Swimming Babies – On Joint Didactic Action in Physical and Sports Activities. A Case Study in a Non-Schooling Institution

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1   Introduction

We are interested in learning in physical and sports activities practised in non-schooling contexts. The analysis of these practices, which are frequently part of individuals' daily lives, tends to be underestimated precisely because of their familiarity. Indeed, practising physical and sports activities in a non-schooling location can be seen as a hard fact which is the object of neither learning nor teaching. The body knowledge at stake in physical and sports activities does not seem to be learned as such (as it would in a school context); instead, it is integrated by the individual as they become familiar with the practice. If certain movements and notions are clearly named, others, on the contrary, remain invisible; since they are familiar to the participants they are not particularly emphasised. My study attempts to give meaning to the familiar invisible, I intend to clarify the non-schooling conditions of teaching-learning in physical and sports activities. The study presents one case of teaching-learning in a non-schooling context (Loquet, 2008): education for toddlers with aquatic motor-awakening activities, commonly referred to as "swimming babies": I present a case study of a young girl learning how to "blow bubbles" under water.

2   Joint Action Theory in Didactics

So as to understand this teaching-learning situation, we analyse our corpus within the Joint Action Theory in Didactics (Sensevy & Mercier, 2007). The fundamental viewpoint of this theory is to consider teaching and learning as a joint action, co-operative and asymmetric, between the teacher and the students. This joint action is thought of as part of "language games" (Wittgenstein, 1997) specific to didactic systems, which are unknown to us and whose rules we want to grasp. Such "learning games" (Sensevy et al., 2005; Sensevy, 2007) are described using a system of theoretical categories (Brousseau, 1997; Chevallard, 1992).

In its latest development (Loquet, 2009a, 2009b), the Joint Action Theory in Didactics seeks to refine the study of the joint actions of teachers/students by adding to it a bottom-up analysis of didactic transposition (Ligozat, 2008). "Epistemic games" are thus determined. They are considered as the *targets* of the practice, emerging from this practice. The target epistemic game is then obtained by decanting and extracting the epistemic elements of the practice observed.

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With analyses of the Joint Action Theory in Didactics, we build an account of: 1) what the effective knowledge practices are which students are exposed to; and 2) the relations between didactic knowledge practices and cultural knowledge practices. We address these two issues by using and developing the notions of "target epistemic game" and "source epistemic game". I will reconstruct the meaning of the swimming babies didactic event by answering the question of which epistemic game the protagonists are playing.

The observation of the swimming babies didactic event was video-taped. This enables me to describe the teaching-learning process as an articulation of a game and rules which give meaning to the game. I demonstrate that learning games need to piggyback on epistemic games in order to deploy and develop. The epistemic game of swimming babies blowing bubbles is one of many sports activities that form a "cultural universe". It represents both target knowledge, a target at the scale of the students, and a set of conditions which structure the construction of learning games. It is thus the interplay between the analysed learning games and the characterised epistemic game that enables us to conclude what type of culture students may acquire in the didactic situation.

3   Swimming babies

The event studied is a didactic game in a non-schooling institution. It refers to the movements of a three-year-old girl and her parents in a swimming pool (Loquet et al., 2007; Loquet & Roesslé, 2008; Roessle, 2009). The "making bubbles" sequence features young Az with her father (Paz) and her mother (Maz) in a water park.

I briefly summarise the description method that is used: The gestures, facial expressions and words of the protagonists (the parents and the child) are produced in a context. I try to understand their meanings by placing them in this context. Thus, two reconstructive phases can be identified:

- The *case story* emerges in the first phase where the gestures, facial expressions and words are described one by one in situation and placed in the context of scenes built around predefined knowledge (or "pieces of knowledge"). This first context is similar to that of a theater play where actors and the knowledge are staged.
- *Plotting* is then the second phase: the modelling of the gestures, facial expressions and words is placed within the context of the game which allows the parent and the child to "read" each other through what each protagonist shows in the other's eyes. This reading hinges on the articulation of the learning game and the epistemic game.

The reconstructive progression, from phase one to phase two, takes us from the gestures, facial expressions and words observed during the event to the context of intentions against whose background the protagonists rely to act and express themselves.

3.1   The case story: a description in the form of scenes

The story is divided into different scenes and reconstructed from the interplay of the three protagonists: the little three-year-old girl (Az), her father (Paz) and her mother (Maz). Six scenes are featured:

[Scene 1] *The episode begins when, after going down the waterslide, Az starts coughing as she emerges from the water.*

She leans on Maz's arm. Paz points out to Az that she does not make bubbles when she is underwater. Az goes away to fetch a watering can.

