

Riccardo Valenti

## Exploring *The Origin of Geometry* Through an Enactivist Lens: An Inquiry into Diachronic Group Formation and Collaborative Dynamics in Real-Time and Phase-Delayed Interactions

### Introduction. Key Claims and Expected Outcomes

This essay examines Edmund Husserl's account of the historical and intersubjective formation and transmission of sense, as presented in the *Origin of Geometry*<sup>1</sup>. To illuminate these features, I draw on recent developments in enactivist philosophy, in particular the theory of participatory sense-making<sup>2</sup>. I argue that the diachronic and interactive unity of geometry is, for Husserl, the very condition for the constitution and maintenance

<sup>1</sup> E. Husserl, *The Crisis of European Sciences and Transcendental Phenomenology*, tr. D. Carr, Evanston, Northwestern University Press, 1970, pp. 353-378. The *Origin of Geometry* is the third appendix of the ninth paragraph of the *Crisis* (Hua VI: *Die Krisis der Europäischen Wissenschaften und die Transzendente Phänomenologie. Eine Einleitung in die Phänomenologische Philosophie*, hrsg. W. Biemel, 2. Aufl., Bd. VI, Haag, Martinus Nijhoff, 1962, pp. 365-386). It was written in 1936. Here Husserl actively engages with the problem of transcendental and scientific historicity. This appendix serves as a compendium for a dense passage in which Husserl criticises the mathematisation of nature, as he believes Galileo had initiated it from the dawn of modernity. Following a top-down strategy, Husserl seeks to reach the origins of sense-making by showing how the process of idealisation is rooted in the coordinates of the *Lebenswelt*. The *Origin of Geometry* discusses precisely how geometry may serve as an exemplary case for his argument. This text aroused lively interest from the outset: in 1939 Eugen Fink first edited *Die Frage nach dem Ursprung der Geometrie als intentional-historisches Problem*. Thanks to Derrida's French translation, the *Origin* later became widely known in France. Yet Merleau-Ponty had already commented on the text between 1959 and 1960, during his lectures at the Collège de France, a few years before Derrida's version was published. Another author who repeatedly returned to this text was Bernard Stiegler, who discussed it extensively in his three volumes of *Technics and Time*. Our work will also draw on the reflections of these authors and commentators to rehearse the questions raised by the *Origin*.

<sup>2</sup> H. De Jaegher, E. Di Paolo, "Participatory Sense-Making. An Enactive Approach to Social Cognition", *Phenomenology and the Cognitive Sciences*, 6, 2007, pp. 487-507.

of the “community of monads,”<sup>3</sup> “transcendental intersubjectivity,”<sup>4</sup> or the “transcendental We,”<sup>5</sup> that is, the collective foundation and joint commitment of successive generations of geometers. At the same time, only this cooperative obligation—together with its transcendental dimension—can account for the epistemic harmony of geometry as such.

This communal union, Husserl contends, is disclosed only in the temporal unfolding of scientists’ participatory activity, whose collaborative pattern can be grasped through the concepts of sedimentation and reactivation of sense. Geometry and its theorems are therefore a matter of construction, continuous discovery, and intersubjective refinement. Such an effort cannot be compressed into the work of a single geometer, nor entrusted to a single generation alone. Rather, the notions of sedimentation and reactivation point to the constant renewal and continuation of this scientific task as a collective enterprise linking past, present, and future geometers<sup>6</sup>. In the *Origin of Geometry*, institution, sedimentation, and reactivation of sense are inseparable from the technical support of writing. Writing secures the omni-temporal validity of meaning and renders geometrical contents transmissible across indefinite generations of interpreters. Ultimately, Husserl holds that the transcendental value of writing is decisive for understanding the mutual constitution of geometry and geometers in the synergistic process of their joint formation.

## 1. Historical and Intersubjective Features of Sense Formation and Transmission

Husserl holds that knowledge can only be historically and intersubjectively discovered, revealed by groups of scientists working as members of a collective enterprise<sup>7</sup>. As originaive products of the *Lebenswelt*—the

<sup>3</sup> “Monadengemeinschaft” (E. Husserl, *Cartesianische Meditationen und Pariser Vorträge*, hrsg. und eingel. von S. Strasser, 2. Aufl., Haag, Martinus Nijhoff, 1963, p. 158).

<sup>4</sup> “transzendentaler Intersubjektivität” (ibid.). Cf. E. Husserl, *Cartesian Meditations. An Introduction to Phenomenology*, tr. D. Cairns, Dordrecht, Springer, 1977, p. 130; id., *Zur Phänomenologie der Intersubjektivität. Texte aus dem Nachlass. 3, 1929-1935* (Hua XV), hrsg. von I. Kern, Haag, Martinus Nijhoff, 1973, p. 16.

<sup>5</sup> B. Stiegler, *Technics and Time, 1. The Fault of Epimetheus*, tr. R. Beardsworth, G. Collins, Stanford, Stanford University Press, 1998, p. 229.

<sup>6</sup> E. Husserl, *Die Lebenswelt. Auslegungen der Vorgegebenen Welt und ihrer Konstitution. Texte aus dem Nachlass (1916–1937)* (Hua XXXIX), hrsg. von R. Sowa, Dordrecht, Springer, 2008, pp. 348, 359.

<sup>7</sup> Cf. W. Goris, “L’a priori historique chez Husserl et Foucault (I). La pertinence philosophique d’un concept directeur de l’épistémologie historique”, tr. J. Farges, *Philosophie*, 4 (123), 2014, p. 20; D. Pradelle, *Généalogie de la raison*, Paris, Presses Universitaires de France, 2013, p. 295.

lifeworld he discusses in the *Crisis*—geometrical theorems emerge through the sensible and historical unfolding of research<sup>8</sup>. What is unknown, for Husserl, is historically constituted by individuals operating within a community of geometers<sup>9</sup>. The *Origin of Geometry* underscores the decisive role of language and writing in the formation and dissemination of cumulative human culture<sup>10</sup>. Writing makes cultural institutions intelligible for a linguistic community and transforms history and its contents into a transcendental feature. Although geometrical content has always been valid—the Pythagorean theorem, for example, does not begin or cease to be true—its constitution and maintenance within a community of knowers depends on a “historical a priori,”<sup>11</sup> concerning both its first manifestation and its intersubjective confirmation<sup>12</sup>. Such features are only possible through cumulative techniques of historical formation, which provide continuity across temporal transitions and secure conceptual deposits.

In the *Origin*, Husserl highlights the role of other subjects in shaping, facilitating, and preserving this constructive yet always incomplete process of knowledge formation, made possible by language and writing. Language, he argues, attains enduring validity only when expressed in writing. This is especially clear in geometry, where theorems and demonstrations must be documented in writing in order to be understood and handed down within a living “tradition”<sup>13</sup> that links past, present, and future contributors through this technical medium<sup>14</sup>. The objective ideality of geometry, as Husserl conceives it, is attainable only once

<sup>8</sup> We should not interpret geometry in a narrow sense here. As Husserl states, he intends geometry as a comprehensive “title” that includes “all disciplines that deal with shapes existing mathematically in pure space-time” (E. Husserl, *The Crisis of European Sciences and Transcendental Phenomenology*, cit., p. 354). In continuity with this statement, I employ the term “geometers” in a broad sense to designate the various individuals engaged in the constitution of these disciplines.

<sup>9</sup> Although Husserl occasionally refers to an “inventor” of geometry, i.e., an individual discovering its theorems, this does not compromise the primacy of intersubjectivity that he maintains in his account of geometrical institutions. Truth contents must be expressed in order to acquire a “geometrical existence”; they cannot remain confined to the purely “mental space” of single individuals (E. Husserl, *The Crisis of European Sciences and Transcendental Phenomenology*, cit., p. 356).

