

Neoformation: A Dialectical Approach to Developmental Change

Abstract In Vygotsky’s writings on development, we find the concept *neoformation* in the context of his distinction between quantitative-incremental and qualitative-revolutionary change in psychological development. Few studies have taken up this concept. The purpose of this paper is (a) to provide a dialectical grounding to the distinction generally and to the emergence of new psychological and personality forms specifically and (b) to describe a five-step historical-genetic method that qualitative researchers can use to document the emergence of new psychological (behavioral) forms. This work therefore contributes to the elaboration of a dialectical method that Vygotsky himself has failed to articulate in a systematic way.

Keywords dialectical materialism; quality; quantity; measure; learning; development; leading activity

Development is not confined to the scheme, “more–less,” but is characterized primarily and specifically by the presence of *qualitative neoformations* that are subject to their own rhythm and require a *special measure* each time. (Vygotsky, 1998, p. 189, emphases added)

In the introductory quotation, Vygotsky describes his concept of neoformation, that is, the appearance of a qualitatively new psychological¹ form. He opposes it to continuous-incremental change (i.e., “more–less,” as in learning). However, in much of the research literature, the distinction between (a) continuously changing psychological forms and behavior and (b) the emergence of qualitatively new psychological forms and

¹ Vygotsky writes about the development of the psyche, not just the mental, as readers of English translations might assume where the Russian adjective *psixičeskij* often is translated as “mental” rather than as psychical (psyche-related, psychological) as in other languages (Ger. *psychisch*; Fr. *psychique*; It. *psychico*).

behavior is rarely made (e.g., “professional development” may refer to continuous or discontinuous change). For Vygotsky the concept of neof ormation was important: it appears more than 100 times in volume 5 of *The Collected Works* on child psychology (Vygotsky, 1998). However, the search term “neof ormation” has not turned up (as of November 2015) a single text in the education or educational psychology subfields of Thomson Web of Science.

This study concerns the general phenomenon of the emergence of new forms (morphogenesis). Vygotsky uses the term to refer to the new form itself (cf. the introductory quotation). Here, however, I use the term neof ormation to designate a process, also referred to as *morphogenesis* (e.g., Thom, 1981). In that process, quantitative change turns into qualitative change. Such a phenomenon, therefore, inherently escapes those educational and psychological researchers who use quantitative methods because a variable cannot change into another, qualitatively different variable.² As Vygotsky notes in the introductory quotation, “neof ormations . . . require a *special measure* each time.”

The purpose of this study is to contribute to developing a dialectical approach to this process—including phases of continuous, quantitative changes and periods of abrupt changes to qualitatively new forms. Vygotsky, though using the notion, applies it to but a small subset of morphogenetic phenomena and only to denote the new form itself. A few authors do indeed parenthetically mention the concept (e.g., Wells, 2004); but there remains much to be done to develop a “more adequate . . . way of thinking about the dynamics of development including such ideas as the social situation of development and *neof ormations*” (Cole, 2009, p. 295, emphasis added). The dialectical formulation articulated here focuses on the transition process from one to another form rather than the product and is based on the law of the transformation of quantity into quality (Marx &

² This is so unless the researchers employ catastrophe theory, a mathematical method and language for describing the emergence of qualitatively new forms from quantitative changes.

Engels, 1975). This law was taken up and further developed by the critical psychologist K. Holzkamp (1983), a scholar in the societal historical tradition of Vygotsky and A. N. Leont'ev. My study therefore contributes to the elaboration of a dialectical approach to developmental phenomena that Vygotsky himself, according to some scholars, has failed to articulate (e.g. Dafermos, 2015; Elhammoumi, 2015).

Neoformation in the Literature

The term neoformation is quite common in the natural sciences, and has been used together with a catastrophe theoretical (mathematical) approach to modeling (e.g., Lyndon & Battey, 1985). A particularly interesting case—also suggested to me by Mike Cole (private email communication, January 28, 2015)—is the use of neoformation in evolution, which, in its continuity, is characterized by the alternation of quantitative (continuous) and qualitative (discontinuous) changes. Every branch of cellular specialization is defined by a stable process and leads to a stabilized and regular spatiotemporal behavior. This leading and stable character in the evolution of tissue has been C. H. Waddington's idea. Waddington hypothesized—now confirmed experimentally (Gilbert, 2000)—that some environmental factors might be strong enough to push a cell, during its evolution, from one stable phase into another. The differentiation of an undifferentiated tissue into different cellular specialization can be described, when it is regular and stable, by a morphological field (Thom, 1981). This application is of interest to those attempting to model how the specifically *human* animal society emerged in *natural* evolution and how this society comes to play the dominant role in cultural history and individual development (Roth, 2003). That is, it would be of interest to a Marxist anthropology, of which cultural-historical psychology is an integral part (Jantzen, 1991).

The term *neoformation* also can be found across Vygotsky's *Collected Works*. But it is in the volume on child psychology (Vygotsky, 1998) that the term appears with the greatest frequency. Vygotsky uses it to denote a product of morphogenesis—i.e., the new form that has emerged—whereas in this study we are concerned with the *process* of morphogenesis. As process, neoformation allows us to distinguish theories of development by means of incremental change—a modern version would be development in terms of log-linear growth curves (e.g., Spada, 1978) or the continuous increases in dynamic mathematical models of cognitive growth (e.g., van Geert, 1998)—versus stepwise change, as in Piaget's theory of stages. The problem of such theories of incremental change is that they involve the *continuous* variation of the *same* behavioral variable rather than a qualitative turnover that constitutes a change from one to another variable, qualitatively *different* behavioral form.³ Moreover, if development were to occur incrementally, then the subject of development could anticipate and orient to the emergence of new forms; if development is a qualitatively *new* form, then the subject of development inherently cannot anticipate the new psychological form (e.g., insight).

Vygotsky uses the term neoformation to refer to a new type of personality structure and structure of a person's activity in the way that these determine the consciousness of a person (i.e., a product). He defines an age-related neoformation as

that new type of structure of the personality and its activity, those [psychological (psikhicheskie)] and social changes which first appear at a given age level and which mainly and basically determine the consciousness of the child, his relation to the environment, his internal and external life, the whole course of his development. (Vygotsky, 1998, p. 190, my replacement)

³ One neo-Piagetian theory does include periods of quantitative-incremental growth and qualitative-revolutionary change (Case, 1985); but it has no mechanism to explain how quantity turns into quality.

Neof ormations, whether related to age or other aspects in life, therefore, are qualitatively new forms of personality, which come with new forms of participations in activity and new forms of relations in and to the (social and material) environment. Once framed in this way, the concept of neof ormation is suitable to theorize the deep-going changes in the life and consciousness of persons anywhere in the lifespan.

Although particularly interested in child development, Vygotsky (1998) also makes references to revolutionary changes during adolescence. He observes that changes may be gradual (“lytic”) or they may be abrupt and crisis-like. *Periods* and *phases* are characterized by the gradual nature of change, whereas in *crises*, there occurs a reorganization of the *quality* of experience (thinking, interests). Thus, “the crisis is most of all a turning point that is expressed in the fact that the child passes from one method of experiencing the environment to another” (Vygotsky, 1998, p. 295). The author uses many examples from childhood and adolescence, stating, for example that “following a period of normal rate of success and work capacity, there are lapses in work and a *sudden* failure to do assignments; students who had done certain work with enthusiasm *suddenly* lose interest in it” (p. 21, emphasis added). Such new forms of behavior not only are qualitatively different from preceding behaviors but also arise suddenly. Although the concepts and method appear in the context of his writings about child development, they pertain not just to mental phenomena generalize to the study of the evolution of human beings and to *psychological* processes more broadly, as shown, for example, in the “Preface to Bühler” (Vygotsky, 1997a, p. 169). In this text, he also charges Bühler as representative of classical psychology for failing to approach development *dialectically*. We therefore may study morphogenesis in the emergence of new psychological forms in personality structure and its activities, experience, interests, or motivations and motives and in the way these determine consciousness in very different contexts. But, if we want to extend Vygotsky’s work, we need to do so dialectically.

The moment of the transition between psychological forms is a complex rather than simple phenomenon, which is due to the fact that behaviorally new forms arise *imperceptibly* so that “it is difficult to determine its onset and termination” (Vygotsky, 1998, p. 191) surrounding the *sudden* emergence of a new form during “an *abrupt* aggravation of the crisis” (p. 191, emphasis added). The author discusses the two senses of Hegel’s (1807) term “aufheben [to sublata],” as both removing and denying something, on the one hand, and keeping it for the future, on the other hand. In development, the old form, though being overcome, does not entirely disappear but, while being preserved, loses its dominance, allowing it to be the basis of what comes, whereas the new form becomes the dominant one. He suggests that some old psychological form (function) is preserved all the while being overturned (negated).

An important dimension in the emergence of new forms is the external, practical activity of the person. Practical activity, that is, *labor*, is the leading activity that precipitated anthropogenesis, the qualitative change from primate to the specifically human society and psychology (Marx & Engels, 1975). For these authors it is the *external* activity of the person—e.g., play in the life of the child—that is the *leading* activity, that is, the external activity that *leads* (i.e., occurs ahead of) and *leads to* a qualitative change in the consciousness of the person. Development, that is, qualitative (revolutionary) change occurs when the *continuous* practical activity of a person is such that it may precipitate the *transition* to a qualitatively different developmental stage as a result of contradictions in each of the two poles of the person–environment unit. The practical activity involves another person generally; and their relation is “not a pace or condition for development but the very flesh of the interpsychic function” (Zuckerman, 2007, p. 48). Working in cooperation with others to obtain *general* (rather than individually specific) goals allows transcending individuality and attaining qualitatively new possibilities (Holzkamp, 1979). That is, although this other person or the other persons are often held to be teachers or more advanced peers, even working with a less

advanced other (e.g., in teaching) may lead to qualitatively new psychological forms, that is, to *development* (Roth & Radford, 2010). Thus, the engagement in the leading activity, which occurs on the basis of the current developmental level, allows quantitative changes that will precipitate the qualitative change to the developmentally new form. This aspect, as several reviewers of previous versions suggested, was not a part of Vygotsky's thinking; but it is essential to understanding morphogenesis (Thom, 1981) and therefore an integral part of the current proposal.

Neoformation and the Law of the Transition of Quantity into Quality

The emergence of new psychological forms—i.e., forms that the subject of development cannot anticipate—is based on a materialist dialectical law: the transformation of quantity into quality. This law has been used to model the relation of quantitative and qualitative changes in the life of an Icelandic fisherman-turned-teacher (Jóhannsdóttir & Roth, 2014). In the following, I begin by presenting a concrete example of the emergence of qualitatively new forms of behavior, and self-understanding in the life changes of a Brazilian teacher, which has many structural similarities to his Icelandic colleague, including shifts into and out of teaching, parallel employment, and changes in teaching practices. The vignette features the kinds of changes that can be ascribed to neoformation, including the qualitative changes in “the consciousness . . . his relation to the environment, his internal and external life, the whole course of his development” (Vygotsky, 1998, p. 190). I then describe the origins of the law and how to visualize it.

A Concrete Example of a Continuity and Discontinuity

VIGNETTE: Having failed the required state examination to enter public school teaching, Leandro had entered the teaching profession in Brazil via a job at a private school that prepares students for taking the obligatory university

admissions test. To meet the needs of his students, Leandro developed a way of teaching his subject matter (sociology) in self-contained one-lesson modules, each focusing on a specific topic. When he later received his teaching certificate and entered the public school system, he continued to plan and teach his lessons in this manner, over time increasingly perfecting the organization and presentation of his lessons. During this period, his teaching changed incrementally.

Eventually Leandro became involved in a research project where the (pre-service) teachers and researcher, among many other forms of engagement, read an article about a biology teacher, who, together with his students, had engaged in advocacy activities against the dumping of sewage into the ocean just off a favela. All of a sudden became conscious of the fact that he had not really been teaching his students, to whom he had talked about K. Marx, É. Durkheim, or M. Weber. Leandro was entering a crisis. He realized that he had never assisted his students to make use of their knowledge or to develop know-how to deal with their everyday problems. That instant was a radical turning point in Leandro's life generally and his teaching specifically.

After that day of *conscientização* [becoming conscious], a crisis-like change in consciousness, Leandro began to completely rethink his teaching. Initially, with the help of others, he created new lessons that truly transformed the lives of the students rather than just giving them knowledge. He continued working on developing lessons that were linked to each other and which allowed greater, active student involvement and comprehension through project work. That is, his teaching, now of a qualitatively different form, was continuously improving but in ways that differed from the improvements of his former ways of teaching.

Leandro not only changed his teaching but also developed an interest in graduate studies, which he took up while quitting what had been his other main employment, that is, his job as a police officer.⁴

In this vignette, we observe a teacher, who, because of his specific conditions, begins teaching (lecturing) in a particular way and, even though the conditions changed, continues teaching in this way. In the course of so doing, he becomes (incrementally) better at it. However, out of the regular discussions within the research group, there emerges a qualitative change in his consciousness. The new, qualitatively different form of consciousness arises when his teaching becomes the object of reflection, in the context of which he compares it to someone else's teaching (the biology teacher in the favela). This new form of consciousness radically changes his experience—he is so dissatisfied with his old ways of teaching that he rethinks his practice and begins teaching in a new way—and has been unpredictable right into its occurrence. While teaching the next few lessons in the way he knows best, he develops a new set of lessons with a very different teaching approach; for a while, he teaches in parallel in two different ways. When he teaches all his classes in the new way, second qualitative shift is occurring into a mode of teaching that heretofore has only been a possibility. This new mode of teaching then becomes his dominant mode. With time and experience, he has been becoming better at teaching in a student-centered way.

Until reading and discussion the article about the elementary students demonstrating against the dumping of waste near their favela, it was his teaching and the continued improvement in lesson delivery that appear (are reflected) in Leandro's consciousness. In the course of the discussion, in the give-and-take of the dialogue, something different appears: his teaching in contrast with the teaching of another person. Now, rather than being in the situation of designing and delivering the subject matter, this designing and

⁴ The story was told to me by Erika Germanos, who is writing her dissertation in part on the quantitative and qualitative changes in the life and consciousness of this teacher.

delivering with respect to other forms of delivery appear in consciousness. The two forms of teaching that he is considering constitute a contradiction of the object of consciousness (outer contradiction), which is reflected in a contradiction of consciousness itself. Here we observe a significant step, a change to a qualitatively new form of consciousness. Because it is qualitatively new, it could not have arisen from the previous form by simple change in magnitude (e.g. a psychological variable). Such a developmental step is co-extensive with a shift in the way experience appears in the consciousness of a person. It is a new insight that the person could not have anticipated. The appearance of a new, qualitatively different kind of experience can be explained by means of the Marxian (dialectical) principle of the transformation of quantity into quality and he uses it to explain the great diversity of qualitatively different experiences. Neoformation as a process captures this essentially dialectical approach to the emergence of new forms of experience from participation in activities characterized by previous forms of experience.

In this case, the development arose from the events in the discussion group. There was nothing in Leandro's life and participation that would have allowed predicting the new form of consciousness to emerge. When he entered the research, Leandro thought he would (incrementally) improve his current teaching manner. But participating in the research-related activity precipitated the qualitative change of his consciousness concerning his teaching. That is, the discussion group constituted a *leading* (external, practical) activity, an external activity that leads (i.e., was ahead of) and leads to (crisis-like, stepwise) development. That is, the external activity creates a zone of proximal development (Leont'ev, 1997), where the transition between qualitatively different forms of consciousness suddenly occurs. It was in and out of this participation in ongoing activity that a new form of consciousness could arise (Marx & Engels, 1975). Similarly, other life-changing developmental changes precipitated from the discussions—e.g., the possibility of pursuing graduate studies and that of abandoning the second job as a policeman. That is, in the course of discussing familiar things such as epistemology,

qualitative reorganizations in and of consciousness occurred for Leandro; and this led to changes in the qualitatively different forms of experiences and personality (no longer policemen, becoming graduate student).

There are periods in in our lives that are characterized by incremental changes—we get better at doing what we already know to do—and there are crisis-like (stepwise) transitions to qualitatively different forms that are new, changes that we often experience in the form of insights and sudden realizations (e.g., Leandro realizing the futility of his own teaching). The emergence of new forms cannot be predicted based on prior knowledge: there is a dialectical turnover. In the course of human lives, slowly changing phases are punctuated by the genesis of new forms; because the new forms are *qualitatively* different, we require a different *measure* than the preceding formations. Dialectical logic provides us with the resources for theorizing development in a way that includes not only quantitative and qualitative changes but also a manner to combine the two so that they co-implicate each other.

Quantity, Quality, and Measure

There are considerable differences between qualitative and quantitative changes (Hegel, 1840). Thus, to take an example from the social sciences, in educational or psychological research a dependent variable (e.g., IQ) does not change into another variable simply by increasing the score. In the case of quantitative change, the thing or phenomenon does not change in its essence (quality); but a qualitative change involves a change of the essence, a phenomenon turns into another phenomenon (Sève, 2005). In traditional logic, quality and quantity are opposites, not because they are such in themselves but because they are different manifestations of the same overarching, integrative unit: the *measure* [Maaß] (Hegel, 1840).⁵ Only because of this *inner*

⁵ Measure is not measurement, which always is a quantitative determination of a variable.

(Holzkamp, 1983). Here it is important to retain that some new forms are only intermediate and therefore are not required *qualities*. The reverse transformation also exists: quality may change into quantity. An example is when an initially general, undifferentiated, and abstract (scientific) concept comes to manifest itself in a scientific research group (Roth, 2014).

To visualize the transformation of quantity to quality, a graphical model based on a mathematical model of morphogenesis has been proposed in the context of conceptual change (Roth, 2016).⁶ We may follow a system—e.g., the subject–environment unit in the Vygotskian category of experience [pereživanie] or a scientific conception—along a familiar and widely popularized diagram (Figure 2). Here, the system initially develops along a path in continuous way (quantitatively) (Figure 2, #1) until there comes a bifurcation point (Figure 2, #2), the birth of a new form characterized by two possible, qualitatively different states. In the vignette above, this corresponds to Leandro’s experience of teaching prior to and right into the crucial meeting where he becomes consciously aware of a different way of (thinking about) teaching his subject. This bifurcation constitutes a first crisis.

«**Insert Figure 2 about here**»

The system continues initially along the lower path (Figure 2, #3) all the while another (psychological) function is available to the system. In the vignette, Leandro continues teaching in the old way all the while thinking about the way, and developing plans, for teaching in a new way. At some point, an infinitesimal change (e.g., in the environmental variable v) may give rise to a (relatively) sudden, qualitative transition, a crisis (Figure 2, #4) where the category under consideration jumps to the second available, qualitatively different phase. Leandro “jumps into the cold water” by doing a first set of lessons representing a new way of teaching in his life. There may in fact be a

⁶ The mathematical-technical details of catastrophe theory, from which the graph derives, are beyond the scope of this article.

period where the behavioral category jumps back and forth or simultaneously displays both behaviors before continuing incrementally in the second phase (Figure 2, #5), which corresponds to the time when Leandro was teaching in both ways.

This graphical description is consistent with the dialectical law of transition of quantity into quality and quality into quantity. The appearance of a new, qualitatively different form (Figure 2, #2) arises from incremental changes immediately preceding the appearance. Neither its emergence nor the two states that follow are predictable on the basis of the system's history (Figure 2, #1). The qualitative change (Figure 2, #4) brings about new forms of incremental change—i.e., changes along the path preceding the turnover (Figure 2, #1) differ from those along the path following the appearance of a new formation (Figure 2, #3), and differ especially those succeeding the turnover (Figure 2, #5).

Neoformation: Requirements for a Qualitative Descriptive Approach

In the previous section, I articulate the process of neoformation in the context of a more general law of the transformation of quantity into quality. Here, neoformation (as process) refers to the appearance of and transition into a new quality, which, depending on the research, may be a step in child development as it was for Vygotsky, but which could also be the emergence of human society and culture as the determining factor of human life that it has in societal-cultural theory (Holzkamp, 1983), a conceptual change in a scientific research group (Roth, 2014), the life-changing taking up of a new career (Jóhannsdóttir & Roth, 2014), or the transformations of personality (Roth, 2016). In all these studies, a historical-genetic approach was used to show the emergence of a qualitatively new form (function) of a psychological category of interest arose from quantitative-continuous changes. There is an understanding in the dialectical materialist approach according to which the investigation of any phenomenon, in the natural, social,

or historical sciences scientific does not impose the dialectical principles on nature, but identifies them in in the empirical materials available (Marx & Engels, 1975).

Accordingly, the turnover of quantitative change into qualitative change is not to be imposed on nature but to be found.

As far as I know, Vygotsky himself did not, provide a specification of how a historical-genetic account has to be structured so that it makes a sufficient case for the dialectical transition of quantity into quality. Another scholar in the cultural-historical tradition to psychology, however, did provide such a specification (Holzkamp, 1983). The critical psychologist explicitly refers to the origin of the method in the historical approach of A. N. Leont'ev that was grounded in a materialist dialectics. In the following, I begin by articulating five required parts that a historical-genetic account has to exhibit to show that a quality-changing, dialectical process has occurred. I then provide some examples from the research literature where this method has been used.

The Five Parts of a Historical-Genetic Account of a New Form

The historical-genetic method for describing a system undergoing a transition from quantity into quality pertinent to biological and social psychological phenomena requires five parts. It is only the presence of all five parts that supports a claim that some new form as arisen as the result of a dialectical process that transformed quantity into quality (Holzkamp, 1983). Conceptually, these five parts are represented in the five different (numbered) aspects that can be seen in Figure 2: moving from left to right, there is (1) a period of continuous change, (2) the emergence of a qualitatively new form, (3) a period of continuous change where the old quality dominates, (4) more-or-less sudden transition to the qualitatively new form, and (5) a period of continuous change following the transition.⁷ In the five steps of the historical-genetic description of a new form,

⁷ The original formulation of the five components (Holzkamp, 1983) has been modified in several empirical studies, including one pertaining to the conceptual change that a scientific research

contradictions are identified in different parts of a system understood in terms of a dialectical category. The encompassing system of interest is the organism–environment relation (Holzkamp, 1983; Vygotsky, 1994).

Researchers interested in showing that a new form has arisen as the result of a dialectical process—i.e., a process following the law of the transition of quantity into quality—need to provide a historical-genetic account that includes five parts:

1. *Real historical conditions.* A description of the real-historical conditions of the initial form (developmental level) within and upon which the qualitative change occurs from one form towards another one (Figure 2, #1). This includes an articulation of all those moments⁸ that are relevant to the new form that is known to have occurred. From the dialectical materialist perspective, these moments are precisely those that are overcome in the qualitative turnover that has occurred later (#4). Pertaining to Leandro, this first part of the description concerns his old teaching and ways of thinking about teaching, which come to be overturned later.
2. *Appearance of the new form.* In this part of the historical-genetic description, it has to be shown that there are objective changes in the *external* conditions. These are reflected in the *internal* contradictions (i.e., contradictions at the person pole of *pereživanie*), which will give rise to the historically new form (Figure 2, #2), to have an equivalent in the external environment (environmental pole). It is thereby especially important to articulate those conditions that pressure the system (e.g., person–environment = *pereživanie*) in the direction of the new function; and it is important to articulate those aspects that make it possible for the “mutants” that have the new form to thrive and reproduce. The new quality has to be shown as

group has undergone (Roth, 2014). This new formulation is consistent with a catastrophe theoretic account of morphogenesis (neoformation), a mathematical approach that combines quantitative and qualitative aspects to account for the topological and local classification of form-generating processes (Thom, 1981).

⁸ In dialectics, a *moment* refers to a part of an irreducible whole that cannot be understood independent to all other parts (moments) and, therefore, independent of the whole.

- relating the pre-existing dimensions in a new way, and thereby the coming of the first qualitative change of the specific nature of the new form. In the vignette, my description sketches how in the crucial meeting, Leandro all of a sudden becomes conscious of his teaching in a new way and how he expresses dissatisfaction with his teaching when his research group discusses an article in which a teacher engages his students in a socially relevant way. This dissatisfaction leads Leandro to consider teaching in a qualitatively new way.
3. *Transition preparation phase.* The new form that has emerged is not yet a determining factor for the organism as a whole but the system moves along a path dominated by the old form (Figure 2, #3). The historical-genetic description needs to account for the *continued* changes in the person–environment system, which still tends to be at the original or emerging intermediate levels. But logical contradictions are likely observed, for there are two, functionally different ways available for acting. In the vignette, Leandro continues to teach in the old way even though he rejects this way of teaching while preparing himself, with the help of his research group, for teaching some lessons in a different way.
 4. *Transition and functional turnover to dominance of new form.* A historical-genetic account has to document a change in dominance, whereby the previously dominant form (function) is negated and the co-existing new form becomes the dominant one (Figure 2, #4). This is a second qualitative change, for a qualitatively specific form becomes the dominant form for the system as a whole. In the vignette, Leandro eventually teaches a few lessons in a new way all the while teaching his other classes in his old way, until he teaches all of his lessons in the new way. In a way, there is not just one step to the new form but, as frequently observed in child development, there is a back and forth of operating between the old and new forms—e.g., between concrete operational and formal thinking—until behavior at the old level no longer is observed.

5. *Incremental change following qualitative turnover.* The historical-genetic account describes how the *revolutionary* process gives rise to a new trajectory of the system as a whole following the transition (Figure 2, #5). The analysis has to show what happens to previously dominant form, how it plays no or little role under the new conditions in the continuing evolutionary history of the system. In the vignette, Leandro has developed a new way of thinking about and practicing teaching; and in this new way of teaching he grows through incremental change. These incremental changes are different from those that were observed while he was still teaching in the old way.

In this five-part descriptive approach of the historical-genetic method that exhibits a dialectical process following the law of transition of quality into quantity, certain aspects of the growth process are located nearer to the environmental pole, which corresponds to Marx and Engel's (1975) notion of the leading, external, practical activity that provokes the emergence of qualitatively new forms of consciousness toward the subject pole of the category experience. Development may be described in terms of central and peripheral lines, where the central lines of one phase are peripheral in the changes of another phase. This is a core feature in the description of shift in dominance of qualitatively different forms, where previously dominant functions continue to exist but now subject to the newly dominant form.

Examples from the Research Literature

The term neoformation as used here denotes the *process* of emergence of a new feature (e.g., a physical property, cell structure, higher psychological function, or form of experience) that could not be predicted on the past history of the phenomenon of interest. Although the organism cannot predict the new form, its morphogenesis can be traced and reconstructed historically. The historical-genetic (dialectical) method documents the five distinct phases and points in the transformation of quantity to the new quality (form),

captured diagrammatically in Figure 2. Whereas Vygotsky's work manifests new forms (products of neoformation) with a special focus on child development, the concept is much more general and can be used in a broad range of social scientific phenomena where entirely new qualities emerge (e.g., Thom, 1981). The following examples from the research literature testify to the broad range of phenomena where morphogenesis occurred and where the concept is applicable: emergence of (a) society as the dominant feature in human psychology, (b) qualitatively new form of experience, and (c) conceptual change of a scientific research group.

One of the tasks of (Marxist) anthropology is to show how society came to take the role it has in social psychology, for example, where societal relations are the origin of higher psychological functions and personality and where *activity* [deyatel'nost'], the minimal unit that retains everything characteristic of society, lies at the origin of human *consciousness* and *personality* (Leont'ev, 1978). According to Vygotsky (1997b), the "development of behavior from animal to man resulted in the appearance of a new quality" (p. 39). The outlined five-part description was employed to show how (a) the psyche might have evolved and what kinds of conditions were required beginning with one-cellular organisms (Leontyev, 1981) so that society, with its collective provisions of general needs, became the dominant function of human life whereas the biological aspect (natural selection) was sublated (Holzkamp, 1983). These descriptions show that at a time in human evolution corresponding to that of present-day great apes, all the features typical of human society and behavior were already present. But these—including division of labor in hunting, fashioning of tools, tool manufacture for future use, exchange of foods for access to mating, and cultural practices—were not the dominant mode in the provision of needs (Roth, 2016). When these functions came to be subordinated to the *collective* (i.e., *human* society), the generalized production of goods to meet basic *individual* needs was possible. This new organization, society, became the dominant form of life allowing a qualitatively new forms of (human) experience to arise

for the species and its members. But the dominance of culture did not eliminate biology; instead, the biological functions, though more latent than culture, continue to constitute the very condition for cultural development.

The described historical-genetic method with its five distinct phases and points also was used to describe the continuities and discontinuities in the experience of an Icelander, who, for much of his life, was working in the fisheries sector (Jóhannsdóttir & Roth, 2014). But with an economic downturn and the arrival of cheap (East-European) labor in Iceland, making a living in the fisheries became increasingly difficult, constituting a contradiction in the environment. For the person and his family, this meant “insecurity, loss of control over their life conditions, and, therefore, a potential threat to their livelihood” (p. 58), constituting a contradiction at the person pole of the chosen person–environment unit. At this point, teaching became salient as an alternative possibility to make a living (Figure 2, #