A Temporal Puzzle: Metamorphosis of the Body in Piaget's Early Writings

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> Context • This target article combats some psychologists' and phenomenologists' blind stereotyped vision of Piaget's ideas on early development and the growing ignorance of his works. **> Problem** • The article tackles the issue of the body in Piaget's manuscript works on infants in comparison to the contemporary theories endorsed by Gallagher. **> Method** • I analyze an unknown source, Jean and Valentine Piaget's manuscript notebooks on their first child, and compare it to the contemporary theories. **> Results** • The method revealed itself as largely heuristic. Piaget built new relevant categories during the investigation, such as observing the child's gaze, and the main category of observation was longitudinal paths of behavior. He carefully observed transformations in the specific behaviors of each path that led to stabilize imitation in infants and he discussed self-cognition of the body, i.e., the child's knowledge of her body, as either a curious object or her own body. **> Implications** • Comparing the contemporary nativist approach on early competences and Gallagher's phenomenology to Piaget's constructivist approach highlighted the contrast between several categories, competence versus paths and age versus processes. The investigation detected implicit epistemologies relying on priority given to age and competences over processes and path in the nativist approach, while Piaget adopted an explicit epistemology prioritizing processes and path over age and competence. A strong implication is the need to look below the surface and go beyond stereotypes towards a complex metaphor for qualifying Piaget's works. Against stereotypes and reification, Piaget worked mainly on paths and processes and the best metaphor to capture his conception of development is to conceive it as a temporal puzzle with new fitting pieces that shape the human subject as a multilinked network of paths. **> Constructivist Content** • Analyzing the founder of constructivism's early works with a historical constructivist method led me to propose the temporal puzzle as a cognitive metaphor that synthesizes his early-development constructivist approach, both methodological and theoretical. Moreover, since Piaget's experimental system has never been reproduced as a whole and early development follows an implicit epistemology that is the opposite of Piaget's, his constructivist multiple longitudinal approach remains unchallenged. **> Key words • Jean Piaget, Valentine Piaget, Shaun Gallagher, manuscript notebooks, constructivism, imitation, body, early development.**

Introduction

« 1 » In this target article, I am going to examine the question of the body in Jean Piaget's early writings by comparison with the ideas of Shaun Gallagher. Indeed, at first sight, the body seems absent in Piaget's constructivist psychology and epistemology. Although his systematic engagement lasted for more than 60 years and spanned across a large variety of domains – biology, psychology, sociology, logic, epistemology (Müller, Carpendale & Smith 2009; Ducret 2011; Ratcliff & Burman 2017), in his theory, the body does not receive much attention. This, except for his idea of the sensory-motor origin of concepts and intelligence, i.e., the claim that conceptual and abstract objects are not only constructions that come later in development, but are rooted in the infant's sensorial and motor action. But this designates less the "body" than an abstract organization of knowledge. Yet, it is an indication that, somewhere, the body should play a role in his theory. But how precisely? What role does the body play in Piaget's early child development theory?

« 2 » In order to answer these questions, far from examining only printed material, I will analyze an unknown source, Piaget's manuscript notebooks on babies. The contents of these notebooks, which were in part co-written with his wife Valentine, shed a new light on Piaget's early works. They lead to a second issue, because reading the notebooks opened a new avenue on a methodological question. Indeed, the notebooks illustrate how Piaget tackled the method of observing and experimenting with his children, an issue which remained by and large *tacit* in *The Origins of Intelligence in Children* (1963), *The Construction of Reality in the Child* (Piaget 1954), and *Play, Dreams and Imitation in Childhood* (Piaget 1951), i.e., his three major books on infants and early childhood. So, I was led to discuss how Piaget did observe and experiment; to explore how and why he observed, and how new categories of observation were constructed; to ask if *early competences* – as one would naively put it – were his general research object, or if it was something else; and generally to determine if this type of investigation, by

comparison with the previous one, called for a new methodology.

« 3 » For the phenomenological approaches, it is, on the contrary, well known that the body and bodily experience play a fundamental role in shaping the mind, as in the *Phenomenology of Perception* by Maurice Merleau-Ponty (1945) and more recently in Gallagher (2005). Let us recall that phenomenology attempted to overcome mind-body dualism and considers that consciousness and objects are inseparable. As a counterpoint in this article, I shall discuss their ideas and the contemporary views on the subject in respect of Piaget's.

