaviour that reflects an emotion. In creative expression, the parameters intensity, tempo, rhythm, time, and form are being perceived cross-modally, through analogy and metaphor, in the artful behaviour in a medium –painting, sculpting, etcetera– together with the behaviour directed into the world (Smeijsters, 2003).

of behaviour, and humans observe these behaviours as a whole. Vitality affects characterize these behaviours. If a person sits on a bench, and, suddenly, jumps up in an explosive manner, it cannot automatically be assumed that this person is angry. One can jump up explosively for many reasons, for example, because he is very happy, or because he forgot something that is very important, and, in the latter case, he wasn't necessarily happy or angry at all. Vitality affects accompany each person in every situation (Rutten-Saris, 2002), that is, one is able to jump up in uncountable ways, each way representing a vitality affect.

Stern (2000) developed the term 'vitality affect' to describe aspects of mother-child interactions that could not be captured with regular categorical affects. He argues that infants are immersed in these feelings of vitality; for example, in the way the caregiver talks or sings to the infant, but also, in the infant's own behaviour towards others, which is equally characterized by vitality affects. Rutten-Saris argues that the infant categorises its experiences in terms of vitality affects, rather than in terms of actions. Rutten-Saris (2002) maintains that every stimulus, whether animate or inanimate, radiates a vitality affect. She refers to the vitality affects of non-living matter with "radiation qualities"; whether they move or not, non-living objects like works of art, appeal to our sense of movement.

Synchronization of movements

Artful behaviour and creative processes can be readily experienced as being encompassed by vitality affects, a quality which can be traced back to the experiences in mother-infant interaction. Furthermore, the craft of *making special* is grounded in the body; in the relationship between the craftsman and the physicality of the used art materials and the environment. Research identified certain bodily processes that occur in interaction with others, which we are not aware of. Our representations of the social world are fundamentally connected with the actions our bodies perform[40] (Semin & Cacioppo, 2007).

Thelen and Smith (2003) suggest that the development of a creative human mind can be seen as the emergent product[41] of many decentralized and local interactions. Any movement, whether performed by an infant or its caregiver, activates implicit motor processes, which give rise to synchronization (or partly mirroring) of the neuropsychological, sensorimotor processes between the producer and the observer of human action (Semin & Caccioppo, 2007). Synchronization occurs in co-action, and can be defined as the automatically and unconsciously, jointly and simultaneously moving together in a certain rhythm, and is evident in brain activation. Observers of a certain action show

[40] Semin and Cacioppo (2007) pose an adaptive and dynamic view on social behaviour. In their opinion, a theory of social behaviour ought to address the complex and continuously changing demands of the social environment, in which social behaviour evolved in combination with the constraints and capacities of the perceptuomotor system. In this view, artful behaviour is best understood as *grounded in* perceptuomotor processes, and interconnected with interpersonal interaction.

[41] Emergence can be seen as the temporary but coherent coming into existence of new forms through ongoing intrinsic processes. This concept is fundamental to the idea of dynamic systems (Thelen & Smith, 2003). Nowak, Vallacher, Zochowski (2005) argues that human beings are complex systems, composed of many individual components embedded within, and open to, a complex environment. Complex systems exhibit coherent behaviour, generated in the relationships between the individual elements and the constraints and capacities offered by the environment, the so-called process of self-organization. Human's thoughts, feelings, and predispositions for action are seen as inherently dynamic, displaying constant change due to internal mechanisms and external forces. Over time, the flow of thought and action comes together on a limited range of states that provides cognitive, affective, and behavioural stability. This state of stability develops through the mechanism of synchronization between two individuals in social interaction, together with the mechanism of self-organization of thoughts and feelings (Nowak, et al., 2005).

neuropsychological activation in specific motor areas of the brain, as if they were executing the movements themselves[42] (Rizolatti & Craighero, 2004). This process promotes partial correspondence between producer and perceiver (Meltzoff & Borton, 1979) and it enables them to continuously and adaptively monitor and respond to their environment by means of discrete, recurrent, and short-lived temporal intervals (Semin & Cacioppo, 2007). Moreover, the mere perception of another's behaviour automatically increases the likelihood of engaging in that behaviour oneself. Hence, synchronization on a neurophysiologic level may facilitate establishing essential human relationships[43].

Several years of studying body motion and speech, by carefully examining frame-by-frame, William Condon (1979) found that one of the very basic characteristics of healthy individual and interactional behaviour was the synchronized timing or changing together of the aspects of behaviour with oneself[44] or with each other, including both speed and body motion. He found that infants move in precise synchrony with the articulatory pattern, phones, syllables, and words[45] of the caregiver's speech. Speech might not be present at birth, but the ability to move with speech exists even before the child is born. It allows the

[42] Among others, Rizolatti and Craighero (2004) demonstrated the existence of a particular class of visuomotor neurons, that discharge when a macaque monkey engages in a particular action, for example when it is grasping, holding, or manipulating an object, but also when it observes, whether by seeing or hearing, another monkey engaging in the same goal-related action. Furthermore, when monkeys were trained to rip a piece of paper, a subset of the observing monkey's *mirror neurons* involved in the execution of these actions were recruited in response to only the sound of the ripping of paper. A subset of these mirror neurons also become active when the final part of a given action is hidden (like grasping a peanut behind a wall), and if the monkey in question is aware of the hidden object. This suggests that the action along with the goal is represented and inferred across different modalities; it underlines the multimodal (visual and auditory) quality of the synchronization process. Moreover, Semin and Cacioppo (2007) and Gallese (2001) argue that these processes have been demonstrated in humans as well. Listening to speech sounds partly activates premotor areas in the human brain that are responsible for the production of speech (Wilson, Saygin, Sereno, & Iacoboni, 2004). When individuals interact, the automatic imitative behaviour as a result of synchronization precedes the awareness of the imitative behaviour (Stevens, Fonlupt, Schiffrar, & Decety, 2000). Liberman and Whalen (2000) refer to this automatic mechanism of a shared neural notation with the term "neural parity". It is unclear if and how mirror neurons in humans are recruited in a newborn (Gallese, 2001).

[43] In this respect, Gallese (2001) coined the term "shared manifold". In a shared manifold a shared bodily state is created through co-action, constituting the basis of mutual or direct understanding, amplifying cohesion. Furthermore, the evidence for synchronization with emotional behaviour is accumulating rapidly. Observing certain facial expressions (for example: disgust) activates very similar processes in the human brain underlying the experience or feeling of the somatic state of the other, an effect research participants were not necessarily consciously aware of (see for a detailed report, Semin & Cacioppo, 2007). Dimberg, Thunberg, & Elmehed (2000) have shown that observers' facial expressions synchronize within a time window of 500 msec., even in the case of subliminally presented facial expressions of emotion. This non-conscious focus on an individual's imitation or mimicking of the postures, mannerisms, facial expressions, and other motor movements performed by one's interaction partner, is referred to as *mimicry* (Chartrand & Bargh, 1999; Semin & Cacioppo, 2007). Chartrand and Bargh (1999) found that research participants were more likely to behave in the same manner as their trained experimenter (for instance by rubbing their nose in opposition to shaking their foot) unintentionally. The function of motor mimicking is primarily communicative and it leads to an increased liking of ones interaction partner (Semin & Cacioppo, 2007).

[44] As in the case of *self-synchrony,* when a speaker is conversing, several body parts are often synchronized with this behaviour, that is, moving at the same time. This occurs while the speaker articulates the syllables, words and phrases of his utterance. Someone may use both hands to emphasize a statement or he or she may reach for an object. The term *responsive entrainment* refers to inferred processes inside the individual, which bring about such synchronization (Condon, 1979).

[45] Patel, Iversen, Bregman, and Schulz (2009) found that the tendency to move in rhythmic synchrony with a musical beat is human universal behaviour, which is only observed in vocal learning species (such as humans, some birds, cetaceans, and pinnipeds).

infant to interact with the world.

Microanalysis indicates that a newborn infant is quite well coordinated and self-synchronous, although it does not exhibit the stylized movements of adults. From twenty minutes after birth, an infant is able to entrain with the structure of adult speech almost as well as an adult listener (Condon, 1979). Entrainment is defined as the alignment of behaviours or rhythms during social interaction. It is an expression of social self-organization that provides a state between two or more individuals that results when the cyclical behavioural movements of one person influence the cyclical movements of another person and they oscillate in rhythm (Semin & Cacioppo, 2007). A striking example of entrainment is provided in the unprompted transition of an applauding audience from disordered clapping to entrained clapping, and then back again to disordered clapping only for entrained clapping to re-appear again a few seconds later (Néda, Ravasz, Brechet, Vicsek, & Barabási, 2000). The transition to entrained clapping seems to enhance noise intensity and requires less effort, whereby each clapper affects the other both locally and globally (Semin & Cacioppo, 2007). Behavioural cycles of entrainment in interpersonal behaviour can range from milliseconds to hours, depending on the particular behaviour and interaction in question.

In a healthy interaction, the caregiver attunes to the infant by following its movements with rhythmical precision. By adding short pauses in the interaction, after three to four seconds of mutual play (Rutten-Saris, 2002), the caregiver creates an opportunity for the infant to experience itself and to learn[46]. Furthermore, a short break in the interaction prevents the interaction from becoming too intensive or monotonous, for the caregiver as well as for the infant (Fogel, 1993; Lavelli & Fogel, 2005). The infant attunes with the movements of the caregiver and also inserts a pause, after which caregiver and child move together in a synchronized manner, insert another pause, and so forth. These synchronized interactions result in the emergence of effective implicit interaction structures, as described, among others, by Stern (2000), who describes, as mentioned earlier, "*The Sense of an Emergent Self".* These structures, developed through interactions between caregiver and infant, are important in our understanding of artful behaviour.

Drawing development

Artful play

Through early mother-infant interactions, synchronized behavioural patterns are stimulated, and the development of artful behaviour is encouraged as mother and child move together (by singing, dancing, playing, and so forth) in a rhythmic manner. These artful behaviours may further develop into adult artful behaviour. All children express these artful behaviours at a very young age through their body movements, whether it is by drawing in the sand, or by running in circles on the porch[47] (Foks-Appelman, 2005). Healthy infants take

[46] From three to four years of age, children are able to synchronize their movements with a metronome (Aiken, 2010). Generally, the response is thought to follow the stimulus, but in the instance of synchronization the response and stimulus occur at the same time. In this instance, the tick of the metronome does not serve as the stimulus. The stimulus is the temporal interval, or the pause, between ticks. Aiken (2010) states that, in mother-infant interaction, the coordination between the caregiver and infant is defined by the intervals of movements and pauses, and she poses that both partners must be capable of anticipating the next tick for synchronized patterns to occur. This anticipation makes it possible to maintain synchrony while accelerating or decelerating the tempo, and is, in Aiken's opinion, more important than regularity.