<sup>10</sup> Cf. E. Husserl, *Zur Phänomenologie der Intersubjektivität*, cit., pp. 218–226.

<sup>11</sup> E. Husserl, *The Crisis of European Sciences and Transcendental Phenomenology*, cit., p. 372; L. Landgrebe, “Médiation sur le mot de Husserl: « L’histoire est le fait majeur de l’être absolu »”, *Philosophie*, 3 (110), 2011, p. 41; D. Pradelle, “La constitution des idéa-lités est-elle une création?”, *Les Études philosophiques*, 2 (85), 2008, p. 236.

<sup>12</sup> R. Shain, “Derrida, Husserl, and the Problem of Prior Sense”, *Cosmos and History: The Journal of Natural and Social Philosophy*, 12 (1), 2016, pp. 292–308.

<sup>13</sup> L. Landgrebe, “Médiation sur le mot de Husserl”, cit., p. 10.

<sup>14</sup> E. Fink, *Sixth Cartesian Meditation. The Idea of a Transcendental Phenomenology*, tr. R. Bruzina, Bloomington–Indianapolis, Indiana University Press, 1995, pp. 174–176.

written, that is, once its meaning has become sedimented and shareable across space and time, recoverable and reactivable in different historical moments. Geometry and the ongoing idealisation of its findings are therefore permanently under construction and always “perfectible.”<sup>15</sup> The process of idealisation follows the temporal rhythm of a “continuous synthesis” of past and new “acquisitions,” a process that would remain incomprehensible without acknowledging its “persisting manner of being.”<sup>16</sup> Only writing secures this persistence, making further theoretical progress possible.

As Derrida and Stiegler have both stressed in their readings of the Origin, writing makes geometers what they are: inheritors and continuers of an institution of perennial knowledge transmission. Geometers thus form a broader cultural community through writing’s passive “communal”<sup>17</sup> sedimentation and reactivation, made possible by the technical act of fixing content in readable form. Such contents may be retrieved by future geometers from the work of past ones, surviving their creators and transmitted across generations<sup>18</sup>. The temporally distributed action of these geometers also contributes to the ongoing constitution of geometry: a sociogenetic yet inherently incomplete cultural process whose temporal and conceptual “solidarity”<sup>19</sup> exceeds the rigid boundaries of immediacy and intuition<sup>20</sup>. This given, Husserl supports a complementary form of cooperation in his understanding of the infinite, teleological task of geometry and of geometers—a task that resonates with the enactivist account of participatory agency<sup>21</sup>. For Husserl, geometers do not sim-

<sup>15</sup> Y. Thierry, *Conscience et humanité selon Husserl*, Paris, Presses Universitaires de France, 1995, p. 94.

<sup>16</sup> E. Husserl, *The Crisis of European Sciences and Transcendental Phenomenology*, cit., p. 355.

<sup>17</sup> L. Landgrebe, “Médiation sur le mot de Husserl”, cit., p. 38; E. Husserl, *Cartesian Meditations. An Introduction to Phenomenology*, cit., p. 120; id., *Die Lebenswelt. Auslegungen der Vorgegebenen Welt und ihrer Konstitution. Texte aus dem Nachlass (1916–1937)* (Hua XXXIX), cit., p. 297.

<sup>18</sup> As will be more apparent in the third paragraph of this text, writing as technics also constitutes them as geometers-writers. Indeed, as in the “chain of generations” composing the diachrony of meaning transmission, writing appears to Husserl as the only tool enabling the formation of what Stiegler would later call the cross-generational “community of geometers” (B. Stiegler, *Technics and Time, 2. Disorientation*, tr. by the Board of Trustees of the Leland Stanford Junior University, Stanford, Stanford University Press, 2009, p. 230).

<sup>19</sup> E. Housset, *Personne et sujet selon Husserl*, Paris, Presses Universitaires de France, 1997, p. 179.

<sup>20</sup> Reading the Husserlian text, Merleau-Ponty defines geometry in his course at the Collège de France as “the integral of a series of cumulative advances” (M. Merleau-Ponty, *Husserl at the Limits of Phenomenology. Including Texts by Edmund Husserl*, tr. L. Lawlor, B. Bergo, Evanston, Northwestern University Press, 2001, p. 36).

<sup>21</sup> Cf. E. Husserl, *The Crisis of European Sciences and Transcendental Phenomenology*, cit., p. 378; id., *Zur Phänomenologie der Intersubjektivität. Texte aus dem Nachlass. 3*,

ply collaborate synchronically in founding knowledge, since synchrony as the mere sum of concurrent efforts cannot account for the temporal duration of geometrical transformation, made possible only through writing, passive sedimentation, and active reappropriation. This process must also be understood diachronically, in light of the constant evolution of a “structural truth,”<sup>22</sup> as Merleau-Ponty likewise emphasised.

Thus, in the *Origin of Geometry*, the *episteme* defended by Husserl is one that can only be historically and intersubjectively accomplished<sup>23</sup>. Moreover, this knowledge—conserved and retrievable through writing that links multiple temporal layers and successive generations of geometers—evolves precisely through temporal deferral, by virtue of its technical medium<sup>24</sup>. This, in turn, opens up a new and superior dimension of intersubjectivity, group composition, and epistemic responsibility<sup>25</sup>. To clarify this further, we shall now confront Husserl’s position with key insights from the contemporary enactivist debate on participatory sense-making.

## 2. “Processes over Individuals”, Diachrony Over Synchrony

In *The Origin of Geometry*, Husserl shows how ideal contents may be empirically grounded in the *Lebenswelt*, that is, how they may first arise, be created, and take shape within the sensible field of knowledge<sup>26</sup>. According to this view, the ideal contents of geometry emerge in temporality

1929–1935 (Hua XV), Haag, Martinus Nijhoff, 1973, pp. 378–386; W. Casement, “Husserl and the Philosophy of History”, *History and Theory*, 27 (3), 1988, p. 235.

<sup>22</sup> M. Merleau-Ponty, *Husserl at the Limits of Phenomenology. Including Texts by Edmund Husserl*, cit., p. 52.

<sup>23</sup> E. Husserl, *Zur Phänomenologie der Intersubjektivität. Texte aus dem Nachlass. 3, 1929–1935* (Hua XV), cit., pp. 407–413; D. Pradelle, *Généalogie de la raison*, cit., p. 296.

<sup>24</sup> Y. Thierry, *Conscience et humanité selon Husserl*, cit., p. 97.

<sup>25</sup> I will also draw on Merleau-Ponty, Derrida, and Stiegler’s observations to support this point. However, to my knowledge, Don Ihde is the only author who has explicitly introduced diachrony into the phenomenological or post-phenomenological debate in an original sense. In *Husserl’s Missing Technologies*, Ihde argues that a large-scale phenomenon such as the greenhouse effect is only “diachronically” detectable, since its consequences can be fully understood only by considering “temperature measurements” that are “a few centuries old” and thus exceed the intuitive measurements of a single lifetime (D. Ihde, *Husserl’s Missing Technologies*, New York, Fordham University Press, 2016, p. 80). To grasp this, one must adopt an “instrumental embodied science,” i.e., an “instrumentation” of “primary perception” (ibid., pp. 80, 82), which renders such transgenerational phenomena observable. As we will see, this also holds true for the relation between language and writing, as clarified by the case of *Dokumentierung* in the *Origin of Geometry*.

