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Janina WELLMANN, Die Form des Werdens. Eine Kulturgeschichte der Embryologie 1760-1830



- Lectures
Date de mise en ligne : mercredi 8 août 2018

- Recensions

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This review has already been published as a part of a [larger book](#).

Janina Wellmann, *Die Form des Werdens. Eine Kulturgeschichte der Embryologie 1760-1830*, Göttingen, Wallstein, 2010, 429 p.

In a book that was only recently translated into English (2017), Janina Wellmann has claimed that around 1800 the concept of rhythm emerged and penetrated the entire Western culture. In literature, in theoretical reflection on art, in philosophy, and above all in the newest life sciences, rhythm became, she argues, a common scientific "Paradigm" or better yet, a new "Episteme" (Wellmann, 2010, p. 12, 33, 116). The book has received some appreciation but I would like to show, in this review, the reasons why one may legitimately question the historical relevance of this fantastic thesis and draw from the discussion some general conclusions.

Rhythm in the Living (Wolff and his followers - 1759-1876)

Let us first summarize Wellmann's contribution. She recalls the rise, from 1760 to 1800, of a new interest in the development and reproduction of living beings. Faced with phenomena impossible to understand within the Mechanistic paradigm which had dominated the previous era, these new sciences overwhelmingly opted for the Vitalism and used, she claims, rhythm as operational concept able to hold together both movement and form (Wellmann, 2010, p. 16 - all following references are to the German edition).

The initial moment of the emergence of the concept of rhythm in life science was, according to Wellmann, the controversy between Albrecht von Haller (1708-1777), a supporter of "preformationism", and Caspar Friedrich Wolff (1734-1794), defender of "epigenesis" (chap. IV). For Haller, all organisms were generated by preformed germs, which were kinds of organisms in miniature, and which had only to grow by getting out of their shell. For Wolff, the development consisted instead of a serial genesis process of a final form, involving interactions between repetition, stability and variation factors. In his thesis *Theoria Generationis* published in 1759 and in his later book *De formatione Intestinorum* (1768-1769), Wolff brought up to date the theory of epigenesis, already advanced by Aristotle and Harvey, and supported at the time by Maupertuis and Buffon. But, without explicitly using the term rhythm, he introduced, besides the germ layers theory, the concepts of "pulsed movement," "successive stages" and "interactions."

Eventually, Wellmann argues, if not the term at least the concept of rhythm spread in physiology, where experiments by Johann Christian Reil (1759-1813) on vital forces (*De structura nervorum - On the Structure of Nerves* 1796), and Ignaz Döllinger (1770-1841) on secretion (*Was ist Absonderung und wie geschieht sie ? - What is Secretion and How does it Happen ?* 1819), made rhythm a crucial aspect of the organism operation (chap. VI).

Wellmann points out that this emergence was not unrelated to that recorded in the same period in the works of poets, theorists of poetics, and even, she claims, some music theorists. In the first part of her book, she thus wanders through the works of Klopstock, Hölderlin, Moritz, Novalis, A.W. Schlegel, Schelling (chap. I, II, III). The link between arts, poetics and life science was embodied in Goethe who, like his French predecessor whom he admired, was a kind of hub where all sciences met and fertilized each other. Only a few years after his discussion with Moritz (1786) and a few years before that with Schiller on poetic rhythm (1795-1798), Goethe published an essay entitled *Versuch die Metamorphose der Pflanze zu erklären - Essay to Explain the Metamorphosis of Plants* (1790), where rhythm featured as an essential part of the metamorphosis of plants (chap. V).

Wellmann then shows the increasing use of engravings, since the middle of the 18th centuries, to capture the successive phases of the embryo development (chap. VIII), and compares it with other uses of engraved pictures, starting from the middle of the 16th century, representing the successive moments of wrestling, weapon handling, army maneuvering, riding, court dancing, choreography and, in 18th century, of artifacts crafting (chap. VII).

In the 19th century, the rhythmic model unfolded, while becoming more complex, in the embryology of Christian Heinrich von Pander (1794-1865) (chap. IX) and Karl Ernst von Baer (1792-1876) (chap. X). Both claimed that embryonic development could be read as a rhythmic transformation of membranes by successive twists and folds in different directions.