[47] Essentially, children are playing and drawing in a very flexible way. When given art materials for the first

pleasure in their physical activity, and its motor qualities caused by the radiation of the materials in their environment. In this respect, drawing is one of those activities that encourage these abundant motor movements (Arnheim, 1954; Rutten-Saris, 2002, Thomas & Silk, 1990, Yamagata, 1997). The interaction between drawing movements and the direct visual pleasure resulting from it is also thought to be of importance in normally developing children[48] (Arnheim, 1954; Gardner, 1980; Gibson & Yonas, 1979; Goodnow, 1977/1981; Kellogg, 1970).

Children take pleasure in the aesthetic qualities of aspects like harmony, balance, colour, shadow, rhythm, and of the use of the basic forms as contour, straight lines, and so forth. As young as 18 months of age, infants spontaneously engage with art materials without invitation or encouragement from a caregiver (Evans, 1998). Infants experience a correspondence between moving and drawing lines on paper together with the structures or perceived contours of the world (Matthews, 1984). Drawing traces reflect the drawing-motor movements, which in turn reflect the body language and growing perceptive skills of the artist (Rutten-Saris, 2002).

Extensive research has been conducted on the aesthetic drawing behaviours of children. Most researchers do not report on the drawing behaviour of young children below the age of two, however. It appears that most investigators only start to look at drawings when they supposedly 'represent' something; when the child is capable of pictorial representation[49]. In response, Rutten-Saris (2002) argues that, next to having

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time, young infants experiment with these materials in a similar manner as they would with other objects in their environment, as when they were playing with other toys (Evans, 1998). Without playful experiments, children will not be engaged in creative and flexible interactions with their caregiver and the environment (Rutten-Saris, 2002).

[48] When given 15 – 38 months-old children with no severe visual impairments direct instruction to draw something, the use of drawing instruments that produced a visual effect of any kind on paper resulted in more complex and longer durations of drawing in opposition to drawing movements which were made in the air (Gibson & Yonas, 1979). The use of crayons or magic markers was associated with more complex and mature drawings in comparison to the drawings made with pencils. Furthermore, the more often a child was provided the opportunity to scribble, the more the child engaged in scribbling, and the more complex the child's behaviour became over time (Dunst & Gorman, 2009).

[49] Most young infants demonstrate the ability to make marks or scribbles on paper with a crayon or other writing instruments (Dunst & Gorman, 2009). "To scribble" is usually being referred to as "to write or draw hastily or carelessly" (Matthews, 1984) and is often seen as meaningless. Perhaps as a consequence of this attitude, this pre-representational phase of drawing has received little attention in research, until the 1980's (Evans, 1998; Matthews, 1984). Most research on children's drawing focuses on analyzing end products, ignoring all activities and the processes of coming-into-being that precede them. The effects of the drawing process should not be ignored, however (Goodnow, 1977/1981). Drawings made by young infants are meaningful experiments and explorations in representation (Matthews, 1984). Children of 22 months of age have the intention to represent, even when they could not produce recognizable representations by themselves (Yamagata, 1997). Arnheim (1954) and Rutten-Saris (2002) name this "presentation". Kellogg (1970) argues that shape is independent of meaning. Right from the onset of marking behaviours, from drawing in spit milk, experiments in symbolization are occurring. It has been suggested that representational meaning arises spontaneously when children notice that their scribbles look like something, after they have finished drawing (Yamagata, 1997), a process referred to as 'fortuitous realism' by Luquet (1927/2001). Furthermore, researchers have shown that scribbling is a highly complex, problem-solving activity for the infant, full of potential significance (Evans, 1998; Matthews, 1984; Thomas & Silk, 1990). Scribbles are a meaningful part of drawing development and they reflect the maturation of the brain (Kellogg, 1970). Analyzing children's scribbles can offer a way to assess children's developing vision and mental processes. Encouraging spontaneous artistic expression and creativity is crucial for children's cognitive and emotional development as well as for their education (Lowenfeld, 1947; Robinson & Aronica, 2009).

representational value, drawings also contain pre-representational, psychological, and graphical meaning[50],[51]. As mentioned earlier, drawings also reflect information of the motor movements[52] and body language of the artist.

Several studies have focused on the development of the early graphic expressions of young children (Dunst & Gorman, 2009). In 1967, Rhoda Kellogg, a psychologist and nursery school educator, published an archive of approximately 8000 drawings of children in the ages of 24 – 40 months[53]. She describes the development of children's mark makings as a sequence of basic shapes or line formations and their configurations. Kellogg distinguishes twenty basic scribbles (as shown in Figure 5[54]), which can be observed around the age of two. These scribbles can be seen as the building blocks of art, from which children develop placement patterns, emergent diagram shapes, diagrams, combines, aggregates, mandalas, suns, and radials, before human figures and early *pictorialism* appear (see for a detailed report Kellogg, 1970). In the analyses, choice of colour was not taken into account, since it is limited to what is made available by adults (Kellogg, 1970). Kellogg understands this sequence as a manifestation of Gestalts, according to Gestalt theory, wherein a Gestalt is described as an essence or shape of an entity's complete form, greater than the sum of its parts (Wertheimer, 1944).

[50] Pre-representational drawing refers to the developmental phase that precedes the phase of representational drawing. Representational drawing is often considered the phase of "real" drawing, because, at this point, the child has acquired the skill of representing a recognisable "something", a situation, emotion, and so forth (Rutten-Saris, 2002). Drawings also provide psychological information, for example the history, personality, or experienced problems of the artist. Furthermore, graphical meaning is found, for instance, in the graphic, non-pictoral complexity of the drawing.

[51] With further respect to the psychological value of drawings, many studies researched the relationship between cognitive development and drawings (Goodenough, 1926; Luquet, 1927/2001). Goodenough (1926) observed drawing differences that could not be related to differences in intellectual development. Furthermore, Luquet (1927/2001) argued that changes in children's drawings tend to reflect emotional rather than intellectual factors. Some psychologists tend to share the assumption that drawings are a direct reflection of the artist's mental state, for example: a drawing portraying an angry mother is a result of unresolved mother-child-issues. Golomb (1992) and Rutten-Saris (2002) criticize this assumption, and they argue that children may also go through an age-appropriate and healthy conflict. Falk (1981) states that indicators of conflict can be present in "normal" subjects. No causal connection can be derived from a drawing without knowledge of the context and history of the artist (Golomb, 1992). Therefore, drawing conclusions on the emotional functioning of the artist based on one drawing is a controversial matter. A widely documented example of a test that is said to measure intellectual and emotional functioning is the Draw-A-Person Test [DAP]. Numerous investigations conclude, however, that diagnoses of emotional disturbance on the basis of the DAP are invalid (Falk, 1981; Pihl & Nimrod, 1967; Ter Laak, Van Rijswijk, Van Leuven, & Brugman, 2000).

[52] Drawing is generally defined as the depiction of shapes on a surface by means of lines, using a drawing tool. Rutten-Saris (2002) broadens the definition by proposing that drawing is the behaviour of leaving traces on any surface, by moving on it with any material. In her dissertation, Rutten-Saris describes the work of Michaella Strauß (1987), who argued that rational understanding of children's drawings is not sufficient in understanding their visual, emotional, as well as their intellectual capacities. A better understanding of this information requires "reliving" the movements that led to these signs, such that their rhythm and shape cause similar experiences in the observer of the work of art as it had done in the artist. Strauß believed that the process of artful development is reflected in the shaping of the body, which becomes visible in drawing through bodily movements. Arnheim (1954) argues that motor movements are the origin from which all development emerges.

[53] It remains unclear why Kellogg (1970) took the age of two as the starting point of her research.

[54] The order in which Kellogg (1970) posed the listed scribbles is not meant to have developmental significance.

Claire Golomb (1992) conducted a thorough literature research on children's drawing development, including the pre-representational drawing phase. She investigated the laws of syntactic and semantic development of the graphical aspect of drawing. Golomb describes a set of widely accepted robust hierarchical phases[55] children go through between 18 months and 10 years of age, developing into pictorial representations (Golomb, 1992; Rutten-Saris, 2002). Unfortunately, Golomb states that pre-representational drawing is a phase of temporary importance, with the only purpose of acquiring representational drawing skills further on, and it needs to be passed as quickly as possible; a view criticized by many other authors on this subject (Evans, 1998; Kellogg, 1970; Luquet, 1927/2001; Matthews, 1984; Rutten-Saris, 2002).

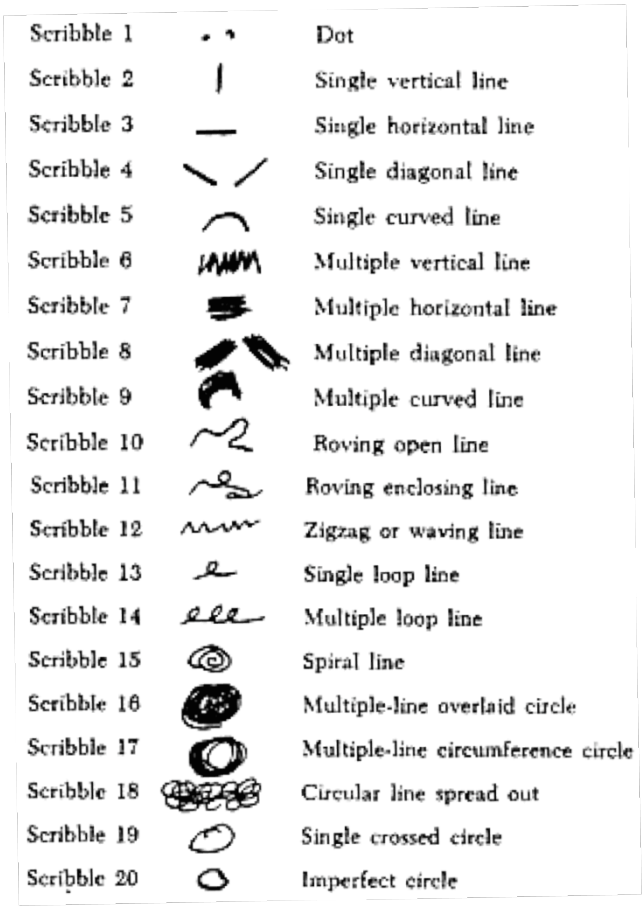


Figure 5. Twenty basic scribbles (Kellogg, 1970).