[Scene 2] *Maz, indifferent to the watering can fetched by Az, shows the little girl how to make bubbles by immersing her face in the water down to eye level and by blowing into the water.*

In the meantime, Az tries to spray Maz with the watering can. The mother then takes the watering can and pours its contents on the little girl's head.

[Scene 3] *In turn, Paz takes the watering can and uses it for something it is not meant for (pouring or spraying): he demonstrates how to release bubbles underwater with this object.*
He submerges himself underwater with the empty object, with its opening turned downwards, while inviting Az to go the bottom of the pool with him to see what happens. To do so, he slowly guides Az underwater with his arms.


[Scene 4] *During her second attempt to see Paz make bubbles underwater with the watering can, Az kisses Paz on the cheek. When she emerges, she sets up a "common" children's game which Paz starts punctuating with the nursery rhyme "one, two, three!": "one, two, three: giving kisses underwater!" and so on: "cuddling", "tickling" then "caressing" then "fighting"…*

[Scene 5] *At the end, Az seems to have run out of ideas to prolong the game. Paz then suggests "One, two, three: making faces underwater!" When he is immersed to make faces, Paz imitates a lion that is showing its claws. He opens his mouth and breathes out to shout. Az, immersed underwater watches Paz "roar like a lion".*

[Scene 6] *Az imitates her father and shouts underwater, thus making bubbles. Twice Paz suggests going back underwater to "shout underwater". Az follows him and makes bubbles twice by shouting.*
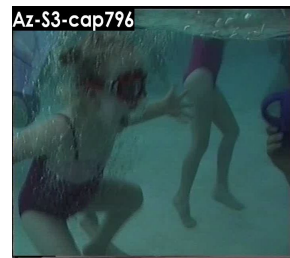
The episode ends: Az emerges from the water. She skips smilingly and heads for the waterslide.

3.2   Plotting: a description in the form of learning games and epistemic games

Our analysis of the video here is guided by the analysis of epistemic and learning games as its background. The researcher has to conduct a form of plotting (Ricoeur, 1983, p. 267, quoted by Sensevy, in press). First, I will consider the plotting process and then I will synthetically characterise each of the notions used: learning game, source and target epistemic game.

Plotting consists of going from a *chronic* story (which narrates a series of events perceived as being relatively independent), to the *plot* (which gives them an oriented form[1]). The transition from the chronic to the plot involves connecting a succession of events in which a preceding event is seen as the potential *source* of a subsequent event (Sensevy, in press).

Let us examine an example, from the story above, of a source event. The story starts when "*after going down the waterslide, Az starts coughing as she emerges from the water*". The locution *"after"* introduces a connection between the first action (going down the waterslide) and the second one (coughing because water has been swallowed). This connection, which includes the idea of a consequence, brings up a fundamental aspect of the plot that gives the game meaning: working on Az's body movement/breathing connection to the water.

I suggest we follow the plot which has thus been outlined and assume that the *followability* of this plot has to do with its didactic dimension, seen as a system of interplay between Az and her parents. Following the plot therefore consists of analysing the didactic dimension of the "interplay" by identifying a form of time progression in the interplay which brings the little girl to develop a more confident relationship with a water environment, by understanding the game played by Az and her father, and by identifying as such the father's strategies surrounding the underwater lion imitation and the corresponding intentions. We thus look for an answer to the question concerning why Paz chooses the roaring lion game.

To build the plot, let us return to the swimming babies video and use a specific semiotic system which reveals the protagonists' *action turns* (Roessle, 2009), associated with *word turns* (when they are present). The procedure guarantees a bottom-up approach; we wish to reveal *the corporal and material inscription of knowledge* within the joint action (Sensevy, in press).
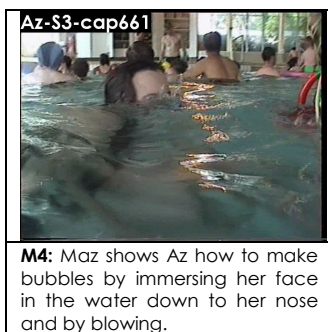
I start with the background. Az plays with her parents at the swimming pool. The parents' objective is to help Az develop a confident relationship with water and, more specifically here, to succeed in making bubbles at the very beginning of the sequence and, later, to shout underwater (playing a lion). Let us go over the previous story and observe how it is cut up through certain key events so as to enhance its didactic characterisation:

Az-S3-cap628	Az-S3-cap630	Az-S3-cap635
M1: Paz waits underwater, takes her hands and watches her making bubbles.	**M2:** Az has swallowed a mouthful of water. She moves into Paz's arms.	**M3**: *Maz places Az opposite her. Paz: hey, Az honey, you're forgetting to make bubbles.*

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[1] Sensevy (in press) distinguishes "story" from "plot" and, more precisely, "plotting". To do so, he refers to the work of Velleman (2003) who gives a striking illustration of this difference by quoting Forster's remark in a novel: "The king died and then the queen died" is a story. The king died and then the queen died of sorrow is a plot. Consider the death of the queen. If it is a story we say 'and then?' If it is a plot we ask 'why?' That is the fundamental difference between these two aspects of the novel" (Forster, 1927, p. 130, quoted by Velleman, 2003, p. 4).

The three photograms indicate both a form of ignorance (Az *cannot* make bubbles, she *cannot* imitate Paz), which causes obvious discomfort (Az has swallowed a mouthful of water) and a search for comfort (Az moves into Maz's arms). The first picture (photogram M1, image n° 628) shows an effort to adjust from Az to Paz in the water environment. Paz makes bubbles underwater thus offering Az guidance for her own activity. One can perceive that Az's attention is focused on Paz (she watches him and grabs his hands) and vice versa.

The bottom-up analysis here allows to determine a piece of knowledge, described as the common game of making bubbles underwater – a common game which has not yet been mastered by Az.
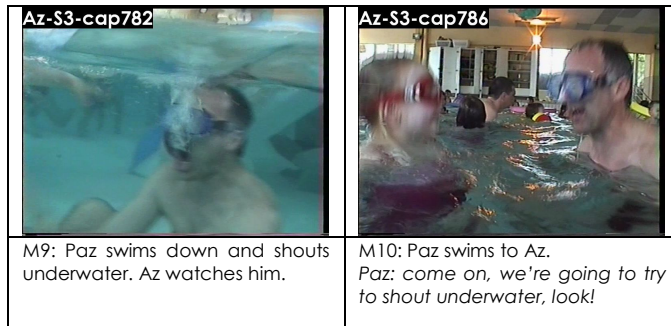

Az-S3-cap661

M4: Maz shows Az how to make bubbles by immersing her face in the water down to her nose and by blowing.

This means that Maz intervenes to show Az how to make bubbles (photogram M4, image n° 661), thus offering another example of behaviour-in-the-water-environment which is intended to guide her didactic action.

The interplay continues with Paz. A form of recurring action initiated by the little girl is established. Here is an example (photograms M5 to M8, images no. 721, 726, 729, 738).

Az-S3-cap721	Az-S3-cap726	Az-S3-cap729	Az-S3-cap738
M5: Az swims back to the surface and places her finger in front of her mouth *Az: Let's kiss underwater* *Paz : Yes, let's kiss underwater.*	M6: Az and Paz swim down and kiss underwater.	M7: Az and Paz swim to the surface and then back down underwater and hug underwater. *Az: Let's cuddle underwater!* *Paz: cuddling underwater, come on let's cuddle underwater, one, two, three.*	M8: Az and Paz swim down and hug underwater.

How can we analyse this recurrence? While the one, two, three! ritornello familiar to the child is introduced, an *immersion ritual* is established: swimming together underwater/performing an action underwater/swimming back to the surface, and so on. In this ritual we can see a kind of micro-unit of shared meaning, which is the first requirement to get the child to act and, eventually, to succeed in the underwater game on her own (Loquet, 2009a, p. 142). The bottom-up analysis of the interactions allows us to identify how knowledge gives them a specified form. It thus highlights the didactic purpose of the whole activity. The immersion ritual plays a central part to give Az a certain ease in the water environment, a major requirement for learning.
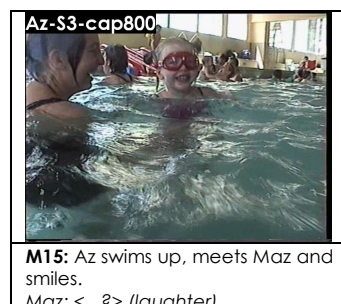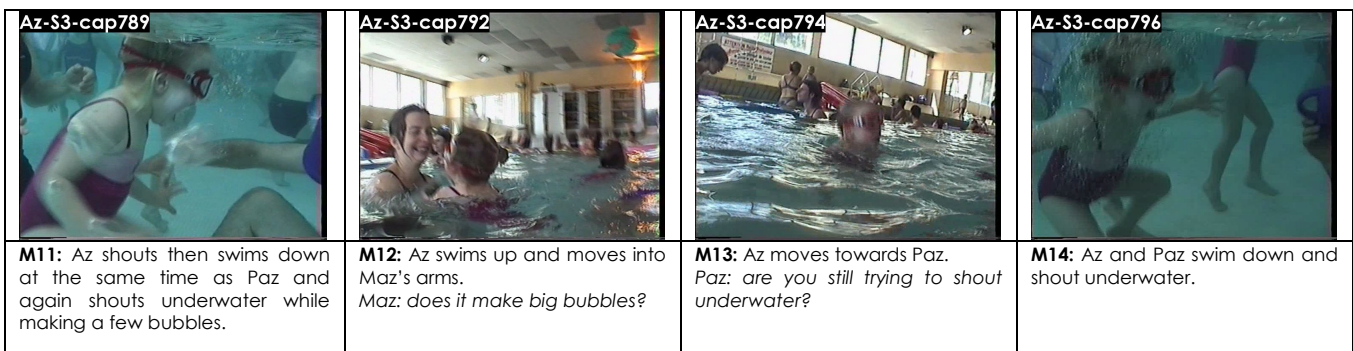
The didactic density is then increased when Paz introduces the game "shouting (playing a roaring lion) underwater" (photograms M9, image no. 782, and M10, image no. 786):

M9: Paz swims down and shouts underwater. Az watches him.	M10: Paz swims to Az. *Paz: come on, we're going to try to shout underwater, look!*

The new game suggested by Paz is a major breakthrough in the didactic interplay. It must be analysed in a specific epistemic context if we want to understand what is concretely at stake in the activity studied.

Here is the essential feature (which will be further detailed in the following paragraph). It is the underlying cultural stake (Loquet, 2009a, p. 144). Man is not a water being, he intentionally faces this element and adapts to it. This leads, among other things, to a reflex protecting his primal physiological need to breathe: the laryngeal closure reflex or pharyngo-glottal reflex (Roesslé, 2009). This relation to water functions fully in respect of cultural practices such as swimming and other water sports. And that is why, in the roaring lion game underwater, the forced expiration during the immersion of the face is targeted by Paz. Let me add that the forced expiration gesture, which is made while swimming, is a well-known and validated technique in the sport of swimming.

We can see how Paz explicitly fulfils the part of the teacher (photogram M7, image n° 786) by offering Az to shout underwater with him. The following interplay then demonstrates that Az is partially successful at this game:

M11: Az shouts then swims down at the same time as Paz and again shouts underwater while making a few bubbles.	**M12:** Az swims up and moves into Maz's arms. *Maz: does it make big bubbles?*	**M13:** Az moves towards Paz. *Paz: are you still trying to shout underwater?*	**M14:** Az and Paz swim down and shout underwater.

M15: Az swims up, meets Maz and smiles.
Maz: <.. ?> (laughter)

The teachers' position (Paz and Maz) and the student's position (Az) co-ordinate adequately. Az accepts the roaring lion game and plays it on her own.

Let me note that verbal language is scarce in our example, but probably plays an important role (a visible role at the beginning of the activity): it names the games that are being played, and the fundamental stakes (making big bubbles, shouting underwater). Because verbal language is scarce, the child/parents' adjustment is largely corporal. Yet, when we imagine the same activity without any verbal language, we realise the effective impact of the utterances produced.

3.3   Game descriptors: learning games and epistemic games

The description of the activity highlights the transition from one game to another: from the making bubbles underwater game to the roaring lion game. In other words, there is a transition from a common game (making bubbles) to a learning game (playing a roaring lion). The common game is recognisable by its strong assimilating[2] structure. The learning game is the process through which the parents *make* the child *learn* given knowledge; accommodation prevails over assimilation.

The progression that the researcher identifies through the bottom-up analysis can be understood as progress towards a target for Az's and her parents' activity. This target is an epistemic game. Here it is the "forced-blocked expiration game".

Precisely observed, the game can be described as an "immersed locomotion source epistemic game" as practiced by competent swimmers. Indeed, epistemically speaking, the breathing rule makes it possible to encounter a *fundamental technical stake* in swimming: advancing from immersion without breathing, to immersion with breathing, in other words, from reflex apnoea to voluntary apnoea.

It is the bottom-up analysis of the video of the practice, divided into commented photograms, which makes it possible to extract through decantation the defining epistemic elements, i.e. a piece of knowledge, in the protagonists' mutual interplay and adjustments *in situ*. We then talk about a "target epistemic game" emerging from the practice and which the learning game aims at as it is actually played[3]. The analysis presupposes a constant dialectics between a kind of theoretical suspension which is meant to account for the materiality of interplay and adjustments, and conceptual tools which lead to refer the identified behaviour to

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[2] Today's theoretical discourses on games are strongly influenced by children's games, notably in the field of psychology, and applied to pedagogy. This interest in children's games lies partly in the recent institutionalisation of the "childhood" category (as evidenced by the research conducted by Roesslé 2009 under our supervision), which turns children into a subject in its own right in our society (for instance, Piaget and Inhelder, 1974). With games, children can transform the real through assimilation to fulfil their own needs (whereas with assimilation they submit to the external reality and pursue accommodation for its own sake). Through the common game, they have at their disposal an activity whose goal is the assimilation of the real, without either constraints or sanctions, and not the accommodation of the real: assimilation prevails over accommodation. Each new action tends to be integrated into a previous structure of action. The psychological characteristics formulated above point to a player who provides a completely gratuitous individual activity on which his or her pleasure depends. Indeed, games are endowed with an affective dimension strongly motivated by pleasure and relatively dependent on the demands of a given context (getting into the game, getting hooked on the game) (Loquet, 2009a, p. 92).

[3] In a clinical analysis, such an interpretation can be linked with other clue-elements such as, for instance, interviews with parents. Paz thus mentioned in a previous interview "the importance to teach Az how to make bubbles underwater so as to be able to swim down. He explained that he often told Az so, and tried to make her feel the "ballast effect" (Roessle, 2009). Such a meaning constitutes an element confirming the bottom-up analysis, even if it cannot replace it.

its strict epistemic content (Sensevy, in press). I will now present those tools with their corresponding descriptors.

3.3.1 The learning game

Let us consider first what triggers the change from the common game to the roaring lion learning game. Three didactic descriptors allow us to identify the change:

What modification of the milieu?

The milieu is an intrinsic dimension of learning: we build a milieu to learn[4]. With this case analysis we can confirm that, in order to specify the milieu, it has to be described in relation to a contract (Brousseau, 1998). Since the contract is basically defined as *what* we do *together*, the milieu is *what* we do *with together*, *what* we make something *of together*.

We therefore ask how these two dimensions, the contract and the milieu, can be articulated concretely in the case studied:

- The father/child's relationships are structured through variations in which close clinching alternates with more distant holding of the hand where the child has to cope with an unstable foothold in the water.
- The one, two, three … let's go! We do mirror things and the underwater immersion ritual is a shared contract: underwater, no matter what we do, we're supposed to make bubbles.

On the basis of the contract/milieu connection, a new symbolic meaning then emerges: The underwater roaring lion.
It constitutes, as we have shown, a didactic turning point in the game because the young girl, so far unable to make bubbles, opens her mouth, letting out bubbles. What new quality does this trivial and spontaneous variant then take on? To what extent is it different from previous underwater actions? The answer is clear: It is indeed the description of roaring underwater in terms of an epistemic game which will make it possible to grasp the importance of the stake and to understand what is unfolding.

What didactic time?

Time is the second intrinsic dimension of learning. We construct a future from a past[5]. The one, two, three nursery rhyme's advantage is that it allows numerous repetitions. It sets the learning process in a measurable time period. But it is not through numerous repetitions that our knowledge advances. It is what the protagonists do with the variants (kissing, cuddling, tickling etc.): it is a time of situation, of enacted experience.

Thus, if we did not explore the epistemic context we might be led to think that the real-life experience there and then is sufficient for learning. In contrast to such a reduction, I have shown that the learning game is a preparation and a progression towards the epistemic game, towards an active time linked to the quality of the epistemic game.

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[4] *Mesogenesis* describes "the process by which the teacher organises a milieu, with which the students are intended to interact in order to learn" (Sensevy et al., 2005, p. 159).

[5] *Chronogenesis* describes "the evolution of the knowledge proposed by the teacher and studied by the students. This progression produces, for the teacher and the students alike, a temporality that is unique to learning institutions, and that we define as the didactic time" (Sensevy et al., 2005, p. 159).

What evolution in the responsibilities?

Responsibility is the third intrinsic dimension of learning: if we want to *make* somebody *learn* something, they have to act on their own[6].

In our case, we can observe alternating roles between the father and the little girl as in your turn/my turn. However, even if those roles are joint, this does not yet mean that they are equivalent: Az initiates a common game, but her father plays a learning game in which accommodation prevails: with the roaring lion game Az submits to the demands of external reality. But what does the accommodation process consist of? What is the problem facing the little girl? The question of Az's entering an epistemic game is posed again.

3.3.2   The epistemic game

Let us then consider a change from an epistemic point of view. When we practice a learning game similar to our example, what do we ultimately learn? What target game do we become capable of playing? The answer is complex: From an anthropological point of view, three descriptors can be identified, as already mentioned above. Man is not a water being; the process of adjustment to the natural element water is cultural; it is essentially composed of emotions, body transformations and technical stakes.

Which emotions?

Emotions are fundamental for sports activities, collective archaic emotions, as specified by Jeu (1977). The "épreuve" which takes place in the underwater descent expresses an organic fear, the fear of drowning. All the receivers of the face signal the presence of the liquid element. We risk swallowing the water when opening our mouths in order to shout.

What type of body transformation?

In any sport practice, its participants have to transform their usual motor skills, in order to develop sport skills. That is why we have to ask to what extent there is an underwater conquest. As I have already mentioned, this conquest has to do with the voluntary suspension of the pharyngo-glottal reflex or laryngeal closure which usually protects the physiological need to breathe. We might say that there is a kind of dialogue at play, a dialogue between: a motor action (to shout means to practice forced expiration) and underwater perception (to relax the vocal cord muscles means to open the glottis). Both motor action and underwater perception can be associated with the representation (or the probably memorisable image) of the sign of non-drowning.

What is the fundamental technical stake?

Sport techniques are solutions invented by men faced with problems they themselves have created (Léziart, 2010). In our example, there is clearly a rule, which is purely a language and a conventional rule, formulated by the father: *you have to learn how to blow underwater if you want to become a good swimmer*; but it is the epistemic rule for blowing which determines the outcome, and this rule is physical and functional: the control of the pharyngo-

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[6] *Topogenesis* describes "the process of the division of the activity between the teacher and the students, according to their potentialities. The teacher should define and occupy a position, informing students of tasks which will allow them, in turn, to occupy their positions in the didactic space" (Sensevy et al., 2005, p. 159).

glottal reflex is the technical tool forged by swimmers during a continuous cycle of breathing in/breathing out so as not to get out of breath and to keep on moving underwater and this is, as I have shown, of great importance in the case of swimming babies.

The target epistemic game can therefore be identified by linking the two operations:

- On one hand, it can be inferred from the learning games actually played. In our example, this is the transition from blocked expiration to forced expiration.
- On the other hand, it refers to cultural activities. In our example, this is the source epistemic game, i.e. the autonomous locomotion in immersion.

I have shown in my study that, from the point of view of the epistemic game, our three-year-old girl has made contact with a cultural object that belongs to our sport culture. We can assume that through this contact, the young girl's body transformations, emotions and techniques can be developed.

4   Conclusion

As we end the analysis of learning games and epistemic games, we can notice that a new form of plotting is possible. We can now tell the story of knowledge in the practice studied synthetically:

- The water milieu is alien and one may swallow a mouthful of water in it, as Az does at the beginning of the sequence.
- In order to become familiar with this milieu, one has to be able to move about naturally in it, to the point that one can "breathe" underwater.
- First, with this making bubbles common game a certain form of forced expiration is at work. Maz and Paz show Az how to play the game by producing big bubbles.
- Then, with help of the one, two, three… kissing, cuddling, tickling etc. immersion ritual, Az becomes more conformable, allowing her to imitate Paz in the underwater game, while blocking her breathing, with her mouth closed.
- Finally, it is her participation in the new roaring lion game which enables her to go one stage further in her forced expiration and her subsequent glottic opening.

Our premise is that the successive analyses of the plotting (numerous viewings and new redescriptions) allow us to move from a first plot similar to a chronicle to plots which increasingly include at the same time: 1) the protagonists' actual intentions as they are shaped in the milieu; and 2) the conceptualisations of the researcher who tries to understand the didactic intentions and behaviours (Sensevy, in press). My swimming babies study therefore highlights how the didactic process becomes part of the parent/child (teacher/student) interplay. We have thus integrated word turns into action turns. The inscription of words into action is corporal as well as relational. This should encourage us to construct all didactic practices as adding corporeity to relationships.

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