Aquatic reflexes in newborn human baby

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Abstract

In 1960 Sir Alister Hardy posed the question "Was Man more aquatic in the past?"
To honour Hardy this paper discusses swimming and diving skills of human babies as possible leftover of littoral past in human ancestral evolution.
It might be related to an ethological sensible period when innate reflexes are activated that are linked with adapting to aquatic behaviour very early in life of H. sapiens.
To my knowledge aquatic development of human babies and toddlers has not reported before ethological. Examples of 'aquatic behaviour' in human infants were already mentioned a few centuries ago.
After introduction of baby swimming courses and water deliveries in many countries it received a lot more attention. Possibly related are properties of neoteny in H. sapiens that seem to show a semi aquatic link.
In 1937, Myrtle McGraw described swimming behaviour of babies. Since then it was always reported that repeated exposing of babies to water activated reflexes resulting in 'waterproof' babies.
These swimming reflexes are fully functional before babies and toddlers can walk. This fact can be interpreted as inborn reflexes during a sensible period.
It shows that from early childhood to maturity all Homo sapiens can swim and dive.
Active in water of babies and very young children was for millennia "normal" by "primitive" island dwelling human populations. It contradicts the common idea that human ancestors left forests for open plains and evolved into bipedal long distance walkers and runners.
A fact is also that no Hominidae are or were aquatic able like H. sapiens.
May be long distance walking and running is correct for recent H. sapiens but that is not sure for earlier Homo spec. ancestors and absolutely not true for earlier hominin related finds.
Perhaps are semi aquatic neotenic and pedomorph properties of newborn babies and toddlers indeed more in line with a heritage of early shoreline semi aquatic ancestors.

Key words
Alister Hardy; Homo sapiens; evolution; ancestors; littoral; semi-aquatic; adaptation; ethology; biosemiotics; imprinting; sensible period; newborns; history; babies; toddlers; baby swimming; aquatic reflexes; water babies; water birth; neoteny; paedomorphosis

Introduction

What I describe in this project is easy to find out because many baby-swimming courses are for many years active, all over the (higher standard living) world.
But alas, my finds for this project have then of course some bad litimations.
Original semi aquatic Human populations as I will state are marginal and deminishing.
Some are still known, but almost all as recreational pleasure for tourists in Asia.
Vacationed divers visit Moken and delightid tourists look to Andaman and Nicobar populations, photographing and filming for the fun naked, "dwarf like savages".
It sounds harsh but is factual and not as bad as at the end of the nineteen hundreds when the Tierra del Fuego semi aquatic aborigines (all extinct now) were exposed in the zoos of London, Hamburg and Zürich. That and the "story" about Charles Darwin's "savage" travelling companions on the Beagle and related people I added as part in "Discussion" in this project.

My point is, that any knowledge in extent about original waterproof behaviour of their babies in water is not known in extenso. The same is still the fact for many existing island bound semi aquatic populations like for example in Micronesia.

After baby-swimming courses started worldwide it became clear that starting few months after birth, human babies and toddlers are able to happy learn floating, swimmming and diving. That started "Aquatic reflexes in newborn human baby".

It is remarkable Homo sapiens babies can perform these aquatic adaptations when none of other Hominidae is or was able to this, orangutan (*Pongo*), gorilla (*Gorilla*), and chimpanzee and bonobo (*Pan*), newborn nor adult.

Starting with newborns and older babies functioning in this process is based on a set of innate reflexes. In ethology and neuropsychology are several adaptive time frames defined as 'critical' or 'sensitive' for imprinting. Those innate processes were first described of birds and later mammals, including our own species Homo sapiens. More knowledge about neonatal neurobehavioral organization for healthy full-term infants presents a link with ethology.

This phenomenon of innate releasing mechanisms is often influenced by environmental factors particularly during a primal period. The nature of a factor often appears less important than the time of exposure. It is not in all cases an absolute critical period for gene-environment interaction but when it begins later it can make adapting more difficult.

How processes like this function in general as an ongoing spiral is to explain biosemiotic: "Sense" an outside "sign" and "react" and reacting "self" is then also "sign" connected to internal "self-sense". A simple description of the process of gene-environment interaction that, when started, realizes an ongoing spiral.
When innate properties are involved, it is a process of "learning" and "knowing".
Consciousness in action depicted here is an example that functions this way in several adaptive activities of (even very young) H. sapiens babies, toddlers, grown-ups and even adults.
An early start of babies with semi aquatic activities reveals adaptation by showing behaviour: the early swimming-like movements, breathing control, diving and floating.

Once started it means in all later stages up to adult humans well-developed floating, swimming, diving and playing.
It is an in and near water natural behaviour for Homo sapiens.
Very important in starting is active participating of mother and in fact the extended family as it functioned originally. Adapting and learning in general took place millennia in extended families of Homo sapiens.
Day in day out acting together in extended family or joint family groups as in traditional societies is in "modern" societies unusual.
In these societies the norm is single "nuclear" family and a lot of adapting and learning has to be or is taken over by trained professionals, as is the case for baby swimming.
The fundamental point in "Aquatic reflexes in newborn human baby" is that babies and toddlers are able to adapt easy in a short time to a substantial aquatic environment.
When developing to "waterproof" babies they can float, swim and dive but never without adults and children present. That is exactly the same as "mending" offspring training for survival of numerous other animals, be it arthropods, amphibians, reptiles, birds or mammalians.

I suggest as hypothesis:

By displaying the ability to float, swim and dive in the first months after birth, human babies and toddlers proof successfully adapting to water.
This adapting is not known of other Hominidae and imprinted in a sensitive period activating innate releasing mechanisms of waterproof reflexes.
It reveals ethological aspects of developing and learning linked to physical, physiological and emotional properties of babies.
In built reflexes are triggered in a genetic preset sensitive (sensible) period that in this case lasts from four or six months to one year.

Real baby swimming

Baby “swimming” in early month after birth is of course impossible really swimming.
The name “ Baby swimming” became in use when little baby courses started successful.
It is in fact realizing “waterproof” behaviour. Real swimming is only possible after an acceptable period of such waterproof behaviour. For what we call “babies” it is advised to start activating "waterproof" after four to six month and sometimes later than that.
Reasons are the earlier not completed immunity system functioning and less developed locomotion to fulfil voluntary movements.
To observe this is the outcome of the luxurious baby swimming in well to do societies.
Biologically speaking about “H. sapiens in natura” earlier is possible. In original (very small) populations of many “primitive” (sic: nonindustrial, often tribal culture) societies mothers were mentioned as passing immunoglobulin antibodies by breast-feeding in more years.
Linking properties of waterproof babies to probable ancestral adaptations is more worth when it was possible to checkout substantial original semi aquatic human populations, without professional trainers and pleasurable swimming pools.
As I pointed out that is scarce.

Water adapted newborns were noticed already in the 18th century as mentioned by Odent and Johnson[28]:

“When Captain Cook discovered the Hawaiian Islands in 1778, he later wrote of seeing ‘neotenic, floating on their backs, in the warm streams and lagoons’ . . . ”

In the 1930’s Myrtle McGraw [6 24 23] did show that babies could learn involved movements like how to stay afloat by adapting. Her data did suggest how cortical control emerges gradually, affording infants to increase awareness of and control over actions.
The way she tested was seen as controversial, underestimating perception and emotion of newborns but that was the other way around in fact. Her results are accepted and still useful.

Eyewitnesses still report young indigenous children swimming and diving in the Amazons, on Andaman and Nicobar islands and in boat-dwelling, fishing and foraging sea nomad communities.
These – diminishing- populations with several features in common are found in territories of five Southeast Asian states; Myanmar, Thailand, Malaysia, India, Indonesia and the Philippines.

In New Scientist Helen Phillips[31] stated remarks by Erica Schagatay about observations on physiological properties of Indonesian Sea Dwellers (fig. 1):

“Orang Suku Laut sea people spend up to 10 hours every day in the water, they give birth in the water, the children dive before they walk and the people harvest all their food from the sea. “

Fig. 1 Suku Laut project Neba: http://www. neba.nl/

One outcome was an original approach in BirthLight baby swimming inspired by Amazonian forest people.
Founder Françoise Freedman[10] was in the nineteen seventies doing fieldwork on the upper Amazon and noticed how much fun they had everyday with babies and children playing in rivers.
Babies were trained to hold on to parents and swim towards them, always picked up before they got distressed.