In the very early experience of infants, drawing offers an opportunity for the expression of sensations, attached to the experience to emerge and be identified through interaction in the present moment (Evans, 1998). The infant is aware of changes in sensation in the environment, in which experience and activities occur simultaneously in time. Through recurring rhythms, the infant perceives and recognizes sensory features holistically and cross-modally. Matthews (1984) states that young infants identify and place interest in the unity of objects by the quality of their movements, rather than by their configuration. The art medium becomes everything that 'is', and infant and caregiver are intimately involved (Evans, 1998). These sensations are further processed towards feelings. Infants start to use gestures and movements to emulate events and objects. These movements are being practiced in interaction with an environment, and evenly represented on paper (Matthews, 1984). Since infant's drawing traces reflect their body language, and because this takes place during synchronized interaction[56] with their

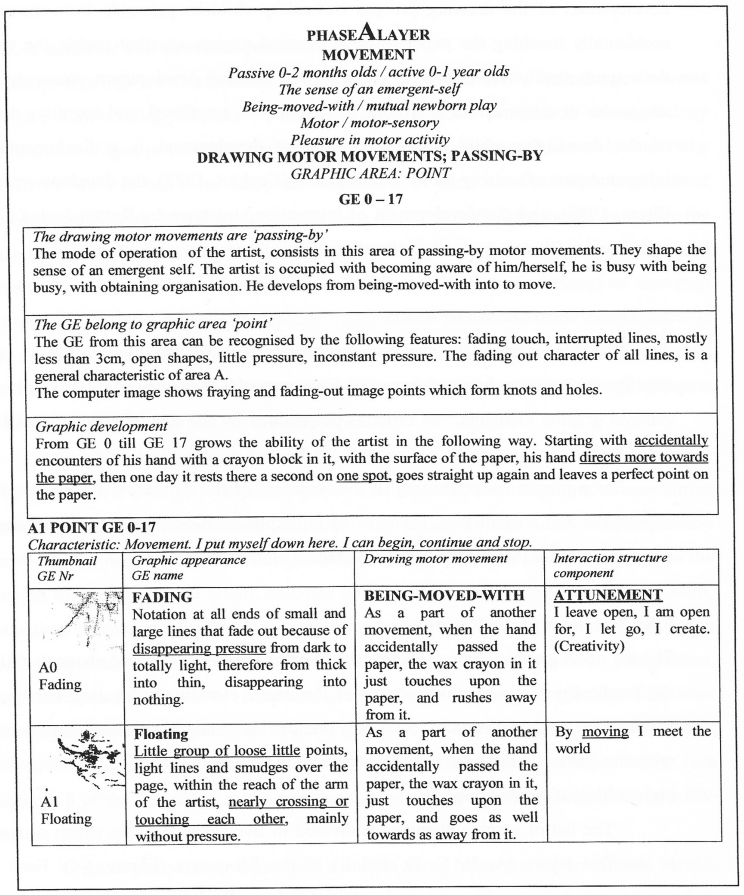
[55] After analyzing 25 studies on infant and toddler mark making, Dunst and Gorman (2009) concluded that variations in the age of acquisition of scribbling follow a relatively similar pattern of development. The development of drawing is universal (Arnheim, 1954; Luquet, 1927/2001). It is expected, however, that infants differ in terms of when they demonstrate early drawing behaviour, as is seen in all domains of development, including drawing (Dunst & Gorman, 2009; Thomas & Silk, 1990). In this respect, Golomb describes the work of Court (1982; in Golomb, 1992), who researched tribes in Kenya without any drawing experience with paper and crayons. When they were offered the opportunity to draw, they showed an accelerated drawing development, relatively similar to the development found in young children; developing from scribbles to typical child-art representations of human figures.

[56] In healthy infants, these movements are synchronized with speech and other vocalizations: sound and

caregivers[57] and with art materials, Rutten-Saris (2002) focuses on children's drawing traces from the moment they engage with their environment, beginning as early as the phase of a "Sense of an Emergent Self" (Stern, 2000), that is, from birth. During this phase, Stern (2000, p. 67) argues: *"All learning and all creative acts begin in the domain of emergent relatedness. That domain alone is concerned with the coming-into-being of organization that is at the heart of creating and learning"*.

The RS-index

To categorize the development of early mark makings of infants, Rutten-Saris (2001; 2002) conducted a thorough research on children's drawings, observing them from birth to at least five years of age. Amongst other things, she researched the tiniest distinguishable graphic markings that, put together, make up a drawing (see also Arnheim, 1954; Kellogg, 1970; Goodnow, 1977/1981). After collecting and scanning all of these drawing elements, Rutten-Saris enlarged and strengthened the colour of the elements subsequently on a computer screen at the pixel level, thereby increasing the visual appearance of each element. These large screen images amplified a large set of parameters of the graphic elements; how the graphic elements were constructed, what movements, and which pressure was used to create them, the length of the strokes, absolute and relative size, connections, rhythm angularity, composition, and so forth.



PHASE A LAYER
MOVEMENT
Passive 0-2 months olds / active 0-1 year olds
The sense of an emergent-self
Being-moved-with / mutual newborn play
Motor / motor-sensory
Pleasure in motor activity
DRAWING MOTOR MOVEMENTS; PASSING-BY
GRAPHIC AREA: POINT
GE 0 – 17

The drawing motor movements are 'passing-by'
The mode of operation of the artist, consists in this area of passing-by motor movements. They shape the sense of an emergent self. The artist is occupied with becoming aware of him/herself, he is busy with being busy, with obtaining organisation. He develops from being-moved-with into to move.

The GE belong to graphic area 'point'
The GE from this area can be recognised by the following features: fading touch, interrupted lines, mostly less than 3cm, open shapes, little pressure, inconstant pressure. The fading out character of all lines, is a general characteristic of area A.
The computer image shows fraying and fading-out image points which form knots and holes.

Graphic development
From GE 0 till GE 17 grows the ability of the artist in the following way. Starting with accidentally encounters of his hand with a crayon block in it, with the surface of the paper, his hand directs more towards the paper, then one day it rests there a second on one spot, goes straight up again and leaves a perfect point on the paper.

A1 POINT GE 0-17
Characteristic: Movement. I put myself down here. I can begin, continue and stop.

Thumbnail GE Nr	*Graphic appearance GE name*	*Drawing motor movement*	*Interaction structure component*
A0 Fading	**FADING** Notation at all ends of small and large lines that fade out because of disappearing pressure from dark to totally light, therefore from thick into thin, disappearing into nothing.	**BEING-MOVED-WITH** As a part of another movement, when the hand accidentally passed the paper, the wax crayon in it just touches upon the paper, and rushes away from it.	**ATTUNEMENT** I leave open, I am open for, I let go, I create. (Creativity)
A1 Floating	**Floating** Little group of loose little points, light lines and smudges over the page, within the reach of the arm of the artist, nearly crossing or touching each other, mainly without pressure.	As a part of another movement, when the hand accidentally passed the paper, the wax crayon in it, just touches upon the paper, and goes as well towards as away from it.	By moving I meet the world

Figure 6. Example of a RS-index page (Rutten-Saris, 2002).

After analyzing the scribbles, Rutten-Saris came to distinguish 88 chronologically ordered graphic elements in healthy children from birth to five years of age. She defines these graphic elements as the smallest possible graphic patterns of the following image elements: A point, line, contour, and plane. Rutten-Saris argues that graphic elements can be only constructed with one particular combination of movements with the drawing materials. Since these differences in movements are observable and describable, it makes it possible to compare the graphic elements of one drawing with the graphic elements of another.

Rutten-Saris developed a diagnostic instrument for analyzing these graphic elements:

movement underscoring each other.

[57] Yamagata (1997) observed the emergence of representational drawing from the shared activity between mother and child, rather than from the effect of the mother's instruction on the child's drawing development.

the RS-index, a standard notation system. In Figure 6, an example of a RS-index page is given. The first column of the RS-index contains a prototypical example of the graphic elements in drawings of healthy infants. In the second column the name of the graphic element together with a description of the element's appearance and construction is given. In the third column, a description of the corresponding motor movement[58] is posed. In the last column, a description of the interaction-structure component (also known as the denotation) is given (Rutten-Saris, 2002). In a normal development, an infant develops these interaction-structures in interaction with its caregiver. Stern (2000) describes these structures as "*ways-of-being-with*" (p. xv); internally represented patterned experiences of self in interaction with another. Bosman (2008) argues that these structures enable the infant to interact with others, to attune to them, to move and create with them, and to give a narrative meaning to the interaction. An accredited RS-index therapist compares the healthy graphic elements in the RS-index with the graphic elements in, for example, an infant's drawing, to see if there are observable differences. If there are, these differences inform the therapist about the development of the infant in relationship with its environment[59].

To be able to compare and describe disturbances in the phases of an infant's development, healthy developmental phases must be described. Rutten-Saris used the *senses of self*, as described by Stern (2000), to structure the phases and layers of the RS-index and the RS-matrix, –the theoretical framework in which the RS-index has to be understood. Stern (1985) distinguishes five senses of self, developed by an healthy infant between birth and five years of age in co-construction with a caregiver: *the sense of an emergent self*, *the sense of a core self*, the *sense of a core self-with-another, the sense of an intersubjective self, the sense of a verbal self*, and, in his revised 2000-version, Stern also names *the sense of a narrative self* (>5 years of age).

These phases develop more or less chronologically, but also develop simultaneously and dynamically, as is shown in Figure 7. In response, Rutten-Saris named five interaction structures[60] or layers that correspond with these phases of the senses of self, namely: *attunement*, *turn-taking*, *exchange*, *play-dialogue*, and, *task/ theme* (for a more detailed report, see: Bosman, Heijligers, & Rutten-Saris, 2012; Rutten-Saris, 2002). These 88 graphic elements are a representation of the development of all five interaction structures.

[58] Since graphic elements correspond with motor movements, analysis of graphic elements measures the body language of the artist, and it does not require the controversial interpretation of assessing the artist's emotional functioning, as in the Draw-A-Person-Test.

[59] It is possible, for instance, that a disturbance occurred in the relationship between the infant and its environment, that influences the way the infant interacts with the world.

[60] Healthy interaction structures are developed from birth in interaction with an individual and its environment. Interaction structures are characterised by awareness of self, other, objects, and situations, by self-confidence, and self-reliance, by self-esteem and recognition of the other, and by an effective relation with objects, environment, and situations Healthy development is characterised by the emergence of five interaction structures before the age of five years old.

Drawing traces reflect motor movements and body language (Arnheim, 1954), and these motor movements are at the basis of interaction, leading to the development of interaction structures. The RS-index is employed to analyze these interaction structures, through the notation of the interaction of the graphic (motor) elements. An accredited therapist can assess whether or not individual and relational experienced disturbances in these developmental phases exist.