<sup>26</sup> M. Rhéaume, “Husserl, la signification et la morsure du temps”, *Philosophie*, 2 (131), 2016, pp. 47–49.

while referring to eternal principles of epistemic validity. Their discovery is only possible through the passage of time and the joint effort of many individuals cooperating in this task<sup>27</sup>. Although imperishable, geometrical theorems are nonetheless discovered and invented anew by geometers working together to consolidate their meaning. Because of this ceaseless constitution and continuous revision, they always require intersubjective validation. In the *Origin*, this process of revision is precisely what makes geometry what it is: for Husserl, a transcendental, historical, and modifiable artefact that no solitary geometer could create ex nihilo.

This constitutes the main point of contact between Husserl's account of intersubjectivity and enactivism. According to the dynamics of "joint sense-making,"<sup>28</sup> individual agents cannot perform complex tasks entirely "by themselves"; rather, such tasks can only be accomplished "through interaction" with others in "high-level"<sup>29</sup> collaborative schemes. For De Jaegher, the kind of "interaction" at stake here is not "reducible to individual actions or intentions" but "installs a relational domain with its own properties."<sup>30</sup> Husserl's geometry may thus be taken as a compelling example of the "exemplary significance"<sup>31</sup> of such a joint-venture model and its relational autonomy. The relational domain of geometrical construction links many geometers in the performance of their proofs and calculations, much as a musical sonata brings together "musicians" who only make sense of the piece "while playing."<sup>32</sup> Yet geometry, like music, also binds its participants diachronically: different generations of geometers or performers take turns in the same progressive and cumulative cultural composition.

By diachrony, I mean a non-simultaneous temporal dimension in which sense is constituted through the successive and cumulative contributions of multiple geometers. In this respect, *The Origin of Geometry* highlights the revolutionary notion of a "historical a priori," which, for Husserl, encompasses "everything that exists as historical becoming

<sup>27</sup> W. Goris, "L'a priori historique chez Husserl et Foucault (I). La pertinence philosophique d'un concept directeur de l'épistémologie historique", cit., p. 21.

<sup>28</sup> T. Fuchs, H. De Jaegher, "Enactive Intersubjectivity: Participatory Sense-Making and Mutual Incorporation", *Phenomenology and the Cognitive Sciences*, 8, 2009, p. 477.

<sup>29</sup> H. De Jaegher, "Social Understanding through Direct Perception? Yes, by Interacting", *Consciousness and Cognition*, 18, 2008, pp. 536, 541.

<sup>30</sup> H. De Jaegher, "Making Sense in Participation: An Enactive Approach to Social Cognition", in F. Morganti, A. Carassa, G. Riva (eds.), *Enacting Intersubjectivity*, Amsterdam, IOS Press, 2008, p. 39.

<sup>31</sup> J. Blomberg, "Interpreting the Concept of Sedimentation in Husserl's Origin of Geometry", *Public Journal of Semiotics*, 9 (1), 2019, p. 81; Y. Thierry, *Conscience et humanité selon Husserl*, cit., p. 93.

<sup>32</sup> T. Fuchs, H. De Jaegher, "Enactive Intersubjectivity: Participatory Sense-Making and Mutual Incorporation", cit., p. 470.

and having-become or exists in its essential being.”<sup>33</sup> He introduces this idea through the concept of “sedimentation,”<sup>34</sup> which designates precisely this process. The “co-consciousness”<sup>35</sup> of what is “constructed through human activity” and through boundless sedimentation, Husserl argues, “implies a continuity of pasts which imply one another,”<sup>36</sup> a permanence that corresponds to the cultural endurance sedimentation aims to capture. History, thus understood, is “nothing other than the vital movement of the coexistence and interweaving of original formations and sedimentations of meaning,”<sup>37</sup> as is the case with geometry as a collective enterprise of knowledge. Such sedimentations are indispensable for meaning to be “stabilized and communicable across space and time,” for they provide “the historical process spanning generations”<sup>38</sup> of geometers.

This brings us to a crucial claim defended in this essay: diachrony plays a distinctive role in joint actions such as geometry. While language, as the most basic means of communication, allows geometers to “intersubjectively share”<sup>39</sup> discoveries in the immediacy of the present, Husserl argues that only writing allows geometry to constitute itself as such, shaping a genuine “scientific community.” Writing ensures that messages can be recovered and transmitted, enabling them to “pass beyond the individual act and become a cultural object”<sup>40</sup> that compels recognition across time. In Husserl’s terms, it is this “linguistic embodiment,” writing, that makes the ideality of geometry “valid” and “understandable by all.”<sup>41</sup> It forms an “ideal construction” that can “be understood for all future time and by all coming generations of men and thus be capable of being handed down and reproduced with the identical meaning,” thereby creating an ideal construction “valid with unconditioned generality for all men, all ti-

<sup>33</sup> E. Husserl, *The Crisis of European Sciences and Transcendental Phenomenology*, cit., p. 372.

<sup>34</sup> R. D’Amico, “Husserl on the Foundational Structures of Natural and Cultural Sciences”, *Philosophy and Phenomenological Research*, 42 (1), 1981, p. 11.

<sup>35</sup> “mitbewußt” (E. Husserl, *Die Krisis der Europäischen Wissenschaften und die Transzendente Phänomenologie* [Hua VI], cit., p. 379).

<sup>36</sup> E. Husserl, *The Crisis of European Sciences and Transcendental Phenomenology*, cit., p. 371; id., *Cartesian Meditations. An Introduction to Phenomenology*, cit., pp. 125-126.

<sup>37</sup> Ibid.

<sup>38</sup> J. Blomberg, “Interpreting the Concept of Sedimentation in Husserl’s *Origin of Geometry*”, cit., pp. 79, 81.

<sup>39</sup> Ibid., p. 84.

<sup>40</sup> R. D’Amico, “Husserl on the Foundational Structures of Natural and Cultural Sciences”, cit., p. 12; cf. E. Husserl, *Die Lebenswelt. Auslegungen der Vorgegebenen Welt und ihrer Konstitution. Texte aus dem Nachlass (1916–1937)* (Hua XXXIX), cit., pp. 159-160.

<sup>41</sup> E. Husserl, *The Crisis of European Sciences and Transcendental Phenomenology*, cit., p. 358; M. Merleau-Ponty, *Husserl at the Limits of Phenomenology. Including Texts by Edmund Husserl*, cit., p. 57.

mes, all peoples.”<sup>42</sup> Through writing, more complex idealities are generated and preserved across multiple generations of geometers-writers. This establishes a diachronic and participatory dimension of sense-formation irreducible to the work of a single individual, group, or generation.

The same holds true for participatory sense-making as conceived by De Jaegher and Di Paolo. While synchronisation plays a key role in intersubjective engagement—just as language does for Husserl—it is not the only, nor the most refined, form of coordination<sup>43</sup>. As their analysis of in-phase and phase-delayed behaviour shows, De Jaegher and Di Paolo also stress the complementary importance of desynchronisation, i.e., the possible breakdown and subsequent re-adjustment of coordination between actors over time. Like Husserlian diachrony, desynchronisation foregrounds temporal deferral and distribution as indispensable for understanding the achievements of complex interactions, in which participants co-regulate their behaviour in a back-and-forth dynamic of mutual mirroring and revision. Geometrical meaning, similarly, is continually reshaped through emendation and reinterpretation. With these remarks in place, we can now turn to the textual evidence of the *Origin of Geometry* to substantiate this argument.