BirthLight Baby swimming is a model accepted in all industrialised societies and swimming and diving babies are now called water babies (fig. 2).
Reported sighting of natural water births in sea people societies are becoming exceptional because their ways of life are diminishing.

Fig. 2 Water babies ©Urchin Rock 2004 [38]

Water birth of human babies was in the 1970s propagated and accepted in Western societies. Experience became available with work of Michel Odent[29]. These water births appeared remarkably safe and peaceful (fig. 3).

Fig. 3 Mother and newborn water birth CC Schuring [34]

It is a next step to contemplate about a possible semi aquatic past of some of our ancestors and I would link this to “waterproof “ Homo sapiens babies.

Reflexes in newborn and young babies

As described by Freedman[10] accustoming very young newborns and babies to swimming and diving succeeded earlier and easier than expected. Increasing safety against drowning was a result because partaking parents learned to realise risks for little children. The basic reflexes are recognised in almost all 'starters':

1. Breath holding
2. Salamander' like swimming movement (fig. 4)
3. Legs moving to turn (fig. 4, 7, 8)
4. Surfacing (fig. 8)
5. (Secondary) always eyes open (fig. 2)

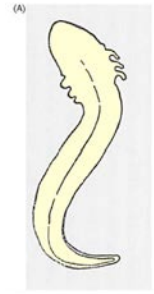
Ethological it is comparable to normal interactions of babies, mothers, fathers, brothers and sisters.
Important are differences in acceptance of adaptive reflexes in newborns: are babies 'only subjects' that can train anyway, or is it an innate resource of newborns to adapt to aquatic behaviour?
The reflexes were already related to physiology and neurobehavioral development and McGraw's conclusions started further research in development (Sweeny JK.[37]).

"The swimming reflex in normal infants was first described by McGraw, who developed a three phase classification of aquatic behaviour development:
a) reflex swimming, b) disorganized motor activity, c) deliberate voluntary movements.
These three phases were concluded after 445 observations of 42 infants (11 days to 2 ½ years of age) to identify the amphibian motions used by children of varying age's during spontaneous prone propulsion through water without swimming instructions. "

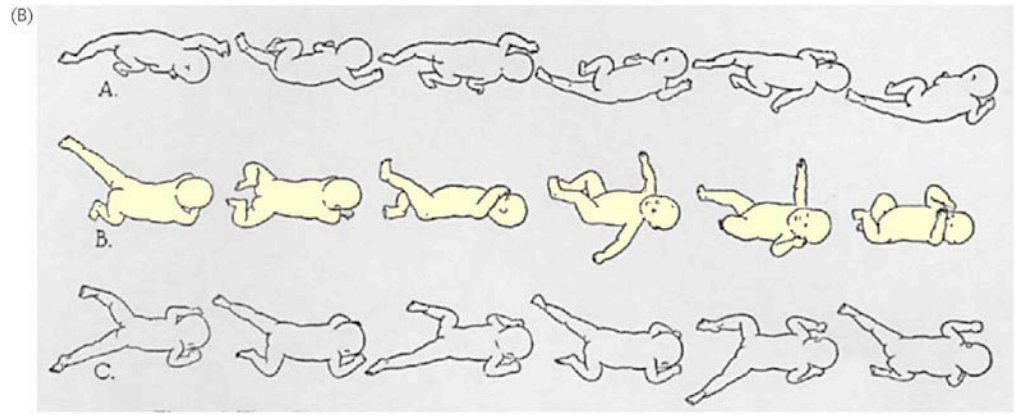
Dr. Myrtle McGraw, Columbia University New York, NY, US, 1940
Photographer: Hansel Mieth

This is based on "McGraw, M. B. (1935). Growth: A Study of Johnny and Jimmy[23]. New York: Institute of Child Development and McGraw, M. B. (1939).
The Neuromuscular Maturation of the Human Infant[24]. New York: Institute of Child Development.

Within these books she described the three-phases, all documented on film, of early childhood development as it pertained to psychomotor abilities. Most clearly on these films are babies in the water. She called this "swimming reflexively" [24 23].
Among all of her achievements she is known for personal traits that made her different from the rest.
Her persistence on scientific integrity, relationships she cultivated with her research subjects.
Compassion and caring for young children in general remained till the end.
She was also influential in development of water-birthing and benefits of for babies to swim at a very early age to develop better psychomotor skills.
The three phases described in McGraw's work of babies in water as mentioned shows clearly early development, pertained to psychomotor abilities.
The classification of phases is depicted in (fig. 4) [23]. The original film of the basic movement is available (fig 5).



S



Johnny ABC

Fig. 4 After McGraw[34], diagonal crawling of Johnny Woods (modified, Meijers)

Phases A, B and C are visible in fig. 4 "Johnny ABC and I am not sure if all are really "deliberate voluntary movements".
S is development of swimming movements in the Salamander larva, an observation that provided McGraw with the motivation for studying developmental changes in the swimming movements of human infants.

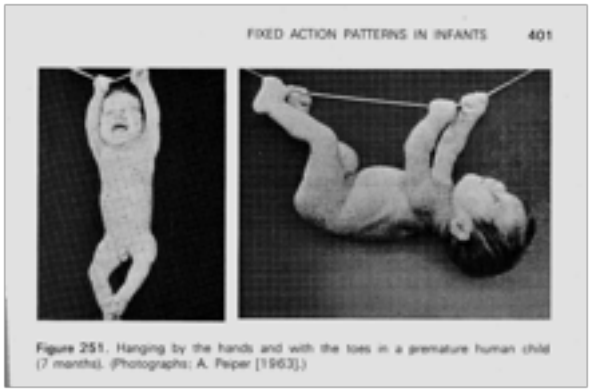
A phase in the swimming movements of the human newborn is like S,
Salamander swimming of Johnny Woods eleven days old.

B is about 2-3 months during which they become more variable.
Probably it is correct to name it "activating of locomotive innate properties" which, once started, leads to more. In movements of stage B we see something that is recognized in the film "Drowning prevention strategy for infants and young children" (fig. 8) ISR [18b].
ISR popularizes this to learn babies effective floating on back.
It is comparable with a life jacket position but based on the buoyancy of "baby shape" bodies.

B coincident with the achievement of unsupported bipedal locomotion C.
The newborn S movements, no longer present when the infant is placed in water after phase B suggest that they are ontogenetic adaptations to the intrauterine environment.

Their ‘reappearance’ at phase C then has to do possible with practice effects as in her co-twin study.
They also demonstrate effects of decreasing gravitational constraints on behavior of newborns. An important fact is that McGraw considered them better organized than either neonatal crawling or stepping movements. It is an early observation of positive effects that baby swimming has.

“Only” reflective and not voluntary” is not useful and not right here. A better definition is as mentioned by Eibl-Eibesfeldt[9]: innate properties of babies, and innate releasing mechanisms.



7 month premature baby: sign => reaction (body) and emotion (expression) => sign

Hand grasping, foot grasping, primary stepping (Sie und Er), diagonal crawling (McGraw, see 4. A)

Fig. 5 Eibl-Eibeslfeld [9]

The physical and emotional reactions are visible in two cases in pictures of experimental tests with newborns (fig. 5 in Human Ethology, Eibl-Eibesfeld [9]).
Eibl-Eibesfeldt did describe diagonal crawling as “diagonal walk” (p. 26) [9], but it is taken from fig. 4, phase A, Salamander swimming as McGraw observed..

Some of the experiments of fig. 5 in my view could be described using newborns as “robot-like” subjects. Nowadays we (should have to) recognize the emotional state and conclude …
“Robotic” is not the way McGraw defined her interaction in the two years with the Woods boy’s. (The Tuscaloosa News - Jul 30, 1934).
She experimented partly with fhese (not identical) twin Johnny and Jimmy Woods.
Johnny was trained and Jimmy functioned as “blank”.
Swimming is only one of the different training sessions she worked with.
She told later that in her opinion a mother should first of all learn of her baby’s responses.