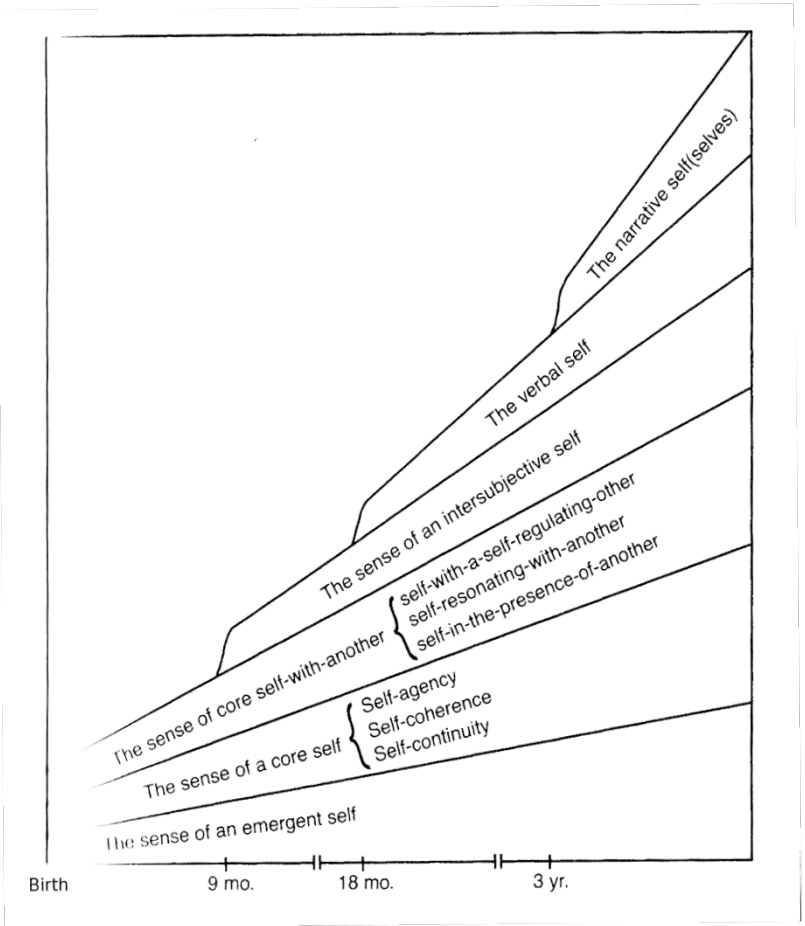


Figure 7. Phases in the development of the Self as described by Stern (1985/2000).

In sum: each graphic element corresponds to a motor movement (Kephart, 1973)[61], a phase in the development of the self (Stern, 2000), and a phase in the development of interaction structures (Condon, 1979; Rutten-Saris, 1990; Trevarthen, 1977). The theoretical background of the RS-index is rooted in the theory of early infant-caretaker interaction, and in the assumption that all human beings are able to create or let creative processes emerge, providing nurturing circumstances. This approach goes beyond and alongside verbal communication[62] (Rutten-Saris, 2002).

[61] Kephart (1973) related the stages of motor movement development to sensory and psychological development. Rutten-Saris (2002), in turn, related each motor movement phase to a particular age group or interaction structure.

[62] In addition to the RS-index, Rutten-Saris (2002) developed –and refined somewhat later (together with Bosman and Heijligers)–, a methodology named *Emerging Body Language* [EBL], to treat clients with underdeveloped or disturbed interaction structures (Bosman, Heijligers, & Rutten-Saris, 2012), by establishing the therapeutic alliance by means of restoring or developing healthy interaction structures. Most commonly used diagnostic instruments assume implicitly or explicitly that the clients tested are able to communicate properly about their own behaviour. Most of intellectually impaired, and behaviourally challenged clients, however, suffer from a lack of insight in their own behaviour. These patients are not aware of the goals of their therapy, usually because they do not acknowledge their problem. When compared to an Applied Behavioural Analysis-approach [ABA], EBL focuses on the underlying observable interaction structures and body language of the patient, attuning with the patients qualities intrinsically, instead of influencing them extrinsically. Both approaches are driven by their particular vision on problematic behaviour. In ABA, however, the emphasis is put on concrete observable behaviour and competences, treating a patient with extrinsic reinforcement; this approach relies heavily on verbal instruction, while EBL does not (Koreman, 2008). Furthermore, Van der Leest (2010) found that the families treated by an EBL-practitioner were generally pleased by the treatment itself

Conclusion

In this theoretical section I have made an effort to provide evidence for the hypothesis that art has an evolutionary origin and that it is by no means a by-product of other adaptations in our evolutionary past. From an evolutionary point of view, art is best described as behaviour, as a creative process, unfolding from birth until the day we die, connected with the relationships we experience with our caregivers, friends, family, and neighbours, through synchronized interactions. First as children, through artful play, and later as adults, through adult forms of artful behaviour, humans are able to relive and assimilate important life-experiences, and give meaning to them. Artful behaviour is not something we decide to do when all our other biological needs, such as eating, sleeping, and so forth, are satisfied, but it is as indispensable for our well-being and survival as those other essential behaviours.

Our engagement in artful behaviour can be observed in the intimacy of early mother-infant interactions. Through synchronized interactions, an infant learns to experience the world and interact with people and objects in it, in an extraordinary manner. Artful behaviour can be observed in infants' behaviour through their motor movements, when captured on paper. These drawing traces provide information about the developmental history and early-experienced motor movements and interactions of the artist. In children's drawings, fundamental shapes (points, lines, planes and contours) can be observed, independent of age or culture children stem from. These shapes can be traced back to our prehistoric forefathers and they can be recognized in art of indigenous cultures all over the world.

In the remainder of this thesis, I will present an empirical study that is a first attempt to investigate whether the traces of artful drawing behaviour can indeed be linked to the psychological development of the self and the way humans interact. This study is specifically designed to test an aspect of the theory of Stern's *Senses of Self* and the theory on interaction structures as described by Rutten-Saris (see Bosman et al. 2012).

and by the treatment results.

Matching behavioural profiles based on drawing analysis with video-taped behaviour

Abstract – It has been suggested that drawing traces can be linked to the psychological development of the self (Stern, 2000) and the way humans interact with their environment. *The RS-index* is a diagnostic instrument for analysing drawings to assess the developmental history and (disturbed) interaction structures of clients in the health care sector (Rutten-Saris, 2002). The *EBL-approach* is employed to treat disturbed interaction structures. In the present study it is investigated whether individuals are able to match clients who were video-taped with abbreviated RS-index drawing-profile descriptions, and whether there is a difference in matching choice between EBL-professionals and participants without EBL-knowledge. Additionally, it has been examined whether EBL-practitioners differ in their judgements compared to EBL-theorists. Overall, the results showed that participants more often correctly identified profiles, than would be expected based on chance. No significant differences in judgement between health-care professionals with and participants without EBL-knowledge were found, however. These findings suggest that the ability of identifying the correct profiles is related to other personal qualities, for example a more practical or theoretical background, rather than EBL-knowledge. Overall, results indicated that 30% of the behaviour revealed through drawing analysis matched actual behaviour seen on video. This finding indicates that the RS-index to some extent provides actual information about the behaviour of the client.

Introduction

Previous studies have reported on the importance of research on infant's early drawings (Goodnow, 1977/1981; Kellogg, 1970; Thomas & Silk, 1990). Investigations into the nature of children's scribbles between 0 and 2 years of age have received little attention, however, probably because some consider this pre-representational drawing phase as meaningless[63] (Golomb, 1992; Rutten-Saris, 2002). This is a peculiar point of view, since numerous studies have shown that early scribbling is a highly complex, problem-solving activity for the infant, full of potential significance (Evans, 1998; Matthews, 1984; Thomas & Silk, 1990) and supposed to reflect maturation of the brain (Kellogg, 1970). Analyzing children's early mark makings can offer a way to assess children's developing visual and mental processes (Arnheim, 1954), as well as their physical activity and motor qualities (Rutten-Saris, 2002), and it can provide psychological information, for example about the history, personality, or experienced problems of the artist.

Rutten-Saris (2002) conducted a thorough analysis on the nature of young children's mark makings, from birth until at least five years of age. She identified 88 chronologically ordered graphic elements that constitute the basic elements of a drawing. Rutten-Saris defines graphic elements as the tiniest distinguishable graphic markings that, put together, make up a drawing, for example: A point, line, contour, or plane. Each graphic element reflects the drawing-motor movements and body language of the artist, as well as its growing perceptive skills (Arnheim, 1954; Kephart, 1973). Infants experience a correspondence between moving and drawing lines on paper together with the structures or perceived contours of the world (Matthews, 1984). Drawing appeals to an infant's sense of movement[64] (Rutten-Saris, 2002).

[63] Representational drawing is often considered as the phase of "real drawing", because during this phase, the child has acquired the skill of representing a recognizable "something" (Rutten-Saris, 2002). For a more detailed report on the development of children's drawings, see the theoretical section of this thesis, p. 21.

[64] In this respect, Stern (2000) refers to *vitality affects,* which arise directly from encounters with people or

Rutten-Saris (2002) also argues that each graphic element corresponds to a phase in the development of the self (Stern, 2000), as well as a phase in the development of interaction structures, developed by an infant in interaction with its environment (Condon, 1979; Rutten-Saris, 1990; Trevarthen, 1977). In normal development, a healthy infant develops these interaction structures between birth and five years of age in co-construction with its caregiver. Stern (2000) describes these structures as "*ways-of-being-with*" (p. xv); internally represented patterned experiences of self in interaction with another. These forms of organization of essential daily social interactions are the subjective experience of what will later be verbally referenced as the "*self*". Stern (1985) proposed four senses of self, for understanding this normal interpersonal development: *the sense of an emergent self*, *the sense of a core self, the sense of an intersubjective self,* and *the sense of a verbal self*[65]. In response, Rutten-Saris (2002) connects these senses of self to interaction structures. She constructed the Rutten-Saris matrix [RS-matrix], to organize and compare these developmental phases with interaction structures, as well as with drawing movements (for an abbreviated version of the RS-matrix, see Table 1). Rutten-Saris (2001) argues that these structures enable the infant to interact with others, that is: To attune to them (interaction structure *attunement*), to move (*turn taking*) and create with them (*exchange*), to play mutually with these created expectations (*play-dialogue*), and to give a narrative meaning to the interaction (*present a task or theme*)[66].