### 3. Group Composition and Maintenance Through Writing

As a collective enterprise, geometry requires intersubjective validation to establish its truths both synchronically and diachronically<sup>44</sup>. This validation becomes possible only once a geometer’s discovery is made visible to others<sup>45</sup>. Fellow geometers, whether contemporaries or successors, can read what has been inscribed in writing and corroborate its correctness, or else correct it without nullifying the sedimented, historical, and structural value of the contribution. Whether confirmed or refuted, the contribution remains part of the ongoing tradition precisely because it appears in a written document<sup>46</sup>. In this way, nothing new emerges except

<sup>42</sup> Ibid., p. 377.

<sup>43</sup> Cf. H. De Jaegher, E. Di Paolo, “Participatory Sense-Making. An Enactive Approach to Social Cognition”, cit., p. 491.

<sup>44</sup> Cf. J. Blomberg, “Interpreting the Concept of Sedimentation in Husserl’s *Origin of Geometry*”, cit., p. 82; J. Vioulac, *Science et révolution. Recherches sur Marx, Husserl et la phénoménologie*, Paris, Presses Universitaires de France, 2015, p. 164.

<sup>45</sup> Cf. E. Husserl, *Zur Phänomenologie der Intersubjektivität. Texte aus dem Nachlass. 2, 1921–1928* (Hua XIV), hrsg. von I. Kern, Haag, Martinus Nijhoff, 1973, pp. 136–137, 254.

<sup>46</sup> Cf. L. E. Cahoone, “The Interpretation of Galilean Science: Cassirer Contrasted with Husserl and Heidegger”, *Studies in History and Philosophy of Science*, 17 (1), 1986, p. 5; D. Pradelle, *Généalogie de la raison*, cit., pp. 297–298.

on the basis of prior knowledge. Developments occur discretely and only through the plurality of interpreters. Written truth-content implicitly refers to an unlimited community of receivers and senders, thereby situating itself within history. These interpreters constitute an ideal sequence of contributors who transcend the immediacy of the present, forming an enduring link with omni-temporal human knowledge and recognising themselves as part of this process teleologically.

As Husserl states in the *Origin of Geometry*, “every science is related to an open chain of generations, to those who work for and with one another, a chain precisely composed of researchers (...) who are accomplishing subjectivity of the whole living science.”<sup>47</sup> For Husserl, this claim applies to all epistemic contents, understood as inescapably geometrical constructions in which “scientific thinking attains new results based on those already attained, because the new ones serve as the foundation for still others (...) in the unity of a propagative process of transferred meaning.”<sup>48</sup> Each “stage”<sup>49</sup> of this construction and transfer of meaning contributes to the teleological project of geometry. Although geometry is a collective enterprise, it does not negate the autonomy of “every researcher,” who operates “on his part of building”<sup>50</sup> knowledge, while nonetheless keeping the larger goal in view. Here, “successive and superior meaning is grounded upon meaning,” as “the earlier meaning gives something of its validity to the later one” and “becomes part of it.”<sup>51</sup> According to Husserl, sciences are instituted and endure through history, passive sedimentation, and tradition, out of which arises an “activity of producing new structures of meaning” that in turn sediment and become “working materials”<sup>52</sup> for further inquiries.

Husserl emphasises the aprioristic role of history and technics in the formation and perpetuation of cumulative human culture. Complex

<sup>47</sup> Commenting on this passage, Merleau-Ponty speaks of an “open chain of researchers” whose “relationship” is possible via the verbal transmission of knowledge (M. Merleau-Ponty, *Husserl at the Limits of Phenomenology. Including Texts by Edmund Husserl*, cit., pp. 24, 26).

<sup>48</sup> E. Husserl, *The Crisis of European Sciences and Transcendental Phenomenology*, cit., p. 362; W. Goris, “La priori historique chez Husserl et Foucault (I). La pertinence philosophique d’un concept directeur de l’épistémologie historique”, cit., p. 15.

<sup>49</sup> Ibid.; E. Husserl, *Zur Phänomenologie der Intersubjektivität. Texte aus dem Nachlass. 3, 1929–1935* (Hua XV), cit., pp. 593–596; id., *Die Lebenswelt. Auslegungen der vorgegebenen Welt und ihrer Konstitution. Texte aus dem Nachlass (1916–1937)* (Hua XXXIX), cit., pp. 319–320.

<sup>50</sup> Ibid.; cf. Y. Thierry, *Conscience et humanité selon Husserl*, cit., p. 111.

<sup>51</sup> The rising ideality content “supports itself on the landmark of inherited geometry and its oldest forms” for the sense here at stake “is undivided between us and the past” (M. Merleau-Ponty, *Husserl at the Limits of Phenomenology. Including Texts by Edmund Husserl*, cit., p. 28).

<sup>52</sup> Ibid., pp. 368–369; E. Husserl, *Zur Phänomenologie der Intersubjektivität. Texte aus dem Nachlass. 3, 1929–1935* (Hua XV), cit., pp. 510–513.

meanings can only develop through sedimentation and the cooperation of individuals across generations. Yet how do generations connect, initiating and continuing this open chain of research? How can a new generation recover and take over what the previous one achieved? Is oral language sufficient to enable such intergenerational coordination? For Husserl, it is not. Later generations of geometers can connect with their predecessors only through writing and reading—the fundamental technique of inheritance. Writing confers extension and stability upon what geometers aim to express. Unlike oral language, which enables only synchronic communication, writing allows for both synchronic and diachronic contact between generations of interpreters<sup>53</sup>.

Moreover, writing accomplishes more. The materiality of the support itself enables geometers-writers to form a community of contributors linked across generations in an uninterrupted diachronic unity<sup>54</sup>. This “supplement,”<sup>55</sup> as Derrida’s reading underscores, acquires a certain autonomy over the individuals who constitute it. Writing thus allows geometers to enter and remain within the field of contributors. Oral language alone is insufficient to establish this cultural dimension: it lacks the capacity to ensure enduring communication that outlives its speakers<sup>56</sup>.

<sup>53</sup> Cf. E. Husserl, *Cartesian Meditations. An Introduction to Phenomenology*, cit., p. 126. Stiegler clarifies this by speaking of a “technical continuity” of the “milieu” in which invention takes place (B. Stiegler, *Technics and Time, 1. The Fault of Epimetheus*, tr. R. Beardsworth, G. Collins, Stanford, Stanford University Press, 1998, p. 61). This concerns writing as a technical enhancement of memory and knowledge in general, once it reaches the stage of “exteriorisation” (B. Stiegler, *Technics and Time, 2. Disorientation*, cit., p. 54), thereby attaining a “new diachrony” of sense perseverance (ibid., p. 110). For Stiegler, diachrony allows human knowledge to be understood “in terms of the evolution of the living being and, beyond that, of the living being’s non-living creations,” as is the case for the transgenerational constitution of geometrical meaning (ibid., p. 163) and for their “undetermined” being (B. Stiegler, *Technics and Time, 3. Cinematic Time and the Question of Malaise*, tr. Board of Trustees of the Leland Stanford Junior University, Stanford, Stanford University Press, 2011, p. 163).

<sup>54</sup> Cf. J. Blomberg, “Interpreting the Concept of Sedimentation in Husserl’s *Origin of Geometry*”, cit., p. 82; J. Vioulac, *Science et révolution. Recherches sur Marx, Husserl et la phénoménologie*, cit., p. 164.

<sup>55</sup> J. Blomberg, “Interpreting the Concept of Sedimentation in Husserl’s *Origin of Geometry*”, cit., p. 90; J. Derrida, *Edmund Husserl’s Origin of Geometry. An Introduction*, cit., p. 88.