In 1953 McGraw began training undergraduate women to work with infants and young children.
In an article published after her death in 1972 she argued that in an era featuring disappearance of an extended family and instability in nuclear families, methods must be developed to train young people to learn to observe and understand the behavioural development of infants before having their own.

On September 8, 1988 McGraw died at the age of eighty-nine. During her eulogy her daughter Mitzi described her mother as a woman on the forefront. She stated, "My mother was born in the 19th Century, lived in the 20th Century and thought in the 21st Century.

If we would not have knowledge about McGraw's findings, maybe we should have missed recognizing the early start of aquatic adaptive behaviour in newborns.
She is for me the pioneer that set me on "Aquatic reflexes in newborn human baby" in the first place.

When realizing this, it is important to be informed about recent findings and it is useful to cite Carrie Gotzke and Heather Sample Gosse [33] in
"Interacting (0 - 3 Months) - Relating to Each Other Right From the Start":

"Each baby is a "people person" right from birth – with natural abilities that have caused some to say that these little beings are "prewired" to communicate with others. Even very young babies show interests and abilities that support interaction with those around them.
In turn, caregivers promote interaction by treating a baby's behaviour as a form of communication.
Listening and vocal skills develop within the framework of these caregiver-baby interactions.
Throughout the first three months, caregivers and babies are learning to understand each other's communication signals."

Discussions about baby swimming resulting in really sound toddlers and little child swimmers are important. Langendorfer and Bruya[20] mention it explicitly and point to (two) different views and consequences.
Examples are Committee Sports Medicine and Fitness & Committee Injury and Poison organisations (SMF and IP) warning that it is not the case [5], a reason for YMCA of USA national organization to publish their disagreement in Paediatrics Letters to the editor[11].

Committee Sports Medicine and Fitness & Committee Injury and Poison (SMF and IP) [5] :
"Generally children are not until their fourth birthday developmentally ready for swimming lessons. "

YMCA USA[11]:
"Neither the terms "developmentally ready" nor" formal swimming lessons" are sufficiently well defined in the policy statement to prevent serious disagreement and misunderstanding among medical and swimming professionals and misinterpretation by the public at large.

Moreover, to our knowledge, no current research data exist to support the use of the "fourth birthday" (or any other such age) as a cut-off for initiating swimming lessons. "

SMF and IP5 are fixed on swimming abilities only. They judge four years as acceptable starting point.
YMCA 11 takes into account the difference between 'formal swimming lessons' and baby swimming activities.
The purpose of baby and toddler courses is not purely 'swimming' but as I stated before realising water safe (water proof) behaviour early in the first year.
Langendorfer and Bruya [20] seem to take sides with SMF IP. Baby swimming training is okay, but very early starts are not. They warn to overestimate a very early start as McGraw with Johnny Woods.

A point is that recently (2010) the position of the two opinions is changing.
The reasoning of the YMCA and other positive baby swimming organisations is more accepted.

To show the change [22]:

Doctors: OK to Teach Toddlers to Swim
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SALLY MACDONALD Reporter

HOUSTON - The largest group of doctors is finally changing its tune when it comes to teaching toddlers how to swim.
The American Academy of Pediatrics has always recommended swim lessons for children ages four and older but now says it's open to classes for younger kids, too.
New evidence shows children ages one to four may be less likely to drown if they've had lessons. Infant Swimming Resource, a program that teaches kids ages six month to six years old how to survive in the water, is commending the decision.

"We think this is a vital step in keeping more kids safe and to keep them from drowning," said Lenie Stroh, a certified ISR instructor who teaches in the Clear Lake area.

AAP had worried swim lessons would give kids a false feeling of security.
There was also concern parents would become less vigilant about watching a child who had learned some swimming skills.

"His confidence level is very high. We'll let him swim across the pool by himself, but there's always an adult within reach," said Araceli Merkle, a mother of a three-year-old ISR student.

In this, all I mentioned is stated prominently including the role of the “adults”. If I change “adults” in “parents and siblings” it fits for a 100% in ethological perspective. In that way it functions in Sea dwellers and similar groups and maybe a “memory” model of possible shoreline littoral ancestors.

Critical or sensitive imprinting period

The term "imprinting" was introduced in ethology for researching animal behaviour.
"Imprints" are recognised innate aspects of behavioural. They develop in critical (fixed) and sensible (flexible) time frames. This can vary from short into much, much longer.
It started with birds and established itself next in research on mammals (and unexpected many more animal groups).

Concepts were learning strategies and a host of social behavioural interactive processes in H. sapiens mentioned by Eibl-Eibesfeldt [8 9].
A problem was and in fact often still is 'tabula rasa' [19 39] for human development described by John Locke (1632 – 1704):

"At one extreme, we have John Locke's idea of 'tabula rasa' that proposes that the minds of newborn infants are blank slates that will be differentiated and altered only through sensory experience.
Modern biological determinism represents the other extreme.
In its strictest form, this ideology suggests that behaviours are inherent and innate, resulting from the expression of genes. Most intellectuals subscribe to a view somewhere between these two extremes, on the gradient of a controversy that is still a hot topic of debate in many intellectual fields".

Carrie Gotzke and Heather Sample Gosse [33] not longer accepted this 'tabula rasa' by in interacting with our (0 - 3Months) babies.
It is acknowledged that 'a variety of faculties to receive and abilities to manipulate or process the content' as Knezek[19] describes it correct: it is innate imprinting possibilities (Meijers) in sensitive - short or much longer - periods.

Most suitable description of what happens is in my opinion biosemiotic reasoning (Hoffmeyer16).
A mammalian central nervous system is essentially not a "tabula rasa" engaged in producing solutions to abstract problems.
For H. sapiens the earliest moments of childhood mean intense occupation with modulating bodily parameters showing up. It has to overcome obstacles posed by body-self interacting with environment, an ongoing vice versa process.
That is absolutely not exclusive mammalian, but to compare with central nervous systems of almost all animalia, simple or super complex and basic to biosemiotic studies.
How processes like this function in general I mentioned in the introduction.
To explain biosemiotic: it is an ongoing spiral: "Sense" an outside "sign" and "react" to it.
The reacting of "self" is also "sign" connected to internal "self-sense".
When innate properties are involved this will release a process of "learning" and "knowing".
Consciousness in action depicted here is not just "robotic" because we are talking about "life", living. A remarkable example of a process that functions this way very early is adaptation to aquatic activities of (even very young) H. sapiens babies.

Proprioception makes clear that cognition is as much concerned to registration of movements and play of muscles, as to in-brain symbolic reflection. These two aspects of cognition do not exist apart.

Interaction of neonates and their mohters (and – or other caretakers) in baby swimming activities does function in a biosemiotic way.
Maybe a long time ago this “ongoing spiral of learning and knowing” started on ancestral riversides, lakesides or a seashore. A forced semi aquatic "habitat" that in evoluionary sense leaded to preformatted gene-environment interaction properties.
When innate properties like that are involved this will release a goal oriented process of “learning” and “knowing”.
A remarkable example is effective adaptation to aquatic activities, a complete behaviour “package” with breathhold, swim, dive and float that functions very early in (even very young) H. sapiens babies
And again, we are not talking about robotic processes, but an inate, preformatted reactive behaviour.
A “product” of ongoing processes that as we know now started in L.U.C.A billions of years ago.

An example of a most for humans reported process like this is the language-adapting timeframe.
Language is a very important aspect of the “super-social” H. sapiens species and much research is available.
A problem exists in different opinions, shown by Johnson and Newport (1989), cited in Purves ET al. [32]:

“Many animals communicate by means of sound, and some (humans and songbirds are examples) learn these vocalizations. There are, in fact, provocative similarities in the development of human language and bird song (Box B). Most animal vocalizations, like alarm calls in mammals and birds, are innate, and require no experience to be correctly produced.
For example, quails raised in isolation or deafened at birth so that they never hear con specifics nonetheless produce the full repertoire of species-specific vocalization.
In contrast, humans obviously require extensive postnatal experience to produce and decode speech sounds that are the basis of language.