Table 1. Abbreviated Overview of the Layers and Developmental Phases of the RS-matrix

Layers and phases			**Development of**		
1	*2*	*3*	*5*	*6*	*7*
Layers	***Passive age in months/names***	***Active age in years/names***	***Interaction structures***	***Self and identity (Stern, 2000)***	***Graphic Drawing and elements***
A	0-2 Newborn	0-1 Infant	Attunement	Sense of an Emergent Self	Fading-out. GE 0-17
B	2-6 Baby	1-2 Stepper	Turn taking	Sense of a Core-self	Line. GE 18-67
C	7-14 Crawler	2-3 Toddler	Exchange	Sense of a Subjective Self	Contour. GE 68-77
D	14-24 Stepper	3-4 Preschooler	Play-dialogue	Sense of a Verbal Self	Geometric. GE 78-87
E	>24 Toddler	4-5 Pupil	Task/theme	Verbal identity	Plane. GE 0-87

* For the original version of the RS-matrix, see Rutten-Saris (2002).

The first column of the abbreviated RS-matrix presents the names of the layers; for example, Layer A corresponds with the interaction structure *Attunement,* Layer B corresponds with *Turn taking*, and so on. The second and third column present the passive and active age, corresponding to the phases in which an infant is learning to acquire a certain skill, or when it is able to use this skill freely, respectively. A newborn (0 – 2 months of age), for example, is passively learning through interaction to attune to its caregiver,

things (as when drawing). When scribbling, infants experience these vitality affects in the creative process. It is supposed that a fleeting line on paper corresponds with a fleeting sound, light, or any other perceivable movement in the environment of the infant. See the theoretical section of this thesis, p. 16.

[65] In his revised 2000-version, Stern added a fifth, *the sense of a narrative self*[65] (>5 years of age).

[66] For a more detailed report on the development of the RS-index and the drawing development, I refer to the theoretical section of this thesis, p. 25.

whereas the infant (0 – 1 years of age) has learned to attune to one another, somewhere in this age period. The seventh column describes the number of chronologically acquired graphic drawing elements each layer or phase consists of.

Microanalysis of video fragments of infants and their caregivers reveals certain basic characteristics of healthy, as well as disturbed, individual and interactional behaviour (Condon, 1979; Trevarthen & Daniel, 2005; Tronick, Als, & Brazelton, 1977). It has been implied that the way an infant attunes to its mother (Table 1, column 5, layer A) can be identified in real life as well as on video fragments, by analysing frame-by-frame films (Rutten-Saris, 2002). Many studies investigated the nature of the interaction between mothers and infants by analyzing videos (among others Aitken & Trevarthen, 1997; Beebe, Sorter, Rustin, & Knoblauch, 2003; Lester, Hoffman, & Brazelton, 1985; Murray & Trevarthen, 1986; Papousek, 2007; Stern, 2000).

Rutten-Saris (2002) assumes a connection between an infant's observable interaction structures and the drawing-motor movements revealed in graphic elements in a drawing. She developed the *Rutten-Saris index of graphic elements* [RS-index]; a diagnostic instrument for analysing the graphic elements in human drawings, employed to reconstruct the history of underdeveloped or disturbed interaction structures (see Table 1, column five). An analysis of the graphic elements with the RS-index results in a personal RS-index profile that may reveal possible disturbances, as well as healthy development. The RS-index is an instrument that serves as the development of a treatment, based on the principles of *Emerging Body Language* [EBL]. EBL is a methodology, employed in the health-care system, for treating clients with underdeveloped or disturbed interaction structures[67]. The RS-matrix is a summary of the theoretical framework in which EBL and the RS-index have to be understood.

In observing interactions and relationships Burford, Kerr, and Macleod (2003) have emphasized the importance of information provided by experienced practitioners as an essential source of knowledge. De Los Reyes, Henry, Tolan, and Wakschlag (2009) argue that differences in observers' knowledge and experiences can influence their judgements. Teachers have different reference points, for instance, than parents have with many typical preschoolers versus familiarity with their own child. Furthermore, discrepancies between participants' observations may reflect a true situation related to variation in behaviour, for example: A child may exhibit disruptive behaviours at home but not at school. It is therefore valuable to research different groups of observers from a different background when it comes to the assessment of interactions.

Previous studies on the EBL-methodology have investigated the way in which certain EBL-professionals observe interaction in video fragments. Professionals, who are familiar with the EBL-methodology, tend to express more technical EBL-related comments about the client, together with more remarks about the interactions between clients and their attendants, as compared to individuals with no knowledge of EBL whatsoever (Jennekens, 2010). Interestingly, Marinussen (2009) found that professionals, irrespective of their theoretical and practical background (i.e., professional whose focus is on *Applied Behavioural Analysis* [ABA] or on EBL), observe interaction processes quite similarly. In his study, the degree to which a professional observes interaction did not depend on experience

[67] The theoretical background of EBL and the RS-index is rooted in the theory of early infant-caretaker interaction, and in the assumption that all human beings are able to create or let creative processes emerge, providing fostering circumstances (Rutten-Saris, 2002). See the theoretical section of this thesis, (p. 25 and further) for more information on this matter.

or affinity, but rather seems to be a personal quality. No research has been conducted, however, on matching video fragments of clients with disturbed interaction structures with their drawing developmental profiles, analyzed with RS-index.

If graphic elements on paper correspond to interaction structures and the traces left on paper caused by motor movements, the question arises whether these drawing movements can be recognized in video fragments. Based on the findings of Jennekens (2010), the hypothesis is that it is more likely that professionals, familiar with EBL or the RS-index, are able to match profile descriptions of the clients more accurately, than participants with no knowledge of this methodology. Based on the findings of Marinussen (2009), however, there may not be such an advantage.

Research questions

The first issue pertains to the question whether observers are able to match abbreviated RS-index profiles with the video fragments above chance level. The second research question is: Are health care professionals, familiar with the EBL methodology, better able to identify clients on video fragments when presented with corresponding, abbreviated RS-index-descriptions than participants without EBL-knowledge? The third question is: To what extent does the distribution of matching the eight profiles with their video fragments differ between observers with and without EBL-knowledge? The fourth issue pertains to the difference in experience with EBL. Some groups have more theoretical experience and other groups have more practical experience with EBL. The question arises whether those with a more practical background are better at correctly matching the profiles with the video fragments than EBL-participants with a more theoretical background. The fifth and final question concerns the question whether any of the profiles are easier to match than others. And to what extent does this differ between participants with and without EBL-knowledge.

Method

Participants

The 58 participants constituted two groups: One group consisted of subjects with knowledge of EBL (*n* = 31; 2 males, 29 females), either predominately theoretical or practically oriented, whereas the second group (*n* = 27, 3 males, 24 females) consisted of participants without any knowledge of EBL. Additionally, the participants with EBL-experience were divided into four groups. The first group consisted of graduated scholars in special education, together with social workers working with children and/or adults on a daily basis. These participants have had monthly contact with each other on the theory and practice of Emerging Body Language. The second group consisted of social workers. They all had daily experience in working with families with video-home-training from the EBL-methodology. The participants in the third group all participated in one or more courses on the subject of the RS-index. The fourth group consisted of group workers in an EBL-oriented day-care centre for children with behavioural problems. All professionals with EBL-knowledge have a college degree (*n* = 21) or a university degree (*n* = 10).

All 27 participants without EBL-knowledge were undergraduate students in the department of social sciences, receiving course credits for participating in the experiment. None of the participants suffered from dyslexia or other problems which prevented them from reading the descriptions within a given time period.

Material

Eight clients who matched the criteria for video-analysis and who were able and willing to participate in a drawing session were selected for participation. The selected clients were residents of a therapeutic treatment facility for children with mild mental retardation and behavioural and/or psychiatric problems. Their ages varied from 12 to 17 years. They all resided in a 24-hours treatment group, in which the principles of the Emerging Body Language-approach were practiced.

Drawings of each of eight clients[68] were obtained and analyzed with the RS-index by an accredited art therapist. Consequently, the analysis produced eight RS-index profiles. In consultation with the art therapist, the integrative summaries of these profiles were further abbreviated[69] which resulted in eight short abstracts, that are supposed to correspond with the behaviours of each of the eight clients. The descriptions were presented on A-4 paper. Two different random orders were developed: Profile sequences A and B.

The video-images were obtained by eight third year bachelor students, in the department of Special Education of the Radboud University Nijmegen. They participated in a course on the subject of Emerging Body Language. Their ages differed from 21 to 55 years old. Each student worked with a different client. The students videotaped their interactions with their clients on a weekly basis for supervision. All students were female; among the clients were four girls and four boys. From each student-client dyad, video fragments of two minutes were taken, and were compiled into a video montage of sixteen minutes[70]. The activities the client-student dyads were engaged in, were different for each dyad, for example: Playing a game of "*Hangman"*, "*Dominos",* or engaging in social conversation, and so forth. All video recordings were taken in the proximate environment of the treatment facility. With respect to the videos, also two random video-sequences were created; Sequence 1 and Sequence 2. Table 2 shows the assignment of the RS-Profile and the Video Sequences to the participant groups (see Participants).

Participants were given a pen, and sheets of paper, with either profile sequence A or B, to write on. The videos were shown on a laptop, or a large projector screen in the case of groups consisting of more than five individuals.

Furthermore, all clients (or their legal guardians) and attendants gave permission for

[68] Since the RS-index assesses the interaction structures of healthy children, which develop between 0 and 5 years of age, it is desirable for mutual comparison among clients included in this research, that they are at least five years of age, so it is clear that all five interaction structures could have developed. Clients on the video fragments all suffered from underdeveloped or disturbed interaction structures, and encountered problems that most likely started when they were below the age of four. Moreover, they tended to experience disturbances in the ability to communicate in a useful verbal manner.

[69] In the abbreviation process, double sentences were erased, for example: graphic element 14 is named 'I put myself down here', and graphic element 15 is named 'I put myself down here'. If both elements were notated for a client, the sentence was described only once in the abbreviated profile. Furthermore, where possible, therapeutic language of the RS-index was translated into observable behaviour, so participants without knowledge of the RS-index would be able to understand what was meant. For example: element 12 'I start a square direction; cognition', was translated into 'I can organize my environment'. The RS-index profiles had to match the video-fragments in a certain way. Since this research was not conducted to assess whether whole RS-index descriptions would correspond entirely with video-images of the clients, the number of sentences was further reduced to select the behaviours that were globally seen on the videos. Not all described behaviour was seen on the videos, however, but the most characterizing information of a client remained intact.