In order to make sense of what she sees as an increasing extension of the concept of rhythm, particularly around 1800, Wellmann uses a few concepts borrowed from Michel Foucault. She proposes to update *The Order of Things* by considering the Modern "Episteme," which has emerged around 1800, no longer as the "Episteme of History," as Foucault put it, but that of "Rhythm." In chapter VII, she also extends Foucault's rhythmic analysis of military exercises in *Discipline and Punish*, while regrettably downplaying and depoliticizing his contribution (for another approach see Michon, 2015c).

Such perspective sheds some light on the increasing interest in the question of the "form of the becoming" in scientific, artistic and philosophical discussions of the time. It also subtly returns the reflection on rhythm elaborated by Foucault in the 1970s against his own previous structuralism by challenging the famous transition of the "era of classification and tabulation" to "the era of history" which, as we have seen with Diderot, starts at least in the 1760s. Finally, it places the concepts produced by the new life sciences in a broader historical context, a move that history of science specialists rarely make and that explains some of the harsh criticisms and also some of the expressions of praise that Wellmann's book received (Levit, 2012 ; Despont, 2017).

Wellmann's historical analyses are extremely valuable because they provide us with a quantity of new historical evidence that can only improve our understanding of a very obscure past. However, in my opinion, their interpretation on refurbished Foucaultian standards bears a certain number of significant historical flaws : first, it ignores the age old contribution of medicine to the spreading of the Platonic paradigm in biology ; two, it lacks supporting evidence ; three, it is based on too imprecise a concept of rhythm to be accurate ; finally, it is topped by a questionable historical interpretation which makes it disregard the contemporary extension of metric and idealist conceptions of rhythm, which simultaneously diffused traditional if not reactionary theoretical conceptions. Since I have already presented in chapter 1 and 2 the contribution of medicine to the modern theory of rhythm, I won't repeat it here. I will concentrate on the two other points.

Rhythm in the Living ? The Missing Evidence

Unless I am mistaken, there is not a single mention of the term rhythm in any of the plentiful original texts Wellmann

provides the readers with, except in two occurrences to which I will return very soon. Every time she claims that rhythm is involved, she actually projects her own analytical categories on the texts or the pictures she is commenting. As a matter of fact, Wellmann herself recognizes it.

To speak of an episteme of rhythm does not entail the use of the word rhythm in contemporary treatises. In fact, the term "rhythm" became a biologic-medical term only around 1900. (Wellmann, 2010, p. 116, my trans.)

Development has thus become a structure of time, which I call rhythm. (Wellmann, 2010, p. 373, my trans.)

Whether in the 18th century with Wolff (1734-1794), or straddling over the 1800 limit with Reil (1759-1813), Kielmeyer (1765-1844), Döllinger (1770-1841), Rudolphi (1771-1832) and Treviranus (1776-1837), or even late in the 19th century with Pander (1794-1865) and Baer (1792-1876), the new life scientists did use such concepts as :

- *repetition and series* e.g. in Wolff's *Über die Bildung des Darmkanals im bebrüteten Hünchen*, 1768 (quoted p. 131, 132).

- *succession of change*, e.g. in Kielmeyer's *Ideen zu einer allgemeinen Geschichte und Theorie der Entwicklungserscheinungen der Organisationen*, 1795 (quoted p. 180).

- *periodic change*, e.g. in Reil's *Von der Lebenskraft*, 1795 - (quoted p. 174, 175).

- *revolution and spiral*, e.g. in Treviranus' *Biologie, oder Philosophie der lebenden Natur für Naturforscher und Ärzte*, 1802-183 (quoted p. 180).

- *regular time moments and oscillations*, e.g. in Döllinger's *Was ist Absonderung und wie geschieht sie ?*, 1819 (quoted p. 187).

- *manifold cycle*, e.g. in Lucas' *Grundriß der Entwicklungsgeschichte des menschlichen Körpers*, 1819 (quoted p. 181).

- *periodicity*, e.g. in Rudolphi, *Grundriss der Physiologie*, 1821 (quoted p. 181).

- *regularity*, e.g. in Burdach's *Die Physiologie als Erfahrungswissenschaft*, 1826 (quoted p. 179).