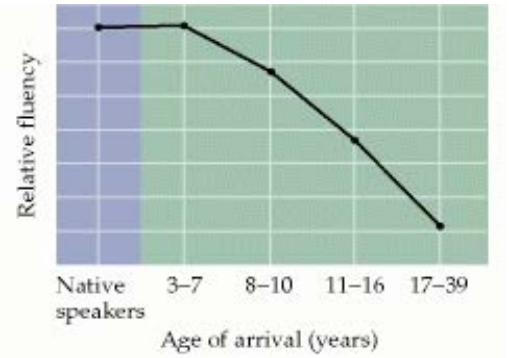

Fig. 6 Decline in language ability

A critical period for learning language is shown by the decline in language ability (fluency) of non-native speakers of English as a function of their age upon arrival in the United States (fig. 6). The ability to score well on tests of English grammar and vocabulary declines from approximately age 7 onward.”

As far as language is concerned, the process begins as mentioned much earlier than three years. Starting in the first year is more accepted but the outcome of course does not mean fully developed 'language'.
Fact is that the internal imprinting phase starts very early. It is visible as correct reacting to verbal communication and that develops fast in the first four to seven or eight month.

The language-imprinting phase shows a very long 'critical period' to complete (fig. 6) but for baby swimming we have on the contrary to do with a very short 'sensible period'. Able swimming can still be realized years later but it takes then older children and grown-ups a lot more time to achieve results.

The discussion between SMF IP and YMCA in Paediatrics [5 11] shows something similar, connected with time lags for aquatic adaptations at different ages.
The YMCA and Infant Swimming Resource (ISR) look at little babies able surviving to stay afloat at an age younger than one year and mention success in one to six months.

The SMF and IP Committees defend real swimming abilities and choose two to four years of age as starting point for training and state that 55 to 58 month are needed to complete this process, in fact a year or more. It did show that there should be cooperation and more research to overcome conclusions that differed until now substantially.
Realizing that they are looking at different outcomes, waterproof babies or swimming toddlers and young children works, see "Doctors: OK to Teach Toddlers to Swim".

ISR Harvey Barnett presented his considerations in 'A Behavioural Approach to Paediatric Drowning Prevention' at University of Oklahoma Health Science Centre, March 5 2009 [3.] .
The question about apparent reflexes of very young children adapting to aquatic circumstances absolutely differs to that about two to four years old children.
The early starting point shows quick and easy aquatic adaptation of newborns and toddlers.
Barnett stated like others that such development is connected to early psychomotor abilities.

Suggesting as I do that it will start earlier than after four month when babies are active in semi aquatic surcomstances is a risc I take. It is not "just an unconsious instinctive process" but functioning in biosemiotic way between open minded "subjects" interacting, a Homo sapiens neonate, its mother and eventual other partakers. A consious open mind of young babies is a factor which should not be underestimated and I prove this in Aquatic imprinting of babies.

It is envisioned in my simple model:

[under construction]

Aquatic imprinting of babies

Success of baby swimming is real and connected to imprinting in a sensitive period.
It is based on innate possibilities in first months to one year after birth. Even when submerged they are stimulated by interacting parents (or trainers).
Missing early imprinting can damage basic behaviour for many birds and mammals, our species included (Eibl-Eibesfeldt [8] and Alcock[1]).
In psychology and neuropsychology the same is mentioned and sometimes compared to ethological definitions in biology as Balatskii [2] did:

"Imprints are tinges of human instincts, which were studied, particularly, by K. Lorenz. Many of the currently dominating theses concerning the imprinting process are either disputable or vague (1, p. 196). What we know about imprinting is as follows:
First, imprints occupy an intermediate place between genetic imperatives (instincts) and conditioning.
Second, they are formed accidentally (their character cannot be predicted).
Third, they are realized during critical periods called moments of imprint vulnerability (4, p. 37), when the individual cannot resist external directives.
Fourth, imprints are of two types: good (positive directives) and bad (negative directives). "

In an ethological perspective baby swimming courses ascertain in a preset sensitive period human adaptation under aquatic circumstances.
Safe aquatic behaviour is fulfilled for young human babies if they interact with parents (including brothers, sisters and other siblings). It shows as result positive affectivities between children and parents.
This makes the ethological observation significant in two ways.
Missing this for older children lead to problems with learning to really swimming and diving. It takes more time to adjust and for a number also to overcome hydrophobia.
Making swimming impossible forever it does not of course.

It differs substantially from missing the imprinting phases for developing much more complex abilities as speech and language [32].
Because learning to swim and dive is obvious possible for adults later, I prefer to label the time frame shown in baby swimming' sensitive' and pertinent not 'critical'.
The three phases described are constantly and everywhere observed in baby swimming courses and is a main point in this research.

McGraw did so when exposing Johnny Woods very young, but the start is still early at four to six months. The reason to start later is generally linked to the immunity system of newborns that is not fully developed until about six months.
As earlier start could be real in 'primitive', not dense populations where mothers are passing immunoglobulin antibodies by breast-feeding in a substantial longer phase, sometimes even for more years.
Starting aquatic activities with babies first swimming is named 'Salamander like' [23] shown in fig. 4, 5, 7 and 8.

Then rotating legs in one direction and popping-up floating in a position on their back as if wearing a life jacket. Some of the reported movements in testing very young babies in water were ethological described earlier by Eibl-Eibesfedt [8], but not explicit as 'aquatic' trait:

"Swimming movements can be released in infants that are a few weeks old by placing them into the water in a prone position and merely holding them up on their chin. They paddle in a coordinated fashion with hands and legs. The behaviour disappears at 3 to 4 months. "

Fig. 7 Salamander-like swimming movements of 11 day's Johnny [1418a 23]

The swimming movements are elicited when Johnny was exposed to water, one of the twin Johnny and Jimmy Woods of Myrtle McGraw, 11 days old [23].
A Salamander-swimming fragment of a simulation of "salamander locomotion" [14] was recently added to the film about Johnny [17 18a.] (Fig. 7) and is phase A in fig. 4.
The 'floating effect' is described on a diversity of sites about baby swimming.
A good and even important example is the film published by ISR [3 18b]: "Miles story, Drowning prevention strategy for infants and young children".
The baby in this film had 3 weeks of ISR lessons prior to this fully clothed self-rescue videotaped. Fig. 8 shows baby turning upward (see also 9b).


Fig. 8 Drowning prevention strategies for infants and young children ISR YMCA [18b]

It depicts what McGraw described and I suggest it is the movement B in fig 4. “Johnny” as McGraw already filmed.
Submerged they hold their breath and start swimming motions (fig. 9a). They show a rotation (fig. 9b).
Floating on back, face above water, they start breathing and rather relaxed crying and babbling (fig. 9c and film about fig. 8).

a

b

c

Fig. 9 Three stages a b c © DJW Meijers 2009

The aquatic sensitive period of our species ends after four to six months in about a year.
It reveals the outcome of a genetically preset sensitive (sensible) period for imprinting with an important role of partaking parents. But accepting ‘we’ have ‘instinctive’ behaviour and beyond this ‘innate imprinted’ learning phases as newborns is still hotly debated.
Positive is in my view the link neuropsychology picked up with original definitions of imprint in ethology for humans.

It shows more open mindedness for the H. sapiens position between other mammals.
Palmer [30] pointing at the role of this imprinting in 'Bonding Matters, The Chemistry of Attachment' mentions the situation that still needs improvement:

"Sadly, over the last century parents have been encouraged by industry-educated" experts" to ignore their every instinct to respond to baby's powerful parenting lessons. Psychologists, neurologists, and biochemists have now confirmed what many of us have instinctually suspected: that many of the rewards of parenthood have been missed along the way, and that generations of children may have missed out on important lifelong advantages."