[70] The criteria for the video fragments were: (1) the client and attendant had to be visible, (2) the fragment could not contain a client or attendant shown in a previous fragment, and (3) 'natural' situations were filmed, that is, situations that would have normally taken place in the treatment facility.

the use of the video fragments for research. The use of all of the research material was confidential and the video fragments were only shown to research participants.

Table 2. Number of Participants assigned to Video and Profile Sequences

EBL-experience	Video sequence	Profile Sequence	*N*
EBL-knowledge	1 *(n = 16)*	A	8
		B	8
	2 *(n = 15)*	A	5
		B	10
No EBL-knowledge	1 *(n = 11)*	A	6
		B	5
	2 (*n = 16)*	A	8
		B	8
Total			*58*

Procedure

Participants were seated in front of a laptop or a large projector screen. In the case of the undergraduate scholars, the experiment was conducted in a quiet room in the Radboud University of Nijmegen. The professionals who worked elsewhere were visited on a quiet location of their own choice. All participants were asked to provide information about their sex, age, educational background, and occupation. All participants were instructed to match the eight particular video-fragments with the eight corresponding abbreviated RS-index descriptions while or after watching the videos. Participants were requested not to consult their neighbours. In the first ten minutes of the experiment, subjects were given the opportunity to read the descriptions if they wanted to[71]. All videos were shown in either Sequence 1 or Sequence 2, after which they were given the opportunity to read the descriptions again. Subsequently, the videos were shown again, with a pause of about one or two minutes between each of the video fragments. Participants were allowed to change their choice at any time during the experiment. All participants were thanked for their time and interest in the research.

Analyses

To investigate the issue of matching the profiles based on guessing, probabilities are calculated with permutations and combinatorics. Furthermore, the probability that a person matches *k* out of 8 of the video fragments correctly, is given by the *Rencontres numbers*. A Chi-square test was conducted on each fragment for both groups to assess the difference in matching choices between the two groups of participants. To answer the question whether participants differed significantly in their overall choice of matching the video fragments with the RS-index descriptions, a repeated measures ANOVA was conducted on the data. Video and profile sequence served as control variables. ANOVA's were also used to investigate the differences among the different EBL-groups, as well as in comparing the EBL-groups separately with the non EBL-group. To investigate interaction effects, separate *t* tests were conducted for each fragment. Finally, to examine the differences in matching outcome between EBL-theorists and EBL-practitioners, *t* tests were conducted for each fragment.

[71] One participant chose not to read the descriptions in the first ten minutes of the experiment; afraid it might influence her decisions regarding the match between the descriptions and the video-fragments.

Results

The results of the analyses pertaining to the five research questions are presented. First of all, the outcome of the probability analyses is presented. Subsequently, the differences in matching-outcome between EBL-professionals and participants without EBL knowledge are given. Furthermore, results of the distribution of matching the eight profiles with their video fragments between observers with and without EBL-knowledge are presented. Then, analyses of differences in experience between experienced practitioners and theorists in the EBL-group are presented[72]. Finally, results of the measurement of difficulty in matching the different profiles between EBL- and non-EBL groups are given.

Matching profiles and video fragments above chance level

The probability that an individual correctly matches all profiles when guessing equals 1/8! = 1/40320. The probability that a person matches *k* out of 8 of the video fragments correctly, is given by the *Rencontres numbers*, a basic concept in Combinatorial Mathematics. A combinatorial result involving the *Rencontres numbers* demonstrates that a person, who guesses all profile-video combinations randomly, will match precisely one profile to the correct fragment on average, regardless of how many film fragments are presented[73]. In this particular case involving eight profiles, random guessing will on average result in 12.5% correct profile-video matches. Table 3 presents the percentages and Chi-squares of correct profile-video matches of participants with and without EBL-experience. Overall, participants with EBL-knowledge matched 25% of the video fragments and profile descriptions correctly, and participants without EBL-knowledge correctly matched 31% of

[72] Furthermore, separate EBL-groups (theorists, social workers, RS-index therapists, and group workers) were compared with the participants without EBL-knowledge to explore potential differences between EBL-subgroups and the undergraduates. The findings of this analysis are presented in the Appendix. These exploratory analysis are not further discussed here, because the number of participants in each subgroup is rather limited.

[73] The research question pertains to the probability of a permutation in which none, some, or all of the objects appear in their "corresponding" place. The term *derangement* refers to the situation in which none of the profiles are in their ordered place. The Profiles (1 – 8) corresponded with Video Fragments (1 – 8): Profile 1 corresponds with Video Fragment 1; Profile 2 corresponds with Fragment 2, etcetera. In the case of an experiment whereby an individual blindly matches a given number (*n)* of profiles with video fragments at random, with X = the number of profiles guessed correctly, the following formula (for the probability *P)* can be employed:

$P(X = k) = \frac{1}{k!} \sum_{i=0}^{n-k} \frac{(-1)^i}{i!}$, $k = 0, \ldots, n$ In this experiment, the value of X can take the form of *k* = 0, 1, 2, 3, 4, 5, 6, 7 or 8. Both the expectation and the variance of X equal 1, regardless of the value of *n*. Furthermore, a randomly matched combination of Profiles [P] and Videos [V] could be: (P1-V2; P2-V4; P3-V1; P4-V5; P5-V3; P6-V6; P7-V7; P8-V8). In this example, three Profiles are matched correctly, namely: Profiles 6, 7, and 8. If we want to calculate whether an individual identifies three profiles correctly, when guessing, these three Profiles or points of the permutation (as is shown in the example) are *fixed points.* A permutation of *n* distinct, ordered items in which some, but not necessarily all, of the items are not in their original ordered positions, the configuration can be referred to as a *partial derangement* (Evans, Hughes, & Houston, 2002, p. 385). These derangements are also called *Rencontres numbers* (*Rencontre* is French for “encounter”). In the case of three fixed points, the formula can be applied: 1/3! ∑[(-1)^i/i!,{i,0,5}] ≈ .06. For more information on *derangement* and *Recontres numbers*, I refer to the following website: Fiacco, Gerald Del. "Partial Derangement." From *MathWorld*--A Wolfram Web Resource, created by Eric W. Weisstein, http://mathworld.wolfram.com/PartialDerangement.html. With regards to the explanation of derangements and the *Rencontres numbers*, I am very grateful to the explanation provided by my brother Joop van de Pol, and one of my friends, Thom Klaasse (both mathematics majors).

the profiles.

Differences in matching outcome between participants with and without EBL-knowledge

Prior to the analyses proper, effects of video and/or profile sequence were listed for effects on the matching score. No effects of video sequence ($F(1, 50) = 2.79$, $p = .10$) or profile sequence ($F(1, 50) = 3.04$, $p = .09$) were found. Furthermore, no interaction effects were found between EBL-experience and either video ($F(1, 50) = 2.08$, $p = .16$) or profile sequence ($F < 1$). The mean number of correct matches made by professionals or graduate scholars was not influenced by video or profile sequence. Furthermore, no significant effect was found for EBL-experience ($F(1, 50) = 3.20$, $p = .08$).

Table 3. Percentages and Chi-squares of Correct Description-Video Matches in Participants With and Without EBL-Experience

	EBL-experience			
	EBL-knowledge	**No EBL-knowledge**	χ^2	***p***
Profile A	64,5	59,3	0.17	.68
Profile B	29,0	25,9	0.07	.79
Profile C	22,6	22,2	0.00	.97
Profile D	3,2	44,4	14.09	.00
Profile E	9,7	14,8	0.36	.55
Profile F	41,9	22,2	2.55	.11
Profile G	12,9	48,1	8.65	.003
Profile H	12,9	14,8	0.04	.83

Table 4. Percentages and Chi-square of Matching Profiles A to H with Video Fragments in Participants With and Without EBL-experience.

Profile	**EBL-knowledge**	**Video Fragment**								χ^2	***p***
		1	*2*	*3*	*4*	*5*	*6*	*7*	*8*		
A	Yes	64,5	0,0	29,0	0,0	3,2	3,2	0,0	0,0	1.23	.87
	No	59,3	0,0	29,6	0,0	3,7	3,7	0,0	0,0		
B	Yes	6,5	29,0	25,8	16,1	12,9	6,5	3,2	0,0	17.78	.013
	No	3,7	25,9	7,4	11,1	1,9	18,5	3,7	29,6		
C	Yes	9,7	9,7	22,6	6,5	19,4	3,2	6,5	22,6	5.09	.65
	No	11,1	7,4	22,2	14,8	11,1	2,8	7,4	11,1		
D	Yes	3,2	6,5	2,7	3,2	22,6	0,0	41,9	16,1	23.06	.002
	No	7,4	7,4	2,3	44,4	14,8	3,7	3,7	7,4		
E	Yes	3,2	7,5	0,0	25,8	9,7	19,4	6,5	19,4	4.91	.56
	No	3,7	6,5	0,0	11,1	14,8	11,1	11,1	14,8		
F	Yes	9,7	12,9	0,0	3,2	3,2	41,9	16,1	12,9	14.77	.04
	No	0,0	7,4	11,1	0,0	25,9	22,2	22,2	11,1		
G	Yes	0,0	22,6	0,0	32,3	9,7	9,7	12,9	12,9	14.57	.012
	No	0,0	7,4	0,0	14,8	22,2	0,0	48,1	7,4		
H	Yes	9,7	3,2	19,4	9,7	19,4	12,9	12,9	12,9	5.91	.55
	No	14,8	11,1	14,8	3,7	11,1	25,9	3,7	14,8		

Differential effects of matching profiles with video fragments

Table 4 lists the percentages and Chi-squares of choice in matching in Profile A through H in participants with and without EBL-experience for each fragment separately. Profile D and Profile G were matched correctly more often by individuals without EBL-knowledge than professionals with EBL-experience.

Differences in matching outcome between EBL-practitioners and EBL-theorists

A *t* test was performed on the number of correct Profile matches with EBL-experience as factor (EBL-practitioners versus EBL-theorists). Theorists identified more profiles correctly on average, but this effect fell short on significance, $t(29) = -2.03$, $p = .05$. Furthermore, eight *t* tests were performed for each profile. The results indicated that EBL-theorists were better able to match Profile A with the correct Video Fragment than EBL-practitioners, $t(19) = -3.06$, $p = .006$. No other Profile-Video matches differed significantly between the two groups.

Are some profiles easier to match than others?