However, they never used the term rhythm except in a very few cases. The first is in one of Döllinger's studies dated 1819.

In the meantime, I watched a single grain [in blood circulation], that remained on its course, distant from others similar to it, and that seemed to have been hanged with one of its dull tips, for it floated from time to time on the opposite side, and this exactly according to the rhythm of the blood flow [*genau nach dem Rhythmus des Blutströhmens*]. (Döllinger, *Was ist Absonderung und wie geschieht sie ?* 1819 - quoted p. 188, my trans.)

The second is a quote from Baer's *Nachrichten über Leben* dated 1866.

The organic life, on the other hand, could only be understood as an order of time, measured according to its own, inherent temporality. For this reason, Baer compared below the forms of the life processes to music, more precisely to the rhythm. The "organic life-process," he said, "develops by continually building the body upon itself by absorbing in it the simple substances of external nature. But it shapes the body and builds it according to its own type and rhythm." (quoted p. 188, my trans.)

However, in the first quote, Döllinger refers to a very common use in medicine to denote the pulse that has, moreover, no relation with the developmental process he is otherwise describing. And in the second, Baer is only using a banal metaphor borrowed from music.

Ironically, Wellmann's study provides overwhelming evidence that the German life scientists considered, at least until the last decades of the 19th century, that the term rhythm "which naturally they knew quite well and employed in other contexts" was not fit to describe the new developmental phenomena that they were discovering. Therefore, she is most unconvincing when she claims that "although Reil did not use the word rhythm, there is no doubt that he had in mind the rules of organic rhythm organization." (Wellmann, 2010, p. 174, my trans.)

Rhythm in the Living ? An Imprecise Concept

Concerning the concept of rhythm itself, while reading Wellmann's study, one sometimes feels that she is not far from the complex idea of *rhuthmos* that was partly re-elaborated in the 18th century. Especially when she deals with literature, she rightly notes the intertwining of language and thought, sounds and concepts, for example in Hölderlin's theory of rhythm.

Language, sound and thought must be brought together ; on their own each one of these aspects is incomplete. Hölderlin put thinking under the conditions imposed by language sounds at the center of his reflections. (Wellmann, 2010, p. 44, my trans.)

Simultaneously, she introduces concepts such as "system" and "interaction" (*Wechselwirkung*) that are essential features in the new conception of rhythm. For Moritz,

the peculiarity of rhythm pertains to its *dual* structure : on the one hand, each individual element of the rhythm makes a complete, self-contained entity. Where the mind evaluates, hierarchizes and prioritizes, the sensation constitutes in return equality. On the other hand, the individual member becomes meaningful only in relation to all other rhythmic series. (Wellmann, 2010, p. 58, my trans.)

But because she holds the flatly historicist and empiricist view that a historian must not start from a definite concept

of rhythm but from the concept(s) of the period she studies (Wellmann, 2010, p. 31) and because she unfortunately knows very little about the research on rhythm that has been going on in poetics, sociology, philosophy and history in France since the 1970sâ€”Foucault is scarcely quoted, Barthes and Lefebvre don't show up at all, Deleuze and Meschonnic are disposed of in a few lines, Sauvanet's and my own research are ignoredâ€”most of the time she uses a quite confusing definition of rhythm in which metric and *rhuthmic* elements are placed on the same level.

The core elements of rhythmâ€”such as repetition, variation, regularity, period, modification, change, relationâ€”are also the key elements that characterized the new Episteme of organic development around 1800. (Wellmann, 2010, p. 31, my trans.)

Worse : as it often happens, the empiricist claim hides an unconscious bias. Far from being completely open to the data, she looks, in her first three chapters and in the chapter dedicated to Goethe, at poetry, art and language mainly from the life science perspective and projects on them a rather poor biological concept of rhythm that finally comes down, as one sees in the last part of the book, to time proportions, which is an old concept borrowed from medicine, and series, periods and cycles, which are in tune with the development of rhythm as beat and waves that we observed in medicine since the 16th century. For Reil and subsequently for Pander and Baer she notes the following.