« 4 » The sources I analyze for this article are totally unknown. In 2009, the Archives Jean Piaget in Geneva recovered the notebooks of Jean and Valentine Piaget on their three children (a short description is in Ratcliff 2011: 92f). The 1,200 pages of the notebooks display about 10,000 observations and experiments, a number which eradicates the implicit connotation of bad research conveyed by the stereotype of Piaget's supposedly having built his theory "on only three subjects, his own children" (Zastrow & Kirst-Ashman 2013: 127). Such stereotypes unfortunately pervade early developmental psychology as well as the work of scholars, such as Gallagher, who ground part of their theory in developmentalists' research. The direct consequence is the growing failure to read Piaget in the original texts. And this is missing the point, for Piaget's original publications are classics in the sense of Italo Calvino, when he says that "a classic is a book with which each rereading offers as much of a sense of discovery as the first reading" (Allen 2000: 162, quoting Calvino). Reversely, stereotypes functions exactly the opposite way: they generate neither new knowledge nor any sense of discovery but are precisely useful in the academic world as they reinforce the scholars' belief that there is nothing to care about in Piaget's texts. Situated at the opposite, in this article, I shall go a step further in rereading Piaget by analyzing, with a microhistorical method, the main research data he used for writing his classic books on early development.

Longitudinal paths at the core of infant development

« 5 » In Paris, between the end of 1919 and July 1921 (Ducret 1984; Harris 1997), Piaget (1926a) had invented a heuristic method – the clinical method (Bang 1966; Duveen 2000; Bond & Tryphon 2009; Morelli 2018) – that made it possible to explore and analyze the child's verbal productions and their logical and reasoning dimensions. Initiated in Paris, the study of the child's explanations quickly led to heuristic results when he came back to Switzerland and settled down in Geneva in Autumn 1921. Between 1923 and 1927 he published four books and many papers on the development of the logical thinking of children, on language, reasoning, on the representation of the world and on physical causality in childhood. Yet, the general framework of this research remained *verbal*, and indeed, the method, as put later by Piaget, consisted "always in a free discussion with the subject" (Piaget 1947: 7).[1] The birth of his daughter Jacqueline in January 1925 changed things. In comparison to the previous free discussion with 4-to-13-year-old children, the encounter with sensory-motor behavior deeply transformed his way of investigating while providing new avenues for psychological exploration. From this period, the Piagets, who actively collaborated in observation, developed a rigorous method that mixed observation, experiment and writing records to analyze and understand developmental transformations in babies. While the body did not take a strong importance in Piaget's early works, it would now be part of the game and studied in a rather different way.

« 6 » The examination of the notebook on the first nine months of Jacqueline's life brings an answer to the question of what kind of method was used: the Piagets observed all possible behaviors of their daughter, they experimented and grouped the results thanks to keywords and through a temporal scheme, in a systematic longitudinal way. Each behavior, for instance the smile, was followed longitudinally – identifying and recording many items – and always reported with its relevant circumstances. These were all relevant items of information concerning the context of production of the behavior, such as body posture, a lack of light, a response to a specific stimulus, previous knowledge of some attitude, play with an adult, things that were *absent*, the expression of the child, her interest, etc. It was always thought about and reported in relation to other behaviors, each of them traced back to their origin. As a result of this *multiple longitudinal method*, the observation extended in multiple specific and multirelational paths of observation to follow. Therefore, a path is the specific trajectory of a competence that transforms itself during development. It can be traced thanks to longitudinal observation and experiments, and the keyword Piaget applied to it was the notion of *genesis*. The young parents quickly discovered these trajectories, from 9 January 1925, the day Jacqueline was born. We will follow a very few of these paths to see how they concern the baby's body and to trace what the progressive changes were in Piaget's understanding of the body's role in psychological development.

« 7 » One week after she was born, the first observation of the journal related that during the first week, Jacqueline "sucks her thumb when it passes by chance" (J.I.1/11-15.1.25).[2] Then come reports about the eye tracking of a match, the first smiles, the study of crying and the orientation of the head to get to the breast. After that, during the first six weeks, Piaget did not write down observations of the thumb. On 5 March, he wrote:

> "Thumb[3] Sucked it from the first days when it arrives by chance to her mouth. Then eclipse. From 5 March on, movement adapted: moves the thumb towards the mouth." (J.I.5/5.03.25)

A few months later, the thumb was integrated into a larger scheme to allow for sleeping: "for several months, to fall asleep she needs

1| I translated the French original quotes except those coming from Piaget (1926b) and Piaget (1963).

2| Archives Jean Piaget, Journal of observation of Jacqueline I, p. 1, from the 11 to the 15 January 1925, abbreviated J.I.1/11-15.1.25. I translated all the French original quotations from the notebooks.

3| The border is in the notebook. There are more than four thousand used as keywords.

to suck her thumb and hold the fringes of her pillow with the rest of her hand. She tinkers in her bed until she manages to find this combination" (J.I.44/20.08.25). Five days afterwards, Piaget synthesized his thoughts on that issue:

> "*25 August*. To sleep, she always needs: 1. to suck her thumbs; 2. to hold the fringe of her pillow with her hand. If the thumb or the fringe slips out, she cries; 3. almost always on the side. Therefore needs a complex set of movements to sleep." (J.I.48/25.08.25)

« 8 » One of the principles of the Piagetian explanation that would be expanded in the later books was already there: a specific capacity (sucking the thumb) had to be coordinated with other specific capacities (holding the pillow) and integrated into more powerful capacities (sleeping). Each of them was followed in its path, and Piaget (1963) conceived it later as reciprocal assimilation.