In "Water babies" of Freedman [10] the work of Liselott Diem[7] in the 1970's is cited and also by baby-swimming organisations in many different countries.
What was shown in systematic testing kindergarten children between 1974 to 1976 by Liselott Diem and students of Cologne Sports High School in Germany is, that interaction with parents and peers does more.
Learning to swim at an early age demonstrated advanced development in motor skills, reaction time (reflexes) and concentration (focus).
But than extra positive evidence was found of social interaction, self-confidence, independence and coping with new unfamiliar situations.
Overall, children were better adjusted than peers who had not participated in early swimming programs.
Increase in both self-esteem and independence due to baby swimming were cited as contributory factors.
It confirmed that children started swimming at an early age benefited of positive interaction and bonding with parents.

As Federal Minister for Education and Science she therefore propagated swimming for babies and teaching movement and gymnastics for preschool children and kindergartens.
Sigmundsson and Hopkins[35] recently explored the effects of baby swimming on subsequent motor abilities.
In this study also a group of baby swimming active children (2 – 4 month old) was compared with a group that had not this experience.
It again repeat the result of McGraw and Diem and shows a correct view about stimulating swimming activities with babies and toddlers they note in the following key messages:

• Physical exercise facilitates the development of motor skill
• Baby swimming programmed may have positive effects on motor skill development
• Baby swimming programmed targets activities promoting eye–hand coordination and the provision of vestibular stimulation
• Baby swimming may have rather specific effects in the motor domain, its potential positive benefits should also be explored in other areas of relevance for child development

What is described by Bell et. al. in "Concept clarification of neonatal neurobehavioural organization" [4] is similar:

What is already known about this topic:
• In the neonatal period (the first 28 days after birth) there is a sensitive and dynamic unfolding of development unique to the neonate.
• This is therefore an opportune time to assess and intervene to promote optimal neurobehavioural organization.
• The policy and culture of many maternal-child units demand clinicians to be task rather than synchrony-oriented and thus there are missed opportunities to enhance neonatal neurobehavioural organization. "

What is add:
• Inconsistent terminology, lack of a gold standard measurement, limited understanding of the concept's interplay between environmental interaction and genetic expression, and limited evidence of the concept's predictive relationship between the neonatal period and later developmental trajectories were identified in literature.
• Neonatal neurobehavioural organization is the ability of the neonate to use goal directed states of consciousness, in reciprocal interaction with the care-giving environment, to facilitate the emergence of differentiating, hierarchical and coordinated neurobehavioural systems.
• Maturation of neonatal neurobehavioural organization is evidenced by the neonate's ever-increasing resiliency and capacity to learn from complex stimuli. "

Partly mentioned in the conclusion:
"Neonatal neurobehavioural organization is a global phenomenon that captures the essence of healthy full-term neonatal function as resilient, individualized, complex, experiential and holistic.

A clear conceptual definition will aid the international community (1) to communicate effectively within and between disciplines, (2) to apply evidence-based research findings, and (3) encourage the development of valid and reliable instruments to capture the multiple dimensions of NNBO.
Clarification of NNBO directs attention to the infant's experience, which facilitates sculpting of early NNBO. "

Ethology fits to all described interactions and is recognized ultimately in 'Myrtle Meagre's "Unrecognizable Conceptual Contribution to Developmental Psychology" of Gottlieb[12]:

"In the late nineteenth century and through much of the twentieth century, the notion of the early developmental autonomy of motor behaviour pervaded behavioural embryology and the developmental psychology of infant behaviour.
In the midst of this predeterminations climate of opinion concerning motor development, Myrtle McGraw briefly and tentatively broached the probabilistic epigenetic notion of a bidirectional or reciprocal relationship between structural maturation and function, whereby structural maturation of the nervous system is influenced by functional activity as well as the other way around.

Myrtle McGraw thus anticipated our current understanding of the role of experience in cortical was epitomized by predetermined epigenetic thinking. In the same vein, McGraw's second unrecognized contribution is her clear formulation of a suitably flexible critical period concept in 1935, one that is consonant with our current understanding. "

What is described here is what I mentioned in "Introduction" and "Critical or sensitive imprinting period" about processes that fit in a biosemiotic model:
Swimming adaptation of (even very young) H. sapiens babies is a remarkable example because it functions very early. Once started it expands with outcome of competence and stability.

The effect of baby swimming activities is proven ever and ever again that it is an important package of "innate" possibilities in the Human sapiens newborns:
McGraw [24], Langendorfer [20], Diem [7], Freedman [10], MacDonald [22], Odent [28], Sigmundsson and Hopkins [35] and added with most recent Robyn Jorgensen "Adding capital to young Australians",
Background paper: Griffith University, Early years swimming, 2012 (research in progress).

"A four-year project sponsored by the swim industry to explore the possibility that early years swimming may enhance the learning of young children. Focusing on under-5s, the project has employed a number of research strategies to formally explore a strong observation by coaches and teachers in the swim industry that young swimmers are more confident, more articulate, more social and perhaps even a little 'smarter' than their non-swimming peers".

To introduce a biosemiotic model as declaration of what happens even in very young babies in first four month is a risc. More accepted is a proces in a bany like this in later, after four month and to a year and more. I take the risc as I did point out in Critical or sensitive imprinting period.
When we have this "overall picture" of aquatic behaviour of babies in mind and also have the notion of what Eibl-Eibesfeldt tells us in his supreme work Human Ethology[9] about ethologic coherence of babies, toddlers and children in all human populations everywhere, I can rest my case…

Neoteny and pedomorphosis
If it is not connected with concepts neoteny and pedomorphy then the hypothesis about aquatic adapting of newborns useless. Swimming adaptation of newborn H. sapiens can be linked to ancestral "predestinations" we carry. In developmental biology these are phylogenetic characters in species revealed in adults that retain traits previously seen only in juveniles.

Lorenz [21], Morris[26] and Gould[13] described this for different animals, humans as well.
It is not the place to go into this, but fig.10 is a simple example of the H. sapiens female face and it can be the origin of Anglo-American "baby, baby I love you so" singing, crying and …

Fig. 10 Neoteny in humans © Meijers

The aspect of human newborns in water reminds to these neotenic developmental properties described by Lorenz [21], Morris[26]and Gould[13].
Lorenz' description of neoteny is significant (p.133): he defined neotenic in combination with pedomorphic retention of (foetal and) juvenile characters into adult life as link to possible original ancestral properties[13].

A point to mention is the result of research to transcriptional neoteny in H. sapiens.
Not as visible as the examples mentioned, but important is that it shows neoteny in H. sapiens is acting considerably on separate levels (Somel et al[36]).
There is more to look into, but not all known and supposed human neotenic properties are important to the aquatic traits of newborns I focus to.
The aspect of human newborns in water in fact reminds anyway about original neotenic developmental properties as described by Lorenz[21], Morris[26] and Gould[13] of different animals as well. Lorenz' description of neoteny is significant (p.133): he defined neotenic in combination with pedomorphic retention of (foetal and) juvenile characters into adult life as link to possible original ancestral properties[13].

"The apparent exception to Dollos law* thus occurs only where neoteny affects forms whose juvenile stages are rich in ancestral characters. In other words, it only involves palingenetic**characters that are recapitulated from ancestral forms.
It was necessary to discuss all of this in some detail because human beings correspond to the juvenile stages of anthropoid apes in a large number of features, both in morphology and in the realm of innate behaviour. Because a number of these persistent juvenile features of

humans are ancestral characters, authors that failed to take into account the principles of neoteny set out above have repeatedly cited them as arguments against our derivation from anthropoid apes. In reality, they do not provide such negative evidence."

He did not point to aquatic activities of newborns but his statement is significant. Neotenic in combination with pedomorphic retention of (foetal and) juvenile characters into adult life is defined as link to possible original ancestral properties.
They can be connected to possible ancestral anthropoid (pre-human) apes. Important is that newborns AND adults correspond in some properties of morphology and physiology and innate behaviour components are mentioned.

According to Lorenz they can be connected to possible ancestral anthropoid (pre-human) apes. If aquatic adaptive behaviour in our species is comparable to Lorenz' definition of neoteny, than it is allowed to connect it with ancestral characters. The "reason" for neoteny of humans is described as linked to the very long developing process of our brain. The question is than still "what was first" ancestrally? Maybe naked and bipedal, "ape brain-like" shore dweller and swimmer first and only then explosive brainstorming and tool making?