<sup>56</sup> E. Husserl, *The Crisis of European Sciences and Transcendental Phenomenology*, cit., p. 360; J. Derrida, *Edmund Husserl’s Origin of Geometry. An Introduction*, cit., pp. 87-88: according to Husserl, without “the ultimate objectification that writing permits, all language would as yet remain captive of the de facto and actual intentionality of a speaking subject or community of speaking subjects.” Conversely, “by absolutely virtualising dialogue, writing creates a kind of autonomous transcendental field from which every present subject can be absent” (ibid.).

As Husserl observes, what oral expression lacks is “the persisting existence of the ideal objects even during periods in which the inventor and his fellows are no longer wakefully so related or even are no longer alive,”<sup>57</sup> when the geometer can no longer demonstrate her discovery directly<sup>58</sup>. Writing, as a technical tool, enables geometers to sediment their findings, making them retrievable and reactivable when needed. Writing thus results in a process of “communalisation”<sup>59</sup> binding geometers together in their work. It is an “infiniteisation,”<sup>60</sup> a cultural and technical enhancement of our capacities that overcomes the “finitude of the individual and even the social capacity”<sup>61</sup> for storing and transmitting data. According to Husserl, the “important function of written, documenting linguistic expression is that it makes communications possible without immediate and mediate personal address,” rendering them “virtual”<sup>62</sup> and transmissible at any time.

“Through this,” that is, through writing, Husserl claims, “the communalisation of man is lifted to a new level”<sup>63</sup> of complexity—a level that oral transmission could never achieve. Writing permits the constitution of a composite “ideality that no one alone has ever thought,”<sup>64</sup> as Merleau-Ponty also argued. Writing allows content to be sedimented without losing its efficacy

<sup>57</sup> E. Husserl, *The Crisis of European Sciences and Transcendental Phenomenology*, cit., p. 360.

<sup>58</sup> Merleau-Ponty supports this interpretation, as Derrida will too a few years later. According to Merleau-Ponty, writing allows the extension of validity to what is no longer intuitively present; it ensures the “permanence of the ideal outside of all conversation” and this “even when the interlocutors are dead” (M. Merleau-Ponty, *Husserl at the Limits of Phenomenology. Including Texts by Edmund Husserl*, cit., pp. 24-25). “[T]exts”, i.e., written things, correspond to a “subterranean communication across time” and “convey their sense as an activity which has fallen into obscurity but which is reawakened and which can again be transformed into activity” (ibid., pp. 27, 29). Derrida echoes these considerations: in his lecture, writing assures the “absolute ideal objectivity” of the object itself (J. Derrida, *Edmund Husserl’s Origin of Geometry. An Introduction*, cit., p. 87). As he states in the Introduction, writing “will do this by emancipating sense from its actually present evidence for a real subject and from its present circulation within a determined community” (ibid., pp. 87, 91).

<sup>59</sup> E. Husserl, *The Crisis of European Sciences and Transcendental Phenomenology*, cit., p. 364; id., *Cartesian Meditations. An Introduction to Phenomenology*, cit., p. 128. “Vergemeinschaftung” (E. Husserl, *Die Krisis der Europäischen Wissenschaften und die Transzendente Phänomenologie* [Hua VI], cit., p. 374; cf. id., *Cartesianische Meditationen und Pariser Vorträge* [Hua I], p. 156). See also E. Husserl, *Zur Phänomenologie der Intersubjektivität. Texte aus dem Nachlass. 2, 1921–1928* (Hua XIV), cit., pp. 523-530, on the properties of “Paarung”.

<sup>60</sup> “Verunendlichung” (E. Husserl, *Die Krisis der Europäischen Wissenschaften und die Transzendente Phänomenologie* [Hua VI], cit., p. 375).

<sup>61</sup> Ibid., p. 365.

<sup>62</sup> Ibid., pp. 360-361.

<sup>63</sup> Ibid., p. 361; cf. E. Housset, *Personne et sujet selon Husserl*, cit., pp. 203-204.

<sup>64</sup> M. Merleau-Ponty, *Husserl at the Limits of Phenomenology. Including Texts by Edmund Husserl*, cit., p. 57.

in the present. In reading written signs, we reawaken what lies sedimented in books, transforming the original intentions of their authors and granting them new life and richer sense. Language embodied in writing does not, as Merleau-Ponty remarked, become “congealed speech,” a fixed possession; rather, it serves as the “transporter of meaning,”<sup>65</sup> making meaning meaningful. Sciences embodied in this way “are not handed down ready-made in the form of documented sentences”; instead, they involve “a lively, productively advancing formation of meaning, which always has the documented as a sediment of an earlier production.”<sup>66</sup> This living, participatory account of meaning ensures “continuity from one person to another” and, equally, “from one time to another,”<sup>67</sup> across successive generations of researchers<sup>68</sup>.

#### 4. Participatory Sense-Making. Interactive Synchronisation and Desynchronisation in Sense Formation

As we delve into geometric knowledge, whether through reading or writing, it becomes evident that we are not merely isolated individuals but

<sup>65</sup> Ibid., p. 78.

<sup>66</sup> E. Husserl, *The Crisis of European Sciences and Transcendental Phenomenology*, cit., p. 365.

<sup>67</sup> Ibid., p. 366.

<sup>68</sup> Commenting on the *Phenomenology of Internal Time-Consciousness*, Stiegler identifies a third form of retention, namely the “material inscription of memory in mnemotechnical systems” (B. Stiegler, *Technics and Time, 3. Cinematic Time and the Question of Malaise*, cit., p. 4), such as books or papers. This form of retention defines the “collective memory qua patrimony” (id., *Technics and Time, 1. The Fault of Epimetheus*, cit., p. 98), that is, a collective mnemonic possession and accountability. Patrimony is a historical feature that constantly expands as time goes on—and geometers, crucially, have historically contributed to its advancement. In the case of geometry, the heritage of culture does not coincide with a single momentary achievement but with the “enchainment” of geometrical evolution within the reference system (B. Stiegler, “Genèse d’une philosophie du dilemme phénoménologique. Sur le problème de la genèse dans la philosophie de Husserl de Jacques Derrida”, *Papiers du Collège International de Philosophie*, 14, 2007, p. 15). This enchainment enlarges the dimension of the present. Once again, such transformation is made possible through writing and the documentation it provides. Through writing, knowledge becomes accessible, historical, and immediately communal. Knowledge is transmitted to heirs for the realization of the “intersubjective transcendence” governing the “community of geometers” across the ages (B. Stiegler, *Technics and Time, 3. Cinematic Time and the Question of Malaise*, cit., p. 230; cf. M. Merleau-Ponty, *Husserl at the Limits of Phenomenology. Including Texts by Edmund Husserl*, cit., p. 47). This takes place through the formation of a “transcendental We” forged by “written expressions,” aiming at an ideal sense collectively shared by multiple subjects. To become a “We,” geometers must depart from “egological monadicity and finally find, in tertiary memory, a certain (re)constitutivity in which present-time-consciousness and past-past-time-consciousness can coincide” (B. Stiegler, *Technics and Time, 1. The Fault of Epimetheus*, cit., p. 229). This process leads to the constitution of larger cross-generational scientific communities, which surpass the contributions of individual researchers.

integral parts of a vast, cross-generational “community of scientists as a community of knowledge living in the unity of common responsibility.”<sup>69</sup> We share the obligation of preserving and advancing collective understanding without losing the “univocity of linguistic expression” and the duty of “taking over from others what is to be taken over”<sup>70</sup> in order to build new and consequent knowledge. Recognising our place within this continuum of geometric expertise instils a specific sense of belonging: we are not only readers and writers but also partners and heirs of geometrical meaning. This collective enterprise allows us to accomplish more than we could as individuals, underscoring geometry’s communal nature as a process of perpetual innovation. It embodies the “new level”<sup>71</sup> humanity has reached through writing and the transgenerational communalisation that it makes possible<sup>72</sup>. Thanks to the ongoing process of sedimentation and reawakening of meaning, we can, as Husserl notes, overcome the dangers of “vocational interruptions and time out for rest,” which otherwise expose “every researcher” to the “constant danger”<sup>73</sup> of losing meaning across generations.

It follows that the continuous, intersubjective synthesis of new attainments takes precedence over the individuals who contribute to its cultural development<sup>74</sup>. This is one of the most significant outcomes of group constitution and mutual comprehension through writing. Its technical instrumentality enables precisely this diachronic form of knowledge, sustained over time. As geometers, we understand our fellows’ actions within this practice and expect others to take the same responsibility that we assume in our work<sup>75</sup>. Writing makes such temporal linkage possible: through interruptions, sedimentation, and reactivation, new groups of researchers can retrieve and build upon the results of their predecessors.

<sup>69</sup> E. Husserl, *The Crisis of European Sciences and Transcendental Phenomenology*, cit., p. 362; id., *Cartesian Meditations. An Introduction to Phenomenology*, cit., p. 129; M. Rhéaume, “Husserl, la signification et la morsure du temps”, *Philosophie*, 2 (131), 2016, p. 51.

<sup>70</sup> *Ibid.*

<sup>71</sup> *Ibid.*, p. 361.

<sup>72</sup> Cf. E. Husserl, *Zur Phänomenologie der Intersubjektivität. Texte aus dem Nachlass. 2, 1921–1928* (Hua XIV), cit., p. 409.

<sup>73</sup> E. Husserl, *The Crisis of European Sciences and Transcendental Phenomenology*, cit., pp. 362–363; cf. id., *Zur Phänomenologie der Intersubjektivität. Texte aus dem Nachlass. 3, 1929–1935* (Hua XV), cit., p. 171; L. Landgrebe, “Méditation sur le mot de Husserl : « L’histoire est le fait majeur de l’être absolu »”, *Philosophie*, 3 (110), 2011, p. 45.

<sup>74</sup> Cf. J. Vioulac, *Science et révolution. Recherches sur Marx, Husserl et la phénoménologie*, cit., p. 177.

<sup>75</sup> E. Husserl, *The Crisis of European Sciences and Transcendental Phenomenology*, cit., p. 26; cf. L. Landgrebe, “Méditation sur le mot de Husserl : « L’histoire est le fait majeur de l’être absolu »”, cit., p. 40.

At this point, it is useful to turn to the enactivist theory of participatory sense-making, which offers a contemporary framework to interpret Husserl's insights on the constitution of scientific communities. *Participatory sense-making* distances itself from the classical *Theory Theory* and *Simulation Theory* of social cognition, which prove insufficient because they neglect interaction, embodiment, and development in understanding others' actions<sup>76</sup>. Both approaches observe behaviour from a detached, third-person stance: they focus too narrowly on "which capacity follows which in time," without considering how capacities emerge dynamically from interaction. In contrast, participatory sense-making holds that social understanding and feedback are not reducible to the static "snapshot activities of one individual's theorising or simulating,"<sup>77</sup> but arise instead in the moment-to-moment interaction of two or more subjects. As De Jaegher puts it, the "process of interacting" must be considered "as a whole as it unfolds in time."<sup>78</sup>

Such processes display "self-maintaining tendencies"<sup>79</sup>; they are "autopoietic"<sup>80</sup> and hold an "autonomy"<sup>81</sup> with respect to the individuals who participate in them—just as the communal constitution of geometrical meaning cannot be reduced to the contributions of individual researchers. Participatory sense-making thus aims to capture the intelligibility of multifaceted interactions that remain opaque when analysed only from the perspective of isolated mechanisms.

<sup>76</sup> The former relies on an "innate or acquired theory of how people generally behave, enabling us to make inferences about their mental states or beliefs"; in contrast, the latter claims that "we have no need for a theory like this because we have an inner model that we can use for simulating another person's mental states, and this model is our mind" (T. Fuchs, H. De Jaegher, "Enactive Intersubjectivity: Participatory Sense-Making and Mutual Incorporation", *Phenomenology and the Cognitive Sciences*, 8, 2009, pp. 467-468). This echoes what De Jaegher also stresses in another paper, where she denounces that "psychologists and cognitive scientists seem generally not aware of, or take for granted, the importance of the interaction process for social cognition, and focus instead on individual capacities" (H. De Jaegher, "Making Sense in Participation: An Enactive Approach to Social Cognition", in F. Morganti, A. Carassa, G. Riva [eds.], *Enacting Intersubjectivity*, Amsterdam, IOS Press, 2008, p. 34).

<sup>77</sup> *Ibid.*, p. 466.

<sup>78</sup> H. De Jaegher, "Social Understanding through Direct Perception? Yes, by Interacting", *Consciousness and Cognition*, 18, 2009, p. 535.

<sup>79</sup> H. De Jaegher, "Making Sense in Participation: An Enactive Approach to Social Cognition", *cit.*, p. 38; H. De Jaegher, T. Froese, "On the Role of Social Interaction in Individual Agency", *Adaptive Behavior*, 17 (5), 2009, p. 448.

<sup>80</sup> H. De Jaegher, T. Froese, "On the Role of Social Interaction in Individual Agency", *cit.*, p. 447.

<sup>81</sup> H. De Jaegher, E. Di Paolo, "Participatory Sense-Making. An Enactive Approach to Social Cognition", *cit.*, p. 485; H. De Jaegher, "Making Sense in Participation: An Enactive Approach to Social Cognition", *cit.*, pp. 35, 38; H. De Jaegher, T. Froese, "On the Role of Social Interaction in Individual Agency", *cit.*, p. 449; T. Fuchs, H. De Jaegher, "Enactive Intersubjectivity: Participatory Sense-Making and Mutual Incorporation", *cit.*, p. 471; E. C. Cuffari, E. Di Paolo, H. De Jaegher, "From Participatory Sense-Making to Language: There and Back Again", *Phenomenology and the Cognitive Sciences*, 14, 2015, p. 1098.

A simple everyday example helps to illustrate this point: when two agents cross a narrow corridor, perfect and timeless synchronisation of their actions would result in an undifferentiated, homogeneous state—useless for resolving the practical problem of who passes first<sup>82</sup>. Instead, effective coordination requires desynchronisation: agents must “lean into the feedback and feed-forward cycles of the interaction,” where the process itself becomes leading over the individuals, and time becomes crucial for the solution. Here, the interaction has a history of its own, with a relational domain in which “meanings emerge, become aligned, change, and so on through the interpersonal coordination of movements.”<sup>83</sup> In this sense, individuals “co-emerge as interactors contemporaneously with the interaction.”<sup>84</sup>

De Jaegher and Di Paolo stress that we must move beyond models of cooperation that treat interaction as a mere aggregation of individual mechanisms<sup>85</sup>. Rather, the focus should be on interactive processes themselves, which sustain mutual knowledge and its evolution. Interactions, they argue, are “extended in time with a rich structure that is only apparent at the relational level of collective dynamics”<sup>86</sup>—precisely as in Husserl’s account of geometry as a diachronic cultural achievement. Coordination within a group becomes possible only when members synchronise and desynchronise their behaviours in order to construct something durable and autonomous beyond the momentary contribution of individuals<sup>87</sup>. This concept of coordination is crucial because it enables us to understand “social interaction as an ongoing process.”<sup>88</sup>

In this sense, we must go beyond a view that reduces interaction to “the spatiotemporal coincidence of two agents that influence each other.”<sup>89</sup> Instead, we should endorse a diachronic and distributed understanding, one in which “patterns of coordination can directly influence the continuing disposition of the individuals involved to sustain or modify their encounter”<sup>90</sup> according to emerging needs.

<sup>82</sup> Cf. H. De Jaegher, T. Fuchs, “Enactive Intersubjectivity: Participatory Sense-Making and Mutual Incorporation”, cit., p. 449.

<sup>83</sup> Ibid.

<sup>84</sup> H. De Jaegher, “Making Sense in Participation: An Enactive Approach to Social Cognition”, cit., p. 38. Here, as De Jaegher points out, “individual sense-making” acquires a particular “coherence through interaction” (Ibid., p. 41).

<sup>85</sup> Cf. H. De Jaegher, “Making Sense in Participation: An Enactive Approach to Social Cognition”, cit., p. 36; E. Di Paolo, H. De Jaegher, “Participatory Sense-Making. An Enactive Approach to Social Cognition”, cit., p. 36.

<sup>86</sup> Ibid., p. 37.

<sup>87</sup> Ibid., p. 38.

<sup>88</sup> H. De Jaegher, E. Di Paolo, “Participatory Sense-Making. An Enactive Approach to Social Cognition”, cit., p. 491.

<sup>89</sup> Ibid., p. 492.

<sup>90</sup> Ibid., p. 491. Their engagement “enacts a world” capable of the “generation of new

## Conclusion. Communalization Through Loss and Regain of Sense Coordination. Disclosing the Uninterrupted Continuity of Science

Like geometry, shared actions unfold through trial and error, sedimentation, and progressive reactivation. Even when coordination breaks down—as in the case of two agents crossing a corridor—actors can “synchronize otherwise,”<sup>91</sup> fulfilling the task through alternative adjustments. This is exemplified by the game of charades<sup>92</sup>. Rarely do players immediately guess what another intends to express; instead, they engage in a longer process that requires a series of increasingly refined, “phase-delayed”<sup>93</sup> attempts. In such cases, “[s]ustained interactions ... can be expected to have undergone several instances of loss and regain of coordinating structures, each of them leaving the interactors slightly better able to remain in such interaction or reinitiate it,”<sup>94</sup> thereby continuously improving their performance through repeated interaction. In charades, as in geometry, “participation is highest when we find the sophisticated case in which we fully and directly participate in a joint process of sense-making and the whole sense-making activity becomes a shared one.”<sup>95</sup>

Shared meaning thus evolves through both coordination and breakdowns<sup>96</sup>. Within participatory sense-making, breakdowns are not failures to be eliminated but necessary steps that enable better coordination in subsequent tasks. When such ruptures occur, actors co-regulate through the “double feedback”<sup>97</sup> of their actions, establishing new and richer connections thanks to the plasticity of the means available for mutual understanding<sup>98</sup>.

meaning” (H. De Jaegher, “Making Sense in Participation: An Enactive Approach to Social Cognition”, cit., p. 35).

<sup>91</sup> H. De Jaegher, “Making Sense in Participation: An Enactive Approach to Social Cognition”, cit., p. 37.

<sup>92</sup> H. De Jaegher, E. Di Paolo, “Participatory Sense-Making. An Enactive Approach to Social Cognition”, cit., p. 500.

<sup>93</sup> Ibid.

<sup>94</sup> Ibid., p. 496.

<sup>95</sup> Ibid., p. 497.

<sup>96</sup> Cf. Ivi., p. 501; cf. H. De Jaegher, “Making Sense in Participation: An Enactive Approach to Social Cognition”, cit., p. 41.

<sup>97</sup> H. De Jaegher, “Making Sense in Participation: An Enactive Approach to Social Cognition”, cit., p. 44.

<sup>98</sup> As Cuffari, Di Paolo and De Jaegher observe, the “recovery of interactive breakdowns requires a co-regulation of the interactive coupling. This co-regulation is directed at managing the mismatches” that may occur in social agency (E. C. Cuffari, E. Di Paolo, H. De Jaegher, “From Participatory Sense-Making to Language: There and Back Again”, *Phenomenology and the Cognitive Sciences*, 14, 2015, p. 1011). As a result of this remedy, “successful social acts also tend to crystallize and be used as the starting point of new searches for conflict resolution”, and successful social acts, in turn, “can become recursive regulators of other social acts” (Ibid., pp. 1011-1012).

As charade sequences show, apparent misunderstandings are integral to the game: participants pursue the same task differently, but ultimately converge on a shared goal<sup>99</sup>. This process generates “a dynamic whereby one bumps into the other’s shadow,” creating “a temporally extended whole”<sup>100</sup> in which “[r]eparation becomes a key process”<sup>101</sup> of coordination.

This recursive pattern of breakdown and renewal mirrors the way geometry advances through writing. The endless reactivation of geometrical sense exemplifies what participatory sense-making brings to light: the historicity and modifiability of ideal contents, such as theorems, which require intersubjective validation to gain binding force. Through the teleological unity that writing secures, geometers diachronically constitute an unbroken research chain, corroborating their findings and ensuring their transmissibility. Writing, in this respect, is not a mere auxiliary but a physical and technical medium that recovers a fundamental transcendental and historical function in Husserl’s work. It allows us to grasp the autonomy of geometry as a science that develops across generations without losing continuity, as a discipline that evolves through the deferred yet cumulative interactions of its contributors. This, ultimately, discloses the uninterrupted growth of geometrical idealisation and the communal affirmation of science as an intergenerational, shared task.

## References

- Blomberg, J., “Interpreting the Concept of Sedimentation in Husserl’s Origin of Geometry”, *Public Journal of Semiotics*, 9 (1), 2019, pp. 78–94.
- Cahoone, L. E., “The Interpretation of Galilean Science: Cassirer Contrasted with Husserl and Heidegger”, *Studies in History and Philosophy of Science*, 17 (1), 1986, pp. 1–21.
- Casement, W., “Husserl and the Philosophy of History”, *History and Theory*, 27 (3), 1988, pp. 229–240.
- Cuffari, E. C., Di Paolo, E., De Jaegher, H., “From Participatory Sense-Making to Language: There and Back Again”, *Phenomenology and the Cognitive Sciences*, 14, 2015, pp. 1089–1125.
- D’Amico, R., “Husserl on the Foundational Structures of Natural and Cultural Sciences”, *Philosophy and Phenomenological Research*, 42 (1), 1981, pp. 5–22.

<sup>99</sup> Cf. H. De Jaegher, T. Froese, “On the Role of Social Interaction in Individual Agency”, cit., p. 455.

<sup>100</sup> Ibid.

<sup>101</sup> T. Fuchs, H. De Jaegher, “Enactive Intersubjectivity: Participatory Sense-Making and Mutual Incorporation”, cit., p. 479.

De Jaegher, H., “Social Understanding through Direct Perception? Yes, by Interacting”, *Consciousness and Cognition*, 18, 2009, pp. 535–542.

De Jaegher, H., “Making Sense in Participation: An Enactive Approach to Social Cognition”, in F. Morganti, A. Carassa, G. Riva (eds.), *Enacting Intersubjectivity*, Amsterdam: IOS Press, 2008, pp. 33–47.

De Jaegher, H., Di Paolo, E., “Participatory Sense-Making. An Enactive Approach to Social Cognition”, *Phenomenology and the Cognitive Sciences*, 6, 2007, pp. 487–507.

De Jaegher, H., Froese, T., “On the Role of Social Interaction in Individual Agency”, *Adaptive Behavior*, 17 (5), 2009, pp. 444–460.

Derrida, J., *Edmund Husserl's Origin of Geometry: An Introduction*, trans. J. P. Leavey, Lincoln–London: University of Nebraska Press, 1978.

Fink, E., *Sixth Cartesian Meditation. The Idea of a Transcendental Phenomenology*, trans. R. Bruzina, Bloomington–Indianapolis: Indiana University Press, 1995.

Fuchs, T., De Jaegher, H., “Enactive Intersubjectivity: Participatory Sense-Making and Mutual Incorporation”, *Phenomenology and the Cognitive Sciences*, 8, 2009, pp. 465–486.

Goris, W., “L'a priori historique chez Husserl et Foucault (I). La pertinence philosophique d'un concept directeur de l'épistémologie historique”, trans. J. Farges, *Philosophie*, 123 (4), 2014, pp. 3–27.

Housset, E., *Personne et sujet selon Husserl*, Paris: Presses Universitaires de France, 1997.

Husserl, E., *Die Krisis der Europäischen Wissenschaften und die Transzendente Phänomenologie. Eine Einleitung in die Phänomenologische Philosophie* (Hua VI), hrsg. v. W. Biemel, 2. Aufl., Den Haag: Martinus Nijhoff, 1962.

Husserl, E., *Cartesianische Meditationen und Pariser Vorträge* (Hua I), hrsg. u. eingel. v. S. Strasser, 2. Aufl., Den Haag: Martinus Nijhoff, 1963.

Husserl, E., *Zur Phänomenologie der Intersubjektivität. Texte aus dem Nachlass. Zweiter Teil: 1921–1928* (Hua XIV), hrsg. v. I. Kern, Den Haag: Martinus Nijhoff, 1973.

Husserl, E., *Zur Phänomenologie der Intersubjektivität. Texte aus dem Nachlass. Dritter Teil: 1929–1935* (Hua XV), hrsg. v. I. Kern, Den Haag: Martinus Nijhoff, 1973.

Husserl, E., *Cartesian Meditations. An Introduction to Phenomenology*, trans. D. Cairns, Dordrecht: Springer, 1977.

Husserl, E., *The Crisis of European Sciences and Transcendental Phenomenology*, trans. D. Carr, Evanston: Northwestern University Press, 1970.

Husserl, E., *Die Lebenswelt. Auslegungen der Vorgegebenen Welt und ihrer Konstitution. Texte aus dem Nachlass (1916–1937)* (Hua XXXIX), hrsg. v. R. Sowa, Dordrecht: Springer, 2008.

Landgrebe, L., “Médiation sur le mot de Husserl: « L’histoire est le fait majeur de l’être absolu »”, *Philosophie*, 110 (3), 2011, pp. 31–55.

Merleau-Ponty, M., *Husserl at the Limits of Phenomenology. Including Texts by Edmund Husserl*, trans. L. Lawlor, B. Bergo, Evanston: Northwestern University Press, 2001.

Merleau-Ponty, M., *Institution and Passivity. Course Notes from the Collège de France (1954–1955)*, foreword C. Lefort, trans. L. Lawlor, H. Massey, Evanston: Northwestern University Press, 2010.

Pradelle, D., “La constitution des idéalités est-elle une création ?”, *Les Études philosophiques*, 85 (2), 2008, pp. 227–251.

Pradelle, D., *Généalogie de la raison*, Paris: Presses Universitaires de France, 2013.

Rhéaume, M., “Husserl, la signification et la morsure du temps”, *Philosophie*, 131 (2), 2016, pp. 36–51.

Shain, R., “Derrida, Husserl, and the Problem of Prior Sense”, *Cosmos and History: The Journal of Natural and Social Philosophy*, 12 (1), 2016, pp. 292–308

Stiegler, B., *Technics and Time, 1. The Fault of Epimetheus*, trans. R. Beardsworth, G. Collins, Stanford: Stanford University Press, 1998.

Stiegler, B., “Genèse d’une philosophie du dilemme phénoménologique. Sur le problème de la genèse dans la philosophie de Husserl de Jacques Derrida”, *Papiers du Collège International de Philosophie*, 14, 2007, pp. 1–24.

Stiegler, B., *Technics and Time, 2. Disorientation*, trans. Board of Trustees of the Leland Stanford Junior University, Stanford: Stanford University Press, 2009.

Stiegler, B., *Technics and Time, 3. Cinematic Time and the Question of Malaise*, trans. Board of Trustees of the Leland Stanford Junior University, Stanford: Stanford University Press, 2011.

Thierry, Y., *Conscience et humanité selon Husserl*, Paris: Presses Universitaires de France, 1995.

Vioulac, J., *Science et révolution. Recherches sur Marx, Husserl et la phénoménologie*, Paris: Presses Universitaires de France, 2015.

**Esplorare l'“Origine della geometria” attraverso una prospettiva enattivista: un'indagine sulla formazione dei gruppi diacronici e sulle dinamiche collaborative nelle interazioni in tempo reale e a fase ritardata**

Il saggio indaga l'*Origine della geometria* di Edmund Husserl attraverso la prospettiva dell'enattivismo, con particolare attenzione alla teoria del participatory sense-making. Sottolineando il ruolo della scrittura come mezzo tecnico di trasmissione, l'articolo mostra come la geometria si costituisca come impresa collettiva e diacronica, irriducibile al lavoro di singoli individui o persino di singole generazioni. La scrittura consente la sedimentazione e la riattivazione del senso, garantendo la continuità del sapere geometrico nel tempo e fondando la “comunità dei geometri” in un compito transgenerazionale. Il confronto con le teorie enattiviste mette in luce come la produzione di senso si svolga non solo sincronicamente, attraverso l'interazione nel presente, ma anche diacronicamente, tramite contributi distribuiti e cumulativi nel corso del tempo. Le interruzioni e le riparazioni nella coordinazione, sia nelle teorie enattiviste sia nell'analisi husserliana della pratica scientifica, non appaiono come fallimenti ma come condizioni necessarie per il continuo rinnovamento del senso condiviso. Collegando prospettive fenomenologiche ed enattiviste, il saggio sostiene che la costituzione comunitaria della scienza si comprenda al meglio come un processo di perdita e recupero della coordinazione, il cui medium è la scrittura e il cui esito è la continuità ininterrotta del sapere.

PAROLE CHIAVE: Storicità, Enattivismo, Participatory Sense-Making, Scrittura, Geometria.

**Exploring *The Origin of Geometry* Through an Enactivist Lens: An Inquiry into Diachronic Group Formation and Collaborative Dynamics in Real-Time and Phase-Delayed Interactions**

This essay investigates Edmund Husserl's *Origin of Geometry* through the lens of enactivism, with a particular focus on the theory of participatory sense-making. By emphasizing the role of writing as a technical medium of transmission, the paper shows how geometry constitutes itself as a collective and diachronic enterprise, irreducible to the work of single individuals or even single generations. Writing enables the sedimentation and reactivation of meaning, ensuring the continuity of geometrical knowledge across time and grounding the “community of geometers” in a transgenerational task. The comparison with enactivist theories highlights how sense-making unfolds not only synchronically, through in-

teraction in the present, but also diachronically, through distributed and cumulative contributions over time. Breakdowns and repairs in coordination, both in enactivist accounts and in Husserl's analysis of scientific practice, appear not as failures but as necessary conditions for the ongoing renewal of shared meaning. By bridging phenomenological and enactivist perspectives, the essay argues that the communal constitution of science is best understood as a process of loss and regain of coordination, whose medium is writing, and whose outcome is the uninterrupted continuity of knowledge.

KEYWORDS: Historicity, Enactivism, Participatory Sense-Making, Writing, Geometry.