« 9 » Jacqueline was now aged seven months, and her thumb was already multi-related to many schemas, including touching, prehension, sucking, sleeping, etc. She could, for sure, get all objects within her reach, but to what extent did she know her body? That its parts belonged to *her* body? And other's bodies? How did she situate her body in comparison to others'? To answer these questions, Piaget had started a series of experiments on imitation, a nice way to test how she could reproduce, with her body, attitudes or movements achieved by another body. On 6 June he tried "to teach her to stick her tongue out. No success. Makes it by chance" (J.I.18/06.06.25). However, unsuccessful imitation of movements was different from imitation of facial expression: he noticed that she "smiles when we smile, is serious when [we are] serious" (J.I.18/06.06.25) – much of the observations were written in telegram style and need sometimes a pinch of interpretation to be understood without ambiguity. Things were specific here and called for a rigorous methodology. Indeed, when looking for *what in children's behavior constructs a specific path*, everything must be substantiated with strong and sustained evidence. For this scope, the Piagets always worked in a multiple longitudinal way. It enabled them to identify all the micro-changes in the paths and to verify that the occurrence of a capacity in that path at a certain time in development was not due to chance. One week later, when aged 5 months, on "14 June. Same experiment [sticking the tongue out], no success" (J.I.19/14.06.25). This same day, with a new experiment, he engaged his own body with large visible movements before her: "I place myself in front of her and I alternately open and close my arms (joining the hands together when the arms close). She imitates 3 times. I stop, she stops. Then she starts with me" (J.I.19/14.06.25). Three days later, he repeated the experiment: there was a clear imitation.

« 10 » However, imitation did not refer here to a general capacity for imitating *everything*, for some attempts were unsuccessful, and Jacqueline was not able to imitate sticking the tongue out. Moreover, Piaget had previously noticed other behaviors that, although he seemingly had not yet written them down in the notebook – things kept in mind but not written[4] –, would serve to control to what extent this was a token of genuine imitation. He remarked that she was successful in imitating only when it was restricted to the "imitation of gesture she spontaneously does by herself. She knows, indeed, how to do this alone" (J.I.24/17.06.25). Therefore, if her behavior had to do with imitation, it was retrieving in her own body a gesture already known to her rather than inventing a new gesture identified in the adult. We can take here a new measure of the ultra-specificity of Piaget's investigation: his constant conceptual accuracy for each path-to-follow ensured that the psychologist would not be deceived by surface appearances, taking an isolated observation for granted. For each situation, the variables at play that could influence the observed behavior, either as a process or as a result, were always explicitly identified in order to give matter to consider in the multi-longitudinal investigation. The more the investigation of the paths proceeded, the more specificity was added. In this way Piaget could establish how much other processes played a role in the genesis of imitation, and thus, invent new experiments.

4| This phenomenon appears in other notebooks and I called it *a-writing* (French: *ascriptions*) in a general analysis of another scientific notebook (Ratcliff 2016: 173f).

Constructing new relevant categories for competing theories about imitation

« 11 » Piaget's early works with 4-to-13-year-old children were based on many structuring categories such as autism (Harris 1997), epistemology (Smith 1993), egocentrism (Kesselring & Müller 2011), equilibration (Vonèche 2005), etc. With infants, the difference in age – observing the children from their birth – left space for many other categories constructed during the investigation. Of course, certain categories were maintained: he still thought and observed both through analysis and synthesis, and was careful to explore totalities and shared behavior. But others were new, for instance, the longitudinal paths-to-follow or the relations between Jacqueline and her body. Her numerous behaviors, from early imitation to the various movements, sounds, and perceptions, supplied matter for building relevant categories, supplying answers to the questions of how and what things to observe. From the first experiments on imitation, Piaget quickly became aware of the orientation of the baby's gaze. Indeed, during one of the above observations, when Jacqueline, aged 5 months and 5 days, imitated her father opening and closing his arms in front of her, his attention was captured by a trait in his daughter's behavior: during the experience, she never looked at her own body but always at that of the adult: "She imitates 3 times. I stop, she stops. Then she starts with me. Everything without looking at her own hands while she looked at mine without interruption!" (J.I.19/14.06.25).