A two (group: EBL versus non-EBL) by eight (fragment: 1 to 8) repeated measures ANOVA on the number of correctly assigned profiles was performed. The main effect of group was not significant $F(1, 56) = 2.46$, $p = .12$. The main effect of fragment was significant $F(7, 392) = 8.19$, $p < 0.0001$, partial eta squared = .13, observed power = 1.00. Bonferroni-corrected pair-wise comparisons revealed that only Profile A was significantly more often correctly identified than any of the remaining seven fragments, all *p*'s < .05. The interaction effect between group and fragment was also significant $F(7, 392) = 3.70$, $p < .001$, partial èta squared = .06, observed power = .98. To investigate this interaction, separate *t* tests were conducted for each fragment. The *t* tests showed a significant effect for Profile D ($t(31.7) = -4.02$, $p = .001$), as well as for Profile G ($t(44.4) = -3.05$, $p = .004$). The participants without EBL-knowledge identified Profiles D and G more often correctly than participants with EBL-experience. Note that Profile A was identified by all participants equally more often correctly identified than any other profile.

Discussion

In the present study a first attempt has been made to investigate whether individuals are able to match RS-index drawing-profile descriptions with behaviours of clients on video. First of all, the probability that individuals identified the correct profile-video matches at random was explored. A distinction was made between participants with knowledge of the EBL-methodology and participants without such experience. It has been assessed whether EBL-professionals are better able to identify the correct profiles with the corresponding video fragments, compared to participants with no EBL-experience. Additionally, the extent to which the distribution of matching possibilities differed between participants with and without EBL-knowledge was investigated. Then is was assessed whether practically oriented EBL-professionals differed in their matching choice, compared to theoretically oriented EBL-professionals. Finally, it was examined whether some profiles were easier to match than other profiles, and, also, to what extent the difficulty of certain Profile-Video matches differed between participants with and without EBL-knowledge.

Matching outcome above chance level

The research results indicate that individuals tended to identify slightly more profiles correctly than would be expected if all profiles were matched with video fragments at

random. This finding suggests that the profile descriptions correspond to some extent with the behaviours shown on video. On average, the EBL-professionals matched about two of eight profiles correctly, which is one Profile-Video match more than would be expected based on chance, whereas participants without EBL-knowledge tended to identify approximately three of the eight profiles correctly.

Matching differences between EBL-practitioners, EBL-theorists and undergraduates

Statistically EBL-professionals (two out of eight) and participants without EBL-knowledge (three out of eight) correctly matched equal numbers of profiles with video fragments; but note that the effect was shy of being significant. Since EBL-professionals tend to know more technical EBL-language (Jennekens, 2010), it would have been plausible that they recognized these descriptions more often than undergraduates who are totally unfamiliar with the language. The research results indicated that this was not the case, however, because both groups had more or less the same number of accurate matches. Undergraduates actually tended to score slightly higher. What might have influenced this difference in result?

It is not clear whether the opportunity of reading the RS-index drawing-profile descriptions *prior to the viewing* influenced the final matching outcome. Observations may have been biased by personal feelings about the target group during or after reading the profile descriptions. In theory, this could have been more detrimental to the EBL-professionals, because they are familiar with the target population, whereas the undergraduates are not. Furthermore, EBL-practitioners, who work with clients on a daily basis, could possibly be more prone to this effect, whereas EBL-theorists are not. Direct observations may be more immune to such bias, as been suggested by Mikami, Chi, and Hinshaw (2004). Furthermore, Redfield and Paul (1976) found that one form of bias potentially influencing behavioural observation might result from observers coming to associate characteristic behaviours with target individuals over repeated observations. If participants repeatedly reviewed therapeutic information about clients, it is possible that the latter source of error could reduce observer sensitivity to behavioural change, when presented with a new client on a video fragment. Research subjects tend to interpret ambiguous behaviours in terms similar to behaviours he or she has already encountered (Tulving, 1983). As suggested earlier, this could also explain the differences in matches between practical oriented EBL-professionals and participants with a more theoretical background (undergraduates or EBL-theorists). The latter group tends to score slightly higher (although not always significantly) on Profile-Video matching outcome.

In their study, Murphy and Constans (1987) asked observers to rate videotaped lectures using scales that contained examples of either good or bad performance that had actually occurred on the tapes, but that were not representative of the observed subject's overall performance. Half of the observers read the scales prior to watching the lecture, whereas the remaining participants read the descriptions after seeing the lectures on video. Their findings suggest that certain behavioural anchors (for example: 'he talks a lot') could be a source of bias in judgements of behaviours on video and they may lead to biased recall. There is no evidence, however, that previewing behavioural anchors bias the observation of the observed subject's behaviour. Anchors had the same effect in the group who had read the scale descriptions prior to viewing, as well as in the post-reading condition. This does not imply, however, that observers who participated in the present study were not susceptible

to any other form of bias when reading the Profile descriptions[74].

Possible bias in participants' observations

Participants tended to match two to three profiles on average. What might have influenced the outcome of the number of inaccurate matches? Chapman and Chapman (1967) argue that errors in observations can be made because of participants' preconceptions. They presented both experienced and inexperienced observers with human figure drawings accompanied by statements about the patient who supposedly drew the figures. Although the drawings and statements were matched randomly in order to eliminate the possibility of relationships between cues and criteria statements, their results indicated that most participants erroneously observed the cue-criterion relationship they had expected to see. This illusory correlation can be experienced, because the variables that capture the attention are novel or deviant. It is possible that participants in the present study perceived an illusory correlation between the profile descriptions and certain attributes of the clients they observed. A hypothetical example of an illusory correlation is: "*Big eyes correlate with an insecure attachment*". This idea does not even have to be consciously accessible; participants often do not know they are biased, but the ease with which such an idea comes to mind can influence individuals to falsely assume that they have made the correct match. Some pairings can come easily and vividly to mind, even when they are not especially frequent. A recent and extreme incident with a client, for example, may have caused a health-care practitioner to make certain judgements about one of the clients shown on video, even when the prior conditions were extraordinary. It illustrates the relative ease with which one can interpret relationships, which do not exist (Falk, 1981).

Furthermore, in the present study participants had to review and recall all eight profile descriptions for each video fragment, to assess which description fitted each distinct video fragment best. They also had to remember the content of the previously watched video fragments. If a participant would have read a certain profile while watching a new video fragment, there is a chance the profile that was last read would influence the matching choice, because it stood out as unique. It is possible that individuals tended to test their hypotheses in a one-sided way, searching for evidence with their current hypothesis. An example is that when participants already matched Profile 2 with Video Fragment 1 incorrectly. Instead of altering their matching choice for Profile 2 when presented with the correct Video Fragment 2, the chance of them matching Profile 1 with Video Fragment 2 incorrectly increases, because participants are more inclined to look at a solution that fits their current hypothesis. It is uncertain whether these effects affected the participants matching behaviour in the current study. After all, participants were able to read the profiles at their own speed, as often as they wanted to, and they were allowed to alter their matches, and watch the video fragments twice.

[74] Kroes (2006) focused his research on child behavioural judgements of different observers. He argues that the agreement in judgements provided by different types of informants (parents, teachers, and group-care workers of children in child welfare institutions) has been reported to be quite low. He found that mothers with higher levels of anxiety, depression, or hostility, were more likely to report internalizing problems, but only when they rated these behaviours at home. When mothers rated videotaped behaviour samples of their children recorded in the clinic, no relations were found between maternal personality traits and maternal child reports. In the case of teachers and group-care workers, however, higher levels of personality traits (for example neuroticism) were found to be related to higher ratings of child behaviours. These findings suggest that professionals working with children are not immune to biased perception.

Why certain profiles were selected more often

Murphy and Constans (1987) examined the role of behavioural anchors in behavioural descriptions that may interfere with the way in which observers process behavioural information about the subjects they have to judge. Behavioural anchors may bias judgements in matching if they misdirect the participant's observation or recall of the behaviour shown on video. This bias could have influenced the present research findings, because the drawing-profile descriptions contained certain behavioural anchors. For example, the following behaviour in Profile A: *"I am somewhat curious towards new things in my environment. (...) I want the other to come to me, instead of me going to the other. This behaviour looks lazy"*, might be easier to recall when watching video fragments, than the behaviour in Profile H: *"I think the other has more possibilities than I have myself. I can get carried away. I will do things that I did not plan to do."* It is possible that certain anchors in different Profile descriptions stood out, whereas other anchors might not have been explicitly observable on Video Fragments. If behavioural anchors of a certain Profile direct the observer's attention to or facilitate the recall of unrepresentative behaviour on a non-corresponding Video Fragment, however, the matching of that Profile with the originally corresponding Video Fragment may result in a mismatch.

Additionally, these effects could have been attributed partly to the abbreviation process of the RS-index drawing-profile descriptions. It is possible the RS-index drawing-profile descriptions are inadequate with regard to these behavioural anchors. Moreover, the therapeutic language of the RS-index may not have been easily and equally easy observable in the video fragments. For instance: *"I can begin with something, and I can stop as well"* might be easier to recognize than *"How I have to attune with the other is yet unclear to me."* Future research should be directed at the question whether the language used in the RS-index is justly related to distinct observable behaviours of clients and whether there is a difference in degree in which the separate therapeutic sentences (as described above) can be connected to these distinct behaviours.

Profile D and Profile G were matched correctly more often by undergraduates than professionals with EBL-experience. Overall, Profile A was most often matched correctly. In the EBL-group, EBL-theorists more often correctly identified Profile A than EBL-practitioners. Perhaps participants with a more theoretical background (undergraduates and EBL-theorists) have more experience with large amounts of written text, and may therefore have been better able to select certain profiles and to attain to specific behavioural qualities in certain profiles more often than the group without this experience. Social workers, RS-index therapists, and group workers have a lot of experience with dealing with unique and specific cases, rather than eight cases at the same time. Participants with a theoretical background might have had more experience with reading larger amounts of text at a time. This may account for the difference between undergraduates and EBL-professionals in matching Profile D and Profile G correctly, and it could explain why EBL-theorists matched Profile A more often correctly than EBL-practitioners.

Future research on the RS-index and drawing analysis

RS-index therapists are convinced that RS-index profile descriptions provide them with valuable information about their clients. This information aids them in the prediction of behaviour and choice of therapy. It is important to investigate what aspects of the RS-index are valuable and how these or other aspects can be improved, standardized, and employed for greater utility. Rutten-Saris (2002) assessed the reliability of graphic elements in a

drawing, which, taken together, constitute the drawing profile. She found that the reliability of the notation of these elements, compared between different RS-index therapist, was sufficient. In other words: Overall, when presented with a drawing, RS-index therapists notated the same graphic elements. However, the validity of the RS-index has never been researched thoroughly, that is: The extent to which the concept of the interpretation of drawing traces corresponds accurately to observable behaviours in the real world. A part of the therapeutic language remains vague, for instance: It is possible that the RS-index interpretation of the graphic element *"I start a square direction; cognition"* is not as easily observable in real life compared to the graphic element *"I begin"*.