Newborn properties are frequently exempted and in my view the declaration I propose is free. The important point is not the value of the examples I described. Neoteny and pedomorphosis aspects in H. sapiens are not only the socially important ones. Many are involved in physiological and morphological properties of adults. Aquatic adaptation of H. sapiens is involved, a pedomorph form of our neonate properties.
And if aquatic adaptive behaviour in our species is comparable to Lorenz definition of neoteny, than it is allowed to connect that with ancestral characters.
I did mention that if my proposed hypothesis is accepted, it has no use if the concepts neoteny and pedomorph are not connected.
Accepting that, early human ancestors possibly did undergo forced adaptation in restricted sets of habitats leading to aquatic physiological, morphological and behavioural properties. In my view not strictly aquatic but at least very intense semi-aquatic habitats that demands special adaptations.
About when and where exactly and with "whom leaves speculating.
It is important to establish not only aquatic reflexes in newborn humans. If we take the evidence ethological in consideration it presents a hint to ancestral H. sapiens behaviour in and preference for aquatic and semi-aquatic habitats for children, adolescents and adults (Niemitz[27]).
I propose that juvenile aquatic properties of human newborn babies and toddlers can be neotenic and pedomorphic examples of aquatic adapted mature H. sapiens. Newborns and little children are very quick aquatically adapted. The physiological properties do encompass diving, controlling breath, early swimming movements or very little children to swim and dive, they continue it from adolescence to maturity. The process to develop this has as I describe a striking ethological aspect.
Swimming, diving, playing in and near water is indeed an important natural behaviour for all human stages Niemitz[27] described.
To this fits that hands free together with bipedalism can be connected to aquatic adaptations as he also mentioned.
Bipedal abilities came first and after this gradually the extras of tool use and skilful dispersion with more brains in bigger skullcap.

And then we have of course long distance swimming, (very) deep diving and floating on almost everything available. Not only for playing but also to able foraging, dispersing, transporting and travelling.

Views are changing and carefully open possible probabilities of "water-linked" like mentioned in Wrangham et. al.[40]:

"Given that early hominins in the tropics lived in relatively dry habitats, while others occupied temperate latitudes, ripe, fleshy fruits of the type preferred by African apes would not normally have been available year round.
We therefore suggest that water-associated USO's*** were likely to have been key fallback foods, and that dry season access to aquatic habitats would have been an important predictor of hominin home range quality.
This study differs from traditional savannah chimpanzee models of hominin origins by proposing that access to aquatic habitats was a necessary condition for adaptation to savannah habitats. It also raises the possibility that harvesting efficiency in shallow water promoted adaptations for habitual bipedality in early hominins. "

Could a next explorative activity be facilitated by ancestral aquatic adaptations as we see it in newborn H. sapiens and in the other mentioned properties? Maybe we even need to point to a strong possible option to declare the speed of world wide human dispersal along shores, riverbanks and over water to many remote islands and archipelagos.
Neotenic facts acknowledged for humans connected with the subject in this project are clear:
Tout properties I want to depict in order of importance are neotenic and probable pedomorph that fit in possible semi aquatic adaptation effects and one that has implications for the discussion:

1.
Both sexes are without fur like our newborns.
Lack of fur like our next kin Primates Chimpanzee and Bonobo (still) have prevents cooling in semi aquatic habitats. A simple experiment is possible to proof this: the "wet t-shirt" game.
Others proposed loss of fur to get rid of parasites or starting to wear clothes.
I want to state that is nonsense when compared zoologically; every member of our extended family of Primates has fur— short, black pelage of howler monkeys to the copper colour of the orangutan —as almost other mammals.
Only humans are unique having a basically naked skin. We have hair on our heads and elsewhere, but when compared with other Primates, even the hairiest Homo sapiens individuals are basically bare.
That is a very strong point: our babies are even more "naked" than us naked grown ups. Why? It is only useful if even newborns of our ancestors had to live an in and out of water life...

2.
Subcutaneous fat is an adaptation for isolating when swimming and water in-and-out activities of babies, toddlers, children and adolescent humans. That is also the point for most aquatic mammalian species. It protects against heat loss of the torso twice:
a. Less cooling off when swimming (and diving)
b. When going ashore preventing heat loss by evaporating water on the skin.
Of both sexes it is a lifelong quality (but not for males and females alike).

3.
Sebum production is a basic water repellent of newborns (and foetuses) and is maintained in all stages up to pubertal and adult humans. Apart from this, it is an important protective against infections.

4.
The alignment of centers of buoyancy and gravity in males and females are different. Predominantly female individuals are able to float horizontally with a considerable volume of the body above the surface. It is a result of the fact that their centers of gravity and buoyancy almost coincide. An example of the floating position of a "floater" is provided in Fig. 11. Such individuals swim with ease and float comfortabel.

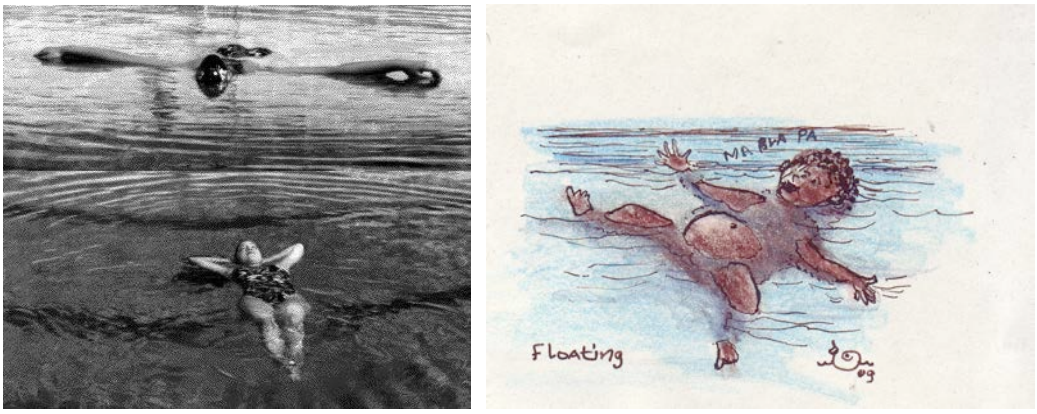

Fig. 11: Floating

What is true for mothers is even more true for their babies. The floating position that ISR recomends and trains proves it and I used it for fig 9 c. Floating mum and her baby an a smi aquatic adaptation? The floating property of mama being a neotenic baby feature?

5.
I add that all human babies worldwide are able to realize waterproof behaviour.
And swimming, diving, playing in and near the water is a very important natural behaviour of all human stages as Niemitz[27] described.
Not only for playing but also foraging, dispersing, transporting and travelling.

Fig. 12 Sea gypsy kids having fun Myanmar

Additions

* Dollo's law (1857-1931) is a hypothesis proposed in 1890 that states that evolution is not reversible, suggesting irreversibility of certain evolutionary pathways.
Lorenz mentions already apparent exception. What is known now about complex DNA organisation learns that he was in a right way.
Some of your vertebrate home-box genes are much the same as in Drosophila, so who knows (Meijers).

** Palingenetic definition in biology:

a. Embryonic development that reproduces ancestral features of species.
b. Obsolete: the supposed generation of organisms from others preformed in the germ cells.