The organism is changing continuously. Cycles, periods and time proportions, day and night, seasons and disposition of vitality are descriptions for the rhythmic structure of the temporal change, to which the organism is subjected. (Wellmann, 2010, p. 182, my trans.)

In Pander's and Baer's works, with which modern embryology began after 1800, we find, as in Herold's, the series as the image form, paradigmatic until today for the reference structure of images and canonical for the representation of development. (Wellmann, 2010, p. 307, my trans.)

One then understands why, on the one hand, her survey of literature, art theory and poetics of the end of the 18th century flattens, with a few exceptions, the difference between life science and arts, nature and culture, the rhythmic features of the latter and those of the former. Klopstock's, Moritz's and Schlegel's contributions are completely misunderstood by overplaying the equivalence of biological and poetic categories they indeed sometimes referred to.

Klopstock is interesting as a transitional figure because on the one hand he still recorded and continued to expand classic rhythm theories, but on the other hand he partly developed a physiological idea of rhythm. This new turn is even clearer by Friedrich Hölderlin, both in his theory of "exchange of sounds" and in his reflections on the good and wrong paths of "arts and education drives." Even Karl Philipp Moritz's concept of autonomy of artistic productions followed the rhythmic order of nature. Moritz exemplified its autonomy aesthetics with language which, precisely because it is rhythmic, becomes poetry and therefore work of art. Just as the rhythmic movement is the law of development of poetic language, so the rhythmic movement in the organic world is the law of development of the new emerging life. A few years later August Wilhelm Schlegel formulated an anthropological theory of rhythm, in which the poetry was not understood as an expression of human artistic skill, but on the contrary of the basic physiological nature of man. The arts remained according to Schlegel, in their most elaborate form as well, attached to the physiology of the body, and rhythm was their fundamental ordering structure. (Wellmann, 2010, p. 34, my trans.)

This misleading approach explains, on the other hand, why Wellmann sees Novalis's and Schelling's cosmic neo-Platonic speculations as perfect examples of the new artistic rhythm theories of the time.

In Novalis' universal poetry too was rhythm that order, after which the nature was perpetually reshuffled, but also man integrated the segmented knowledge of disciplines into an ever-changing image of the world. [...] Schelling is important for my argument because in his system rhythm has the key function to merge the spheres of art and nature together : with rhythm art is provided with a concept that nature presents as it is in its very nature. Conversely, with rhythm nature is provided with a means to alienate itself into the forms of art. (Wellmann, 2010, p. 34, my trans.)

Handicapped by her gross empiricism and her lack of knowledge concerning modern research on rhythm, Wellmann has no means to discern the real meaning of the emerging biological conception of rhythm that she wrongly considers as generalizable and when she comes to literature and art, she misses the most productive ideas of the epoch—those of Moritz, Goethe, Schiller, Schlegel, Hölderlin—while paradoxically overvaluing those of Novalis and Schelling which are wrongly aligned with their predecessors and will eventually support the cosmic or technical views of rhythm.

The Erasure of the Rhythmological Conflicts

The last vexing question raised by Wellmann's essay concerns her endorsement of the a-rhythmic or even anti-rhythmic Foucaultian notion of "episteme" itself. A few remarks come here to mind.

1. The notion of "episteme" loses most of its meaning once it has been separated from its twin concept, the "epistemic break," which certainly was never explained by Foucault but gave to it rigor and theoretical sharpness.
2. There is a tension between the concept and its use, which only gives a more modern look to what was called in the days of historicist conceptions of history, "the spirit of an era," but still paradoxically induces seeking a tipping point between two periods between which numerous continuities have been rightfully shown (e.g. Wellmann, 2010, p. 373).
3. Last but not least, the endorsement of the notion of episteme favors the erasure of the theoretical conflicts specific to this period, not of course the scientific controversies that Wellmann very accurately recalls but these more secretive theoretical conflicts that divide the past as much as the future.