If experience in reading larger amounts of text influences the matching outcome of different groups of participants, it is recommended for future research to ask participants to match a smaller amount of text with video fragments. For instance, an investigator could ask participants to match one profile description at a time with a certain number of video fragments, or a multiple-choice variant could be applied, where participants have to choose between a number of behavioural options for each video fragment. Furthermore, an investigator ought to look into the abbreviation of the RS-index-drawing profiles. In this study, the profiles were abbreviated by a theorist, which could have led to a greater mismatch in Profile-Video matches in the group of individuals with a more practical background.

Conclusion

This study was the first attempt to measure the correspondence between RS-index-drawing profiles and video fragments. It showed that 30% of the behaviour revealed through drawing analysis matched actual behaviour seen on video. This finding indicates that the RS-index to some extent provides actual information about the behaviour of the client.

Epilogue

In this thesis I presented a theoretical framework, providing information on the origins of early human and children's artful behaviour. I posed that artful behaviour is inherent to human nature and it provides us with a sense of well-being. Human infants are born with amazing capacities to interact in an extraordinary and creative manner with the world around them. Through the intimate creative process of rhythmic synchronized interactions, infant's artful play unfolds and connects them with their caregivers, friends, and family. It helps them to relive and assimilate their experiences of the world, and give meaning to important life events. I explained that this is of fundamental importance for our fitness and well-being as other biological needs, such as eating, resting, mating, etcetera.

Early artful behaviour is observable in mother-infant interaction. It has been suggested that observing these behaviours provides us with essential information about an infant's development and the interactions it has experienced. I have provided evidence for the hypothesis that artful behaviours can be observed in humans' motor movements, when captured on paper. Rutten-Saris (2002) has made a valuable effort to analyze early infant's mark makings, to assess these developmental interaction experiences. Furthermore, she developed a diagnostic instrument for analyzing these graphic elements, which she called The RS-index. These drawing traces are supposed to provide information about the developmental history and early-experienced motor movements and interaction structures of the artist. Rutten-Saris did establish the reliability of the graphic elements, but only made a provisional attempt to investigate whether these RS-index profiles can be linked to behaviours of the artist.

In the second part of this thesis I followed up upon the wish to answer the question whether these traces of artful behaviour can indeed be linked to child development and the way humans interact. The people who participated in the empirical study were able to match the drawing profiles with the video fragments above chance level. Approximately 30% of the behaviour revealed through drawing analysis matched actual behaviour seen on video. This finding indicates that the RS-index to some extent provides actual information about the behaviour of the client.

Thus, the theoretical assumption about the relationship between art and human development, suggested by scholars such as Ellen Dissanayake, Nancy Aiken, Rudolf Arnheim, Marijke Rutten-Saris, and many others, has received some empirical support in this study.

"Once we accept and truly appreciate the message..., that the antecedents of the arts—rhythmic-modal experiences—evolved to enable our human way of life in relationship with others, it becomes possible to enlarge and amend the customary dismissive ways in which our society thinks about art." – Ellen Dissanayake, 2000, p. 205.

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List of Figures

Appendices

Appendix A – Abbreviated drawing profiles

Profile A

I am not very curious about new things in my environment.
I do the things I can and like to do, and I want to repeat these things.
I am searching how I can join the other, with what I already can.
I want the other to come to me, instead of me going to the other. This behaviour looks lazy.
I am looking for the boundaries of my efforts and my laziness.
I am having trouble attuning to my environment.
I am willing to try new things together with someone else.
I accept this if I think that the other understands me.
I am not yet sure what my effort can be.
I have yet few words about what things do to me.
I experience my emotions intensely, but they do not occupy me.
I am busy with doing, and I find this hard enough.
I prefer doing what the other asks of me.

Profile B

I am aware of what happens in my environment.
I am having trouble attaching to my environment.
I am aware of myself and my goals, and I am going straight for them.
I keep going to the environment without taking a break. I am not aware this happens.
The other, in return, may feel ignored by my behaviour and accuses me for not attuning to his or her needs. Then I feel rejected.
I am trying to maintain contact with my environment.
I want to learn from others how I can belong to the group.
I try to belong by doing what the other asks of me, by being obedient.
I am studious and this helps me to keep looking for a way of making contact with others.

Profile C

Straight movements are available to me from birth.
If I begin with something, I can stop.
I want to belong less to the other, and choose more what I want to do.
I have become more powerful in my behaviour; I go for the environment in a sturdy way.
I am looking for what suits me.
I am having trouble to interact with the environment in an attuned manner.
How I have to attune with the other is yet unclear to me.
I am sometimes moved by my own bodily functions.
This gets me into situations I cannot sufficiently get a hold of.
In return, I respond in my own monotonous way.
I can make a clear distinction between fantasy and reality.
Because of this, I realise that I can influence my environment.
I am able to say clearly what I want.

Profile D

I love to move.
I move with myself and I move with the environment.
I follow the movements of the other and I like to participate.
The force of this "moving with the other" is so strong, that I cannot break loose from the other to do something for myself.
If I am attuned to an activity, I am having trouble to attune to the other.
I will continue with what I find pleasurable.
I need the other to stop.
The feeling not being able to influence myself and others makes me angry and afraid.
I am stuck in between what I can and do and what I want to achieve.
I do not feel a connection with the other.
I am 'floating' in the air, as a figure of speech, I do not know how I to keep my feet on the ground.

Profile E

I move in a pleasurable manner and I am enjoying this.
I can start without directions from the other.
If I like what I am doing, I want to continue – even if it is not appropriate anymore.
I cannot understand everything I encounter. I will go for it and sift it out.
I am having trouble achieving something with another.
If I am working with another in a pleasurable manner, I can enjoy it intensely.
I can be and stay in contact with another.
I lose myself if I do too much what the other asks of me.
I am moving with it and cannot control myself.
I want to reach and learn something.
I am trying to adapt to the rules and wishes of the other
I am trying to be like the other and hope to belong with him or her.
I have a distinct, expressive style to adjust to my environment.
I like to be on my own, because the environment is very difficult.

Profile F

I can organize my own environment.
I am aware of the things in my environment and I can handle them.
I know which step I am ready to take and which steps I am not ready for.
I need a lot of practice before I can call something my own.
I can enjoy my capacities enormously.
If I disagree with something, I am able to make that clear.
I experience my frustration and I will let the other know.
I like to be on my own and be engaged in something I like to do.
I like to participate with others; I want a job from which I can learn.
I enjoy working together.
I want to be in a secure environment to develop.
I want to share with others and I find it important to know what the other thinks.
In interaction with the other, I form my own opinion.

Profile G

I am aware of myself and of my environment.
I can name my wishes to the other.
I can focus on what I do and I enjoy my own effort.
I experience my emotions intensely.
My emotions have different levels of intensity.
I experience that I can affect my environment and I can explore it myself.
I am able to say who and what I want when this concerns something near in my environment.
I can be in mutual play with my environment.
I develop my own opinion. This is connected with the opinion of the other.
I dare to show who I am to the people I trust.
I repeat what I can and I enjoy this.

Profile H

I experience that I am able to move pleasurable and subtle.
I find it hard to experience a connection in contact with the other and to understand him/her.
Many things in my environment overwhelm me.
I rather keep the other at a distance and wait for the other to come to me.
I resist when I am invited to do something with another.
I want to have a say about what should happen, then I will have control over it.
If others are in my proximate environment, I find it hard to stay close to myself.
I think the other has more possibilities than I have, and I can get carried away. I will do things that I did not plan to do.
If I keep to myself, I can be aware of the environment, and I have influence on it.
If I trust the other I am able to learn and share my capacities.
I can participate if I am invited and there are boundaries.
I prefer to do what the other asks of me.

Appendix B – Additional exploratory analysis

For each of the different EBL-groups (1 to 4) separately, a two (group: EBL versus non-EBL) by eight (fragment: 1 to 8) repeated measures ANOVA on the number of correctly assigned profiles was performed, to investigate whether independent EBL-groups scored differently in comparison with the group without EBL-knowledge (see the results in Table 5).

Table 5. Between-Subjects Effects, Within-Subjects Effects, and Interaction Effects of the Four EBL-Group Compared with the Non-EBL group.

Group	*df*	*F*	*p*	*Partial èta squared*	*Observed power*
Theoretical practitioners					
Main effect group	1, 33	0,08	.78	.002	.06
Main effect fragment	7, 231	4,39	.00	.12	.99
Interaction group x fragment	7, 231	2,37	.02	.07	.85
Social workers					
Main effect group	1, 31	12,89	.001	.29	.94
Main effect fragment	7, 217	1,64	.12	.05	.67
Interaction group x fragment	7, 217	1,08	.38	.03	.46
RS-index therapists					
Main effect group	1, 36	0,09	.77	.00	.06
Main effect fragment	7, 252	4,71	.00	.17	.96
Interaction group x fragment	7, 252	3,15	.003	.08	.96
Group workers					
Main effect group	1, 31	16,92	.00	.35	.98
Main effect fragment	7, 217	3,26	.003	.10	.95
Interaction group x fragment	7, 217	0,92	.49	.03	.39

A main effect of fragment was found in the group of theorists and practitioners, as well as in the group of RS-index therapists, when compared with the graduate scholars separately. This effect characterizes a significant difference between the EBL-theorists/practitioners and the non-EBL-group, as well as between the RS-index therapists and non-EBL-group, on the number of correctly matched fragments with descriptions. A main effect of group has been found in the group of social workers, as well as in the group of group workers, when compared with the graduate scholars separately.

Furthermore, a four (group: EBL-theorists/practitioners versus Social Workers versus RS-index Therapists versus Group Workers) by eight (profile: 1 to 8) repeated measures ANOVA on the number of correctly assigned profiles was performed. The main effect of group was not significant $F(3, 27) = 2.17$, $p = .16$. The main effect of fragment was significant $F(7, 189) = 8.71$, $p < 0.0001$, partial eta squared = .24, observed power = 1.00. Post-hoc Bonferroni-corrected *t* tests revealed that in the EBL-group Profile 1 was more often correctly identified than Profiles 2, 3, 4, 7, and 8. Moreover, Profile 4 was more often correctly identified than Profile 6, all *p*'s < .05

The interaction effect between group and profile was also significant $F(21, 189) = 1.65$, $p = .04$, partial eta squared = .16, observed power = .95. Separate One-way Anova's for each profile on the number of correctly matched fragments, revealed a significant effect of Profile 1 only. Post-hoc Bonferroni-corrected *t* tests showed that the group of RS-index therapists correctly identified Profile 1 more often than the Social Workers, $p < .05$.