***USO's: aquatic or semi-aquatic underground storage organs of plants (Meijers).

Conclusion

Human offspring is unable earlier than eight to twelve months after birth to walk.
Newborns and little children can adapt very quick before that time to water and perform aquatic activities.
Physiological properties do encompass floating, controlling breath when submerged, early swimming movements and diving.
Acting of babies like this is based on genetic traits activated in an ethological defined sensitive period.
Success of imprinting is guaranteed when a set of innate waterproof reflexes is combined.
This has to be triggered in a genetic preset sensitive (sensible) early period from four to six months to a year.
Interacting with parental and other connected individuals is needed to fulfil the process.
The outcome is implemented aquatic dynamics early in life that guarantee more possible activities in aquatic circumstances later.
Important is the statement that H. sapiens babies perform these aquatic adaptations when none of the other Hominidae, orangutan (*Pongo*), gorilla (*Gorilla*), chimpanzee and bonobo (*Pan*), is or was able to this newborn nor adult.
Some other primates are known that are semi aquatic, but never as versatile as Homo sapiens.
That it exists is worth looking at, because they were adapted to use a habitat like maybe our early ancestors were forced to:
Proboscis monkey (Nasalis larvatus), arboreal and endemic to the south-east Asian island of Borneo (Malay and Kalimantan). It is in Kalimantan named as monyet belanda ("Dutch monkey") or orang belanda ("blanke man") because we (Dutch and British colonisers) somewhat similarly nose and fat belly.
Rhesus macaque (*Macaca mulatta*) native to South, Central and Southeast Asia, inhabiting a variety of habitats: grasslands, arid and forested areas and often close to human settlements.
They are regular swimmers and babies as young as a few days old can swim. Adults are known able to swim over a half mile to islands, but sometimes also found drowned in drinking waters they use.
Allen's swamp monkey (Allenopithecus nigroviridis), African Congo region.
It has slight webbing of fingers and toes that point to a partially aquatic life.
Brazza's monkey (Cercopithecus neglectus) endemic to central African wetlands.
It is a widespread African forest primate.

The reflexes observed in aquatic behaviour of human babies are:
1. Controlling breath when submerged which can be accepted as adequate innate.
2. Early swimming movement in ‘Salamander fashion’.
3. After being submerged turning up and resume a floating position, head up with arms and legs spread, comparable with a life jacket position but based on the buoyancy of “baby shape” bodies.
4. Active and joyfully interaction with parents (and other relatives) strengthen the functioning.
5. If realised in the innate sensitive period of the first four or six months to one year, young babies can become “waterproof”.

To add is to propose:
H. sapiens neotenic properties of newborns and babies that are recognized in adults show a link with possible semi-aquatic adapted ancestors.

It makes the hypothesis acceptable:

By displaying the ability to float, swim and dive in the first months after birth, human babies and toddlers proof successfully adapting to water.
This adapting is not known of other Hominidae and imprinted in a sensitive period activating innate releasing mechanisms of waterproof reflexes.
It reveals ethological aspects of developing and learning linked to physical, physiological and emotional properties of babies.
In built reflexes are triggered in a genetic preset sensitive (sensible) period that in this case lasts from four or six months to one year.

Discussion

Preface

“Vanuit dit gezichtspunt beschouwd vormt de drieteenmeeuw een schitterend voorbeeld van de algemene regel, dat aanpassing betrekking heeft op het hele dier en niet op een paar afzonderlijke eigenschappen.”

Rissa tridactyla
Drieteenmeeuw (NL) - Kittiwake (EN) -

“From this perspective the Kittiwake presents an excellent example of the general rule, that adaptation relates to the animal as whole and not a few separate properties.”

Niko Tinbergen, In 't vrije veld. Uitgeverij Het Spectrum, Utrecht / Antwerpen 1978
p 263

Waterproof innate ‘reflexes’ of newborns are an essential unique feature of our species, not in that way observed in other great apes (genus Pan, genus Gorilla and genus Pongo).
In all later stages of development up to pubertal and adult maturity, humans show physiological and morphological talented swimming, diving, playing in and near the water as natural behaviour.
Baby swimming gives as well social interaction, self-confidence, independence and coping with new unfamiliar situations.
This development is connected to psychomotor and social abilities in the first year after birth.
It contributes to the debate about a possible semi-aquatic start of early human ancestors.
Swimming adaptations of newborns probably have a neotenic and pedomorphic connection with ancestral properties.
If accepted it seriously pinpoints a semi-aquatic habitat as possible evolutionary use for early human ancestors.

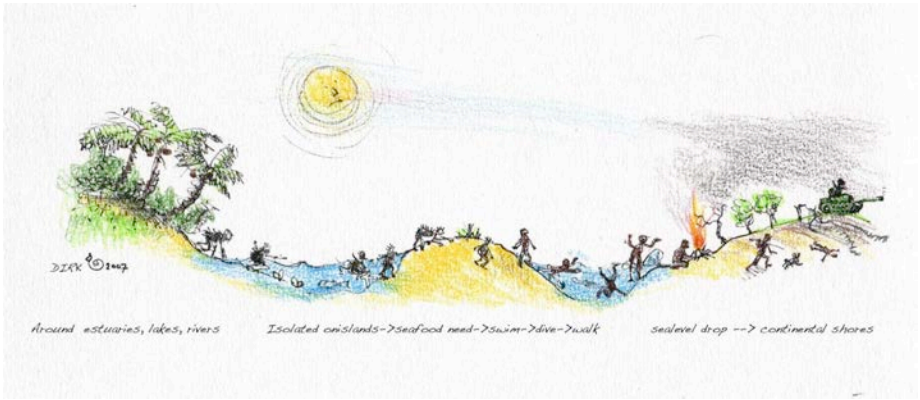

Fig. 13 What possibly happened © DM

If they in first setting were only adapted to bipedalism after leaving woods it does not correspond with young that are their first year impossibly able to walk and had to cling to mothers with no fur.

Lacking biological coherence with the swimming adaptations shown by newborns and toddlers is obvious.
It can mean on the contrary a possible link with an ancestral starting point in semi aquatic habitats leading to aquatic adapted babies (fig. 12). The drawing shows what in my – and not only mine- opinion could have happened. Imagine; a significant small population of ancestral species isolated in an archipelago.
Preconditioned anatomic had many possibilities as we know about at least some of fossils. Not to consider as direct ancestors to *Homo sapiens* but closely related to more ancestors. Kin of us like Bonobo and Chimpanzee are also very versatile, but not with the number of options we have.
Some other primates I named earlier are known semi aquatic, but never as versatile as Homo sapiens.
That these semi aquatic species exist is worth looking at, because they were adapted to use a habitat like maybe our early ancestors were forced to:
Proboscis monkey (Nasalis larvatus), Rhesus macaque (Macaca mulattaof), Allen's swamp monkey (Allenopithecus nigroviridis) and Brazza's monkey (Cercopithecus neglectus) .
How, why and since when are the using semi aquatic habitats?

Partly Epigenetic?
Even we, the genus Homo, started in mall isolated populations, in a relative short time changing of habitat properties and "selection" of "fit" offspring. Rather fast may be true, the principle of genetic "learning" and adapting is the same basis for almost all other animals –or better: all living entities -

What is short span for "mankind"? Not the same as birds every season laying eggs of course, but after a reasonable number of Homo sapiens generations we have examples:
A Typhoon called " Lengkieki" devastated the Micronesian atoll of Pingelap around 1775. The typhoon and famine after this occurrence left about 20 survivors. One of them was heterozygous for achromatopsia and after six generations the prevalence of achromatopsia is about 5% and 30% as carriers. That is extremely high, it is known "normally" as 1/33,000 = 1/330%.
The people have named achromatopsia "maskun", "not see" in Pingelapese, they do not have normal "cone vision." Oliver Sacks went to the island Pingelap and wrote his 1997 book, *The Island of the Colour-blind*. These people are active in evening and night foraging around the atoll. In daylight the macula lutea of the fovea does not function appropriate and peripheral retina rods are "shut off" by pigment. In evening and night peripheral retina rods do function and the fovea cones of course not. Inbreeding because there is no other option can on Pingelap be accounted for the situation. Two related concepts are at work, bottleneck effect first and genetic drift as consequence. An effect when we take 20 year for a generation, in 45/20 = 2,5 generations.

Moken vision
The Moken small population of Southeast Asian, as I mentioned are sea gypsies diving for food.
Moken children divers off the coast of Thailand see more than twice as well under water as European children, according to Anna Gislen and colleagues from Lund University, Sweden:

"I think this has proven that the eye is extremely flexible," Gislen said. "Nobody thought you

could see well underwater, and these kids do."