This leads us to the last problem raised by Wellmann's essay : the idea that a "Rhythm Episteme" would have emerged in the West around 1800 is not only largely exaggerated but it also blurs the real evolution of rhythm theories in Modern Times. Inspired by a part of Foucault's work that, at least in my opinion, has proved obsolete—its structuralist part—it abusively disregards the continuous spreading of the Platonic paradigm since the Renaissance, whose remarkable dynamism we realized when we analyzed the contribution of Modern medicine to rhythmology. It also erases the fierce conflict that started precisely in the early years of the 19th century between the rhythmologies directly inspired by poetic and artistic experience, and those of medical, biological, metric, or philosophical origin, which dominated the epoch thanks to the growing symbolic power of Technique, Science and Idealism. As we will see in the next chapter, due to the very progress of the new metrics initiated by Hermann and the philosophies of Schelling and Hegel, which converged with those made in medicine, embryology and physiology, the contributions

brought by the philologists and poets of the last decades were repelled and pushed into the background.

For, if it is clear that embryology as it developed in the 18th century, was not unrelated to a key point made in the *Rêve de d'Alembert*, where Diderot, precisely, takes the egg as a paradigmatic example of a forming process, that is to say, a process which makes shapes appear without having to assume any already existing or eternal form, the serial, cyclic and periodic definition of rhythm that Wellmann adopts is utterly at odds with the holistic and interactional conception assumed by Diderot in his reflection on hieroglyph, manner and role (above chap. 3 and Michon, 2015a), as well as to the subsequent German Romantic contributions (above chap. 4 and Couturier-Heinrich, 2004).

Contrary to Diderot's or the German Romantics' analyses of poetic, pictorial or theatrical rhythms, which always presuppose a duration whose intensity certainly varies but remains continuous, the serializing of images studied in Wellmann's chap. VII representing the successive moments of weapons handling, army maneuvering, court dancing, artifacts crafting or embryo evolution, shows a duration structured by a series of "strong times" (observed phases) and "weak times" (unobserved interphases), whose frequency is determined at least in the case of the embryo in a strictly metric way (the number of days, hours, etc.).

This new imaging technology was for Herold the image series. In the serial representation appeared for the first time the change itself. Development revealed itself no longer through a single image, but in the relation of images. The organic change was no longer one impossible to watch but one that could only be brought to light by investing a series of images : it was taking place in the images as well as between them. Now the sequence of images, the alternation of interspaces and representations, fullness and emptiness, represented and not represented, constituted development. (Wellmann, 2010, p. 306, my trans.)

One will compare the complexity of Diderot's analysis of pictorial image in the *Salons*, his very ornate description of the circuits of pleasure and truth, with these forms of teaching or truth extraction subjected to absolute control by the power of the gaze and a drastic reduction of meaning complexity.

Moreover, whereas artistic rhythms convert the powers that come from bodies and groups in innovative and shareable forces, so that they produce something new, some history, some *trans-subject*, biological rhythms simply structure the expression of vital forces with no other consequences than the reproduction of the species (*vis essentialis corporis* in Wolff). In short, these are only operating rhythms that have no explosive character.

Finally, while poetic, artistic and theatrical rhythms will remain in the 19th and 20th centuries liberating or at least transformative powers, the serializing methods increasingly used by life sciences will help standardize scientific description and grasp the becoming in an analytical manner. They will quickly get into consonance with the industrial revolution, the development of technique and capitalism, and offer new means to penetrate, control and master human bodies (Hopwood, Schaffer & Secord, 2010). There is actually nothing in common between these opposite rhythmological conceptions, except the gross net thrown on one and the other by the analyst.

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In short, the idea that after 1800 a "Rhythm Episteme" has dominated the whole Western knowledge has too many serious flaws and must be rejected : it takes no account whatsoever of the ancient contribution of medicine to the spreading of the Platonic paradigm ; it lacks factual basis, to say the least ; it resorts to much too imprecise a concept of rhythm which is reduced to the notions of series, cycle, and period ; finally, it erases the acute conflict that broke

out, in the early years of the 19th century, between the poetic and artistic rhythmologies, inspired by a common neo-Heraclitean, neo-Democritean and neo-Aristotelian viewpoint, and the medical, biological, metric or philosophical rhythmologies, that quickly established their domination based on neo-Platonic models. From 1800-1805 until the mid-1860s, the reflection on rhythm, with a very few exceptions, was no longer irrigated by artistic experience but subjected to abstract metric theories, Idealist philosophies, medical and natural sciences.