« 12 » Here the profit was also epistemological: the observer had constructed the category of "observing the baby's gaze during an action that engaged her body or a part of her body." It was reused three days later, on 17 June, during a counter-proof for an experiment on magical causality where, to make a suspended doll move over the cradle, Jacqueline engaged her whole body, "shaking herself entirely, including her legs, while shouting" (J.I.22/17.06.25). Among the observables, the gaze: she "starts once more to wriggle with hands and legs, exactly like before and looking *only* at the doll (not her feet)" (J.I.23/17.06.25, emphasis in the original). The same day, Piaget repeated

the experiment of visual imitation of his moving arms with complete success and here, once more, "at no time did Jacqueline look at her hands to imitate. She constantly looked at me, her eyes fixed on my hands" (J.I.24/17.06.25). Later on, the category of observing the child's gaze was strengthened by its extension to many observations, for instance when Piaget played with his daughter and held her feet: "She tries to free herself, but never looks towards her feet" (J.I.25/17.06.25). Three months later, at the beginning of September, Jacqueline was aged eight months. Piaget observed the same visual attitude during an interaction of the child with her mother involving visual imitation. Jacqueline

> "is still under the quilt. Valentine hits the duvet. She imitates immediately while laughing out loud when Valentine starts with her she laughs a lot. […] Yet she only looks at Valentine's hands. Nor does she try to compare them with hers, despite Guillaume." (J.I.58/6.09.25)

« 13 » Psychologist Paul Guillaume was the first scholar to be cited in the notebooks. The same year, in 1925, Guillaume (1925) had published a book on *Imitation in children* and Piaget (1925) reviewed it. He took that occasion to question the author's ideas in comparison to his own observations: "if you yawn before a baby (for instance at 3 months), he does not yawn in return; if you put your finger in your mouth, he does not imitate you, etc. Yet he knows yawning and sucking his thumb" (Piaget 1925: 88). These were Piaget's own observations. Several observations of Jacqueline – the imitation of the smile on 6 June, the imitation of the moving arms on 17 June – engaged him to challenge Guillaume's interpretation, already in the notebooks. Hence the review of the book was a good opportunity to highlight the gap between his and Guillaume's ideas. As a defender of associationism, the latter stated that the Pavlovian model of the conditioned reflex explained early imitation. Piaget had applied the conditioned reflex model for understanding early smiles or the use of signals: "the mere sight of the bottle will lead the little child to open his mouth and stop crying" (ibid). But the associationist stance was limited and Piaget's careful following of longitudinal paths of observation brought forward contradictory findings: "the imitation of movements, for instance, cannot be explained in this way. How does a child who has never seen his mouth become able to yawn when we yawn before him?" (ibid). The examples of yawning, smiling and sticking out the tongue illustrated the same pattern, because in each case, the same part of the body remained *invisible* to the child's gaze – and the parents cautiously avoided any sight of a mirror by Jacqueline before she was one year old. Once more the category of the child's gaze was at stake, and concerned now those parts of the body not directly visible. The observations made while looking at the gaze when engaged into imitation – both the *absence of the baby's looking at her own body* and the *body's parts not accessible to the gaze* – concurred to refute Guillaume's explanation. According to him, the child imitated through a comparison of an external model and herself. But, if Guillaume was right, Jacqueline should have alternately looked at her own hands and her father's hands, which did not occur.

« 14 » A competing explanation of the imitation quickly emerged, already in the notebook. On 14 June, after the experiment of imitation of his own movement, Piaget wrote that she "knows the action of joining the hands, which she has frequently observed on herself" (J.I.21/14.06.25). Consequently, this motor schema was *assimilated* to her visual perception when her father was doing something equivalent before her. The locus for imitation was the motor schematism, where the alchemy of coordinating perceptual and motor actions took place. As we saw, the child's gaze was fundamental, as well. Piaget's explanation with the schematism, already outlined in summer 1925, was heuristic and called for three dimensions:

a dispatching over time the various actions of the baby that dealt with imitation – the path;
b attributing to a specific mechanism the functions that allowed it, schematic conservation and their relationships;
c linking together motor action and perception.

« 15 » For instance, when Jacqueline "fixes her eyes on my hands," Piaget wrote, "therefore it is exactly my movement which is perceived through her motor schemas" (J.I.24/17.06.25). It is worth noting that the review of Guillaume's work was published in December 1925 when Jacqueline was 11 months old and already made use of the competing explanation of imitation put down in the notebooks six months earlier.

« 16 » Therefore, Guillaume and Piaget differed much on imitation, because Piaget (1963: 357–419) built a constructivist framework as a *tertium genus* that overcame both associationist and nativist theories. Now, does the contemporary discussion on early imitation compete with this constructivist explanation or ignore Piaget's theoretical advances? We have no choice but to note that it is the latter case. Gallagher (2005: 67–69) considered that, for Piaget, invisible imitation was not possible before the age of 8–12 months. He cited (ibid: 69–74) several pieces of research, among which were works by Andrew Meltzoff and Keith Moore (1994) showing that imitation took place in neonates. By contrast, the main stake for Piaget was not so much the age at which the baby is able to imitate. Indeed, through the careful following of paths, he tested how action and interaction were the source for the construction of the baby's tools to adapt. Mostly what interested Piaget was the baby's agency, not just for acting on the world, but also for *acting on herself* to construct the paths and the mental tools to improve adaptation. Constructivism in Piaget's thinking is not optional and, far from the stereotype of the stage theory, his conceptions of the paths and processes cannot be reduced to "acquisition" of the body schema (Gallagher 2005: 68) or "learn[ing] to relate sense experiences" (ibid.) – which would be reverting to the associationist conception that Piaget refuted thanks to his empirical works.

« 17 » In other words, it would not have been a problem for Piaget to accept that there was something the experimenters called neonate imitation – as a scientific finding – but, knowing that imitation vanishes later in development, these data are neither comparable to nor challenge his scientific inquiry on the paths, but only shape a new series of questions: are we dealing with the same object while comparing neonate imitation and invisible imitation?[5] Is that mainly a question

5| Recall that invisible imitation is the imitation of a behavior that the child cannot see in him or herself (for instance the face) while neonate

of words, where innate neonate imitation = constructed invisible imitation? But then I would have to ask: what kind of reductionism do we endorse when labeling bartering with the notion of "money"? The points identified under this early competence relate to things that call for both new vocabulary and new conceptions, as put by Marshall Haith (1998: 177). Haith considered it was "the psychologist who has put the cog in infant cognition" and asked for "a kitbag of new terms to talk about infant constructs." And, indeed, quoting Stefano Vincini, Gallagher (2017) said that neonate imitation must be understood as "the greater frequency of a gesture in response to the same gesture than in response to other gestures." There lies the problem: in the definition. Indeed, this *frequency definition* does *not* correspond to the standard notion of imitation. It would fit the description of a boxing match or of a dinner well, where people perform gestures that are similar, but not only those gestures. Especially, it allows psychologists to put imitation *in* infant behavior when there are about 50% of subjects who do *not* imitate after seeing another's gesture…! By comparison, Piaget's notion of imitation concerned not only gesture but also sounds, including voices, facial expression and posture. Moreover, the frequency definition sticks to the present gesture and is actually incommensurable with the notion of "deferred imitation," which Piaget (1951) used to understand the later transformations of imitation into mental representation. In the notebooks and in the full enquiry, to identify imitation, Piaget did not content himself with finding that the infant sometimes imitated, and sometimes not – which is what the *ad hoc* frequency definition of imitation allows. Piaget always secured imitation – as well as other types of competences – both horizontally and vertically:

- horizontally, imitation was secured by the many trials that reproduced an imitative experiment and by the analysis of the circumstances surrounding whether the child imitated or not (for instance, the lack of interest, or already knowing or not knowing some gestures, etc.). But the goal was to detect without ambiguity the changeover to a stable way of performing imitation. Here, a stable way is not capturable through a percentage, but through the finding that, at a certain point, imitation has become a mobile tool that is fully mastered, transposable and generalized to new situations for the adaptation of the child.
- vertically, imitation was secured by its appearance at the crossing of several specific paths in which the same stability had not previously been observed. Of course, Piaget identified *traces* of imitation in the first months of development in certain paths. But these behaviors were unstable, sometimes appearing and sometimes not – close to the frequency definition – and therefore they could not be considered imitation.

« 18 » Piaget observed and experimented along many paths to capture the changeover that transformed unstable imitation into a stable tool for the child to use at his or her convenience. All this converged in allowing Piaget to say that the competence had been *stabilized*, far from obeying a frequency definition. By way of consequence, it would be a benefit to take into account the work Piaget did on invisible imitation. The frequency notion of imitation is a highly abstract and probabilistic conception about redoing something similar that contrasts with Piaget's hunting for specificity of imitation within several paths. Therefore, the pressing questions are: Can we put neonate imitation and invisible imitation on the same path? Are the processes underlying both kinds of imitation the same? Does constructed imitation rely on innate imitation or are they unrelated processes?

Using and knowing the body

« 19 » In Piaget's investigation, the more experiments were invented – and there were *thousands* during the seven years of observations of the three children –, the more new specific paths of behavior were traced and, thanks to the notebooks, reconstructed like a *temporal puzzle* where each day added new pieces to generate a developmental multilinked network of paths. The new pieces were of three types, either observed or inferred from observation:

a observed *specific behaviors* or *conducts*, a translation from the French *conduites* and not *comportement*, as Piaget (1926b: xii) claimed he was influenced by Pierre Janet's "psychology of conduct which offers a happy combination of genetic methods and clinical analysis."[6]
b inferred *schemas* – as units of action;
c inferred *relations*, intra- or inter-schemas.

« 20 » While the specific behaviors or the conducts showed a variable and progressive co-adaptation of the child to the material and semantic world, the schemas were designed as the main locus for longitudinality. They were structures that reorganized all the previous experiences that could be observed when following longitudinally a specific type of behavior, within a path. Through the longitudinal observation of the conducts, Piaget was looking for any clue showing the presence of schemas – later called scheme in the publications of 1936 and 1937[7] – and of the day-by-day construction of these relations – later called schematic coordination. Conversely, he searched in all specific behaviors when, at a certain time in development, schemas and relations were still unachieved. In this moving pattern, more than the body and the always-changing behaviors, the schemas and the relations were stable points, invariants that witnessed the respective presence of structures and functions.

« 21 » Yet, the baby's body was also the locus of certain phenomena that revolved around the question of how Jacqueline did know her body. There, tracking the baby's gaze helped to trace many specific behaviors. For this, the Piagets frequently observed their daughter when left alone, unaware of being observed, and the sentences "does not see me" or "can't see me" were reported in the notebooks showing that the couple controlled for the effects of their presence on the child's behavior. Many paths-to-observe emerged here that concerned the self-cognition of the body, for which Piaget soon started to establish an increasing register.

imitation relates to competence of imitation during the first weeks of life.

6| Unfortunately *conduct* has a moral connotation that is not present in Janet's and Piaget's French notion of *conduite*.

7| In the notebooks, the word *scheme* was not used until 1927, with his second child, Lucienne.

His close following of paths enriches a contemporary debate rooted in the phenomenological tradition, at least for Merleau-Ponty, for whom "the body is not a simple object."[8] More recently, Gallagher (2017) replied to authors for whom the infant perceives their hand "as an object among others, not as part of her body" (Di Francesco *et al.*, quoted by Gallagher 2017). Gallagher (2017) objected that Di Francesco and colleagues' claim was largely definitional, i.e., "they define self-consciousness precisely as an explicit objective view" of the body seen as one's *own* body. This point relies on Gallagher's (2005: 74f) claims about the presence of an innate body schema and body image in newborns, the early sense of self in infants and the status of embodiment, which are not necessarily "objective" views or "explicit" consciousness. Moreover, as we shall see now, Piaget's conception emerging from the notebooks shows how the infant's body is not subject to the definitional view of self-consciousness although its bodily parts are clearly taken as objects.

« 22 » During the first months, perceptual and motor skills worked towards co-integration – motor schemas coordinated with vision –, as observations on bodily self-cognition taught. The first signs of bodily self-cognition took place with the hands, when Jacqueline was 3½ months old. On 22 April, she was crumpling her duvet:

> "When the hands pass into her visual field, she cares about them for a while (the left as much as the right hand). Same attention when a fold of the duvet comes before her eyes. Obviously, she must sense two worlds, one muscular-tactile, the other visual, without any relation of one to the other, if not magic." (J.I.14/22.04.25)

« 23 » Observing the child's attention and her expressions raised a new question: how does she come to consider her hands in the same way as the folder of the duvet? In other words, there was neither difference nor specificity of her hands when compared to the duvet. None of them was considered to belong to her body, which could be explained by a dissociation of cenesthesic and visual areas. Multimodality is therefore a conquest for the child. Two months later, Piaget noticed the growing interest in her feet, which "she contemplates every day with a systematical interest" (J.I.25/21.06.25). What was previously a slight care towards the hands was changing now into a strong interest in the feet. Though it was a new attitude with respect to the previous observation, it fuelled the same explanation:

> "it seems that there is no relation for her between the visual image of her feet and the kinesthetic impressions (mixed with intentionality = related to the legs' movement). Perhaps these impressions are already localized into an I, but the image of the feet is not conceived as the external concomitant of these impressions." (J.I.26/21.06.25)

« 24 » Piaget inferred thus a strong dissociation – or better, an absence of relations between two systems under construction – to explain both Jacqueline's slight care for and new interest in the parts of her own body. This converged towards the same explanation: what she saw was not at all correlated with what she felt – her kinesthetic impressions. When she observed her feet moving, she did not *know* it was her doing so, nor that it was *her* feet. Hence the feeling of interest.

« 25 » A week later, new experiments were invented to fully investigate the issue. In one experiment the father held the child's hand and remarked:

> "she makes fruitless efforts to free herself but does not try to look in the direction of her restrained hand. Yet these days, she looks at her hands and fingers with an increasing interest, but as a foreign body. Once more here, there is no direct relation between the internal sensation of the intentional movement and seeing the hand." (J.I.26-27/21.06.25)

« 26 » The behaviors listed in this observation were consistent with the previous one, which all belonged to the same path: if her own limbs were regarded as foreign bodies, this explained both her interest towards them and that she did not use her gaze to control her hands when trying to free herself. Two weeks later, the issue at stake was reworded in terms of the frontier between

> "I and Non-I – Looks with a strong interest at her hand moving. The hand draws near to her nose and ends in hitting the eye. Scared, she recoils – Obviously, her hand still does not belong to her. After a moment, she looks at her cradle: her hand, which climbed slowly, passes in her visual field. She follows it like a foreign body." (J.I.31/9.07.25)

« 27 » The next day, he attempted a general explanation that linked together the appropriation of the body and a faint perception of the frontiers of the I, not correlated to the body:

> "*Possible explanation*. There are still 2 worlds, one visual the other kinesthetic. When the child sees her hand, she desires the movement, but notices the result as situated in the non-I. […] The hand is still not felt as personal: this 10 July evening, Jacqueline looks at it, with the same surprise as before, when it passed in her visual field." (J.I.35/10.07.25)

« 28 » Two months later, she showed the same expression in the same situation. On 6 September, she "looks once more at her hands with astonishment, when the hands cross together. She slowly shakes her fingers, looking at them carefully" (J.I.59/06.09.25). It was only ten days later, therefore, when Jacqueline was over 8 months old, that she did "not observe any more her fingers these days. She's accustomed. But this morning, when she put her thumb in her mouth, she looked at length at the 4 fingers that moved slowly" (J.I.75/18.09.25). After a few weeks, the two areas of the visual and kinesthetic were fully coordinated together, a sign that the baby had passed the threshold of a new stage.

« 29 » These short passages of the huge notebooks raise then some simple questions that can be addressed to Gallagher and the psychologists on whom he based his enquiry: How can these findings and paths be accounted for in the phenomenological view as explored with Gallagher and Merleau-Ponty? What has the innate body image or the early sense of the self become when the 4-to-8-month-old infant is surprised when she hits herself, or when she looks with astonishment at her hands? What is the meaning of a so-

8| See Merleau-Ponty (1945: 119–123), and thesis abstract "La phénoménologie du corps et de l'intersubjectivité incarnée chez Gabriel Marcel et Merleau-Ponty" by Gül Cevahir Sahin at http://lettres.sorbonne-universite.fr/IMG/pdf/GULCEVAHIR_SAHIN_Position.pdf

called early competence when it cannot be connected with later behaviors because there was no investigation on the paths and their relations? Is it just, while implicitly using a different definition, to make scholars believe that the "same" competence appeared earlier in development? And, therefore, saying that Piaget (or better, the stereotype of Piaget in the psychologist's and the phenomenologist's mind) was wrong? This more closely resembles using a semantic operation on a definition than a scientific comparison.

A new theory

« 30 » For Piaget, knowing one's own body resulted neither from mere experience, nor from an innate knowledge, but from a constant adaptive interaction with objects. In his French theoretical work, *The origins of intelligence in children*, published more than ten years later, in 1936, the conception of the body was in line with his first observations on Jacqueline. For sure, other differences took place – the model was much more formalized, thousands of observations taken on the three children allowed him now to secure or abandon findings and ideas, and several kinds of explanation had meanwhile been put aside to shape the first constructivist theory of intelligence. In this model, the body was important mainly for the core of two sub-stages, out of six sub-stages, where the early know-how of one's own body was the necessary ground for a subsequent knowledge of objects.

« 31 » The first stage was characterized by the use of innate behaviors and inherited reflexes, while the second stage saw the birth of new habits whose center was the body. One of the functional tools was the circular reaction, a capacity to repeat the same conduct, which allowed the infant to calibrate it. *Knowing one's own body* was the main scope of stage 2, and the hand provided the criterion to specify it: "The second stage is that of the first circular reactions related to hand movements, prior to any coordination between prehension and sucking or vision" (Piaget 1963: 90). At this very moment, getting acquainted with the body and its parts became an end in itself, for nothing would be possible at later stages if the child did not know her body and how to use it. Observations on that topic had already been done by previous scholars, such as Wilhelm Preyer, whom Piaget cited (ibid: 94f). To Preyer, getting an object when the hand passed simultaneously in the visual field took place during the 17th week. In Piaget's published works, this same observation did not receive a fixed locus in time, because the "coordination between vision and hand movements is a continuous process depending on functional use more than on acquisitions that can definitely be placed in time" (ibid: 95).

« 32 » More generally, discovering one's own body took much time, because each limb was first understood as a casual object:

> "when he discovers his own body, his fingers, his feet, his arms, he considers them exactly like other objects, without any thought that these particular objects of which he admires the movements are actually driven by him or herself. Therefore, we can grant Baldwin that, at the origin, the baby has no feeling of his I." (Piaget 1927: 101)[9]

« 33 » In addition, cautiously observing the same paths – vision related to the movements of the hand – in the three children had revealed the enormous *variability in time* of the same competence: to get an object when the hand was simultaneously seen was performed by Laurent at 3 months 6 days, by Lucienne at 4 months 15 days, and by Jacqueline at 6 months 1 day (Piaget 1963: 95)! Therefore, a strong methodological hypothesis by Piaget was verified: *it was not the competence nor the absolute age by themselves that counted, but the longitudinal path in which the competence took place*, in other words: genesis. This led to thinking in terms of process and not of substances. The exact correspondent to this hypothesis was the notion of scheme, slowly constructed during the investigation, by which the path found a cognitive inscription in the child's body. Hence the development is the locus of a transformation of the schemes driven by action that increasingly coordinate with one another, through their constant interaction with the world.

9| On several occasion, Piaget referred to James Baldwin's ideas, on the concept of circular reaction, the role of imitation and the frontiers of the I. For an overview of Baldwin in Piaget's ideas, see Burman (2013).

Conclusion

« 34 » A cautious examination of known printed and unknown manuscript material showed that the body took a particular place in Piaget's early writings. The mid 1920s saw a strong change in Piaget's conception, for which a substantial innovation took place with respect to the body. Through the observation of his children, in part done with his wife Valentine, Jean Piaget assigned a specific role to the body. Before absence of language, the problems were different. Its genesis had become the new problem: a human is born with reflexes, but without language and without logic, so where do they come from? Piaget's answer was framing the first avenue for constructivism. With the baby, the body was turned into a multilinked set of schematic relations. Those were always observed through specific paths to build together the giant temporal puzzle of development, where, for Piaget, the very pieces, far from being isolated competences, were longitudinal paths.

« 35 » Nowadays stereotypes of Piaget's findings are criticized as a comfortable foil that avoids discussing his revolutionary constructivist ideas. As this article shows, Piaget cannot simply be criticized as the holder of the traditional view on invisible imitation or on the limb considered as object *without* taking into account the full investigation on the paths. Experiments on neither the findings, nor the competence, but instead on the paths-as-temporal-networks-of-findings-and-conducts should be taken up for the same developmental period and with close multiple longitudinal methodology in order to validate criticisms of his theoretical framework. But this was never done with a similar engagement in a multiple longitudinal investigation. The metaphor of the temporal puzzle must neither be underestimated nor stereotyped: time creates new things and Piaget found a way to capture both the creation of novelty and of *a priori* necessities while escaping the nativist laziness. And this, as an experimental system using a multiple longitudinal method has not been reproduced and remains unchallenged.

« 36 » In spite of surface similarity arising from the use of the word imitation,

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not only are we probably not dealing with the same competence, but we are also dealing with different *values* – therefore different hierarchies of values: is *age* more important than *processes* or the reverse? For contemporary psychology and embodied theory, the age of appearance of a competence appears to be the leading value that shapes the developmental conception, taking the upper hand over processes and paths. When age – and the methodology of comparing groups used in early development – becomes prior to the quest for the process, there is a price to pay. An implicit epistemology lies behind it, which is a reification of periodization in development, forgetting that age, objective though it may seem, remains a social and cognitive construct. But now let us hear what Piaget said against reification in a text from the same period:

> "The problem statement is not clear as long as we compare the individual to the society. Nothing is more equivocal than these two words. There is no society. There are social processes […] There are no individuals. There are individual processes of thought." (Piaget 1928: 189)

« 37 » Therefore, the conditions for finding a theory that explains development must be conceived of as the interaction of processes that lie behind paths, but not as the interaction of substances – and even less as putting a magic cog in the infant behavior. Piaget's constructivist conception grounded in human action is strongly opposed to the belief of contemporary psychologists for whom an increase in age and maturation pushes the child towards more competence. Where Piaget adopted an explicit genetic epistemology that prioritized processes and path over age and competence, the nativist approach is trapped into an implicit epistemology relying on priority being given to age and competences over processes and path. And it seems that, at least for imitation and the early sense of the self, Gallagher took the latter for granted.

« 38 » Speaking of early self or innate imitation is putting the emphasis on that special time before other periods, and the same is valid for the field of early competences where 3-month-old babies are considered to master number or object permanency. By contrast, for Piaget the main values were understanding developmental changes thanks to adaptive interaction and identifying the processes of construction that underlie paths and networks of competences. The age itself was less important for it has but a weak predictive strength – he noted for instance that the emergence of the same competence in his three children was subject to strong variations in time. The more the emphasis is put on age and competence, the less the processes and the paths are discussed. Bottom-up data are sometime disconnected from top-down interpretation driven by implicit hierarchies of values – and this illustrates the moral economy of scholars. Piaget's project was to drive psychology towards making the values explicit, thinking about process and structures and not age of appearance, in order to fill out a constructivist agenda.

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