Fig. 14. Source: Anna Gislen

Because the children do this frequently, Gislen believes they learned to maximize their visual potential under water. According to Gislen these highly unusual underwater reactions present in the Moken were in no way mirrored by the Europeans:

"Because a severely blurred image usually triggers very little accommodation, or none at all, the response from European children when diving is as one would expect.
They open their pupil slightly, possible in response to dimmer light, and show no evidence of accommodation.“

Preliminary findings of another experiment by Gislen indicate that even European children can probably learn superior underwater acuity.
Then in my view, what happened with Moken people could be an epigenetic case. Diving start very early in the way I described and it does so for many, many generations.
A DNA analysis would show if I am right or not.
For a long time I suspected that the term “junk DNA” could partly be no junk at all.
To me it was a possible functional and variable set for encoding “on” and “of”, “less” or “more” to expression. Possibly used as epigenetic evolution “tool”?
There is now determined that insertion and deletion of large pieces of DNA near “activated” genes are highly variable between humans and chimpanzees and may account for major differences between the two species.
The DNA gene sequence of humans and chimpanzees is nearly identical. Large “gaps” in areas adjacent to genes can indeed affect the extent to which genes are “turned on” and “turned off.”
Research shows that the differences between the two species for these genomic “gaps” are predominantly due to this. It is like viral sequences called retro-transposons that seem to comprise about 50% of genomes of Homo and Pongo - Bonobo.
It is the way I suspected and maybe does make my story about small populations and what could happen viable.
What I described here shows the way small isolated populations of organisms – us including – start to differ from the other ones. If it works in a habitat that “dictates” it, maybe a “Darwin finch” effect is consequence.
Ancestors of our line in a respectable number of million years….aquatic adapted newborns, why not?

It failed me to find anything in paleo-anthropology or genetics as well to make it obvious or absolutely impossible that bipedalism – and not possible marathon like – was first with wading, swimming and diving.
When our babies' can, they could… be early pioneers in the unfathomably time game fate everything has to suffer.
In those day's the populations were very small, absolutely smaller than the billions with we are.
Fossilized baby leftovers are extremely rare and it seriously is not to expect paleontological finds that will proof I am wrong or right.
The same goes for left over hair to prove ancestors had fur or not. To draw "Lucy" not as pure furless naked could be offending to her self-adorable feeling and her descendents...

My argumentation in this project can only be based on living, fleshy very young- and adult - H. sapiens.
It does seriously defends the answer "well, maybe yes", to Sir Alister Hardy as questioned in1960, "Was man more aquatic in the past"[15] and strengthens the view of Elaine Morgan[25] in The Descent of Woman:

"Most land animals can walk or even run within an hour of being born. But a newborn baby cannot even crawl and is totally dependent on it's mother.
For this to happen it means that human babies had to be able to evolve in very safe conditions".

Important point is the 'floating' reflex that is problematic when babies and little children are not brought in contact with water the first four to six months to one year after birth.
Reason is missing the mentioned sensitive imprinting period. Then drowning of little children can be a real danger as Eibl-Eibesfeldt mentioned [8].
Young babies and toddlers easy adapt to water in a few weeks. It means less fear in presence of parents and reacting naturally to diving and swimming.

Because training babies in swimming pool sonly started recently, possible strengthening of reflexive adaptations were not fully recognized and a completed ethological interpretation was lacking.
It creates controversies about importance of baby and toddler swimming to realize very young efficient swimmers.
Better safe swimmers are generally not to be expected at more than four years. But 'natural' early learning does exist as long as our species itself and most probable even much longer than that.

Many children in extensive societies started in discrepancy for ages not or considerably later with swimming lessons and did not adapt easy or not at all:
Some never learned it and a lot of adults, even seamen, were unable to swim.
That is a serious reason to justify baby swimming as valuable activity everywhere.
It is NOT to defend that baby-swimming courses deliver guaranteed 'safe' swimmers and divers, but only to find out if there exists indeed a quicker adaptation.

It is a challenge because it invites to an efficient research on differences between time lags for different age groups.

A second point is to gather ethological aquatic adaptations in other Mammalia species to find out if human newborns really are exceptional. H. sapiens babies can perform aquatic adaptations and none other Hominidae is able to this, orangutan (*Pongo*), gorilla (*Gorilla*), and chimpanzee and bonobo (*Pan*).
Curious fact is as newborns they all can walk and H. sapiens newborns cannot.
Most examples I know do not have the distinct combination of 'not walking' but 'able swimming' period.

I did not find any reporting of young 'baby' Hominidae showing the same aquatic abilities assisted by parents as does H. sapiens.
Of course there are anyway numerous variations of physical possibilities of H. sapiens as Eibl-Eibesfeldt[8] cited Konrad Lorenz (p.607):

"Konrad Lorenz (1943) once characterized man as the specialist in the unspecialised, a reference to human universality how man is superior to all other animals in versatility".
But one remark in the sentence Eibl-Eibefeldt of Lorenz used is interesting for my project:

"Using the example of the following imaginary athletic competition, he showed how man is superior to all other animals in versatility. If the contest consisted of sprinting 100 m, *diving into a pond and retrieving three objects from a depth of 5 m, then swimming 100 m toward a rope at the other bank*, climbing 5 m up the rope, and finally walking an additional 10 km any untrained physically fit adult, even older individuals, could execute the task, where no other vertebrate could perform it."

The aquatic part thus not fit in a not semi aquatic adapted ancestral connection.
To state this I can tell that the tide is turning seems to be real:
David W. Cameron and Colin P. Grooves in "Bones, stones and molecules"
Elsevier academic press, 2004 isbn 0-12-156933-0

The emergence of Ardipithecus and early Australopithecines:
P -68
"…Nor can we exclude the Aquatic ape Hypothesis (AAH). Elaine Morgan has long argued that many aspects of human anatomy are best explained as a legacy of a semi aquatic phase in the proto-human trajectory, and this includes upright posture to cope with increased water depth as our ancestors foraged farther en further from the lake or seashore. At first, this idea was simply ignored as grotesque, and perhaps unworthy because proposed by an amateur. But Morgan's latest arguments have reached a sophistication that simply demands to be taken seriously (Morgan, 1990, 1997). And although the authors shade away from more speculative reconstructions in favour of phylogenetic scenarios, we insist that the AAT takes its place in the battery of possible functional scenarios hominin divergence."

The best compilation about all proposed is in my view: "The Evolution of Hominid Bipedalism" of Michael J. Friedman.
http://www.shoreline-man.name/Swimming_reflexes_in_newborn_humans/aquatic_babies_web/article/The_Evolution_of_Hominid_Bipedalism.html

The Evolution of Hominid Bipedalism
Michael J. Friedman Illinois Wesleyan University April 20, 2006

Abstract
Paleoanthropologists mark the divergence between apes and hominids with the adaptation of bipedalism five to six million years ago. In this paper, I argue that while the first upright hominids occurred in this time frame, the process of becoming a fully efficient biped took much longer and was not complete until *Homo erectus* at 1.8 million years ago. To provide context to the puzzle of how and why our ancestors evolved upright walking, I examine many of the prevailing theories of bipedal origins, including the aquatic ape hypothesis, the heat hypothesis, and the carrying hypothesis.

Added are on the "Shoreline-man" site

a. In html some examples of baby swimming activities.
b. Also videotaped ethological resembling phenomena and aquatic activities of other animals are presented.
With comment: Otter with baby, Sea lion with baby, Elephant swimming with David Attenborough, baby Elephant enjoying the seashore, Tapirs enjoying a swim and a Penguin adapting to water in a zoo.

Some examples of other Mammalia semi-aquatic Otter (Lutra spec.), Elephant (Elephas and Loxodonta), Polar Bear (Ursus maritimus), Water Shrew (Neomys fodiens and other genera), Beaver (Castor spec.), Nutra (Myocastor coypus), Capybara (Hydrochoerus hydrochaeris) and Tapir (Tapirus*)*.

About semi aquatic populations:
http://www.shoreline-man.name/darwin_bronnen/darwinjaar.html.
http://www.andaman.org/BOOK/chapter54/text-Fuego/text-Fuego.htm

The Voyage of the Beagle by Charles Darwin
http://www.gutenberg.org/ebooks/3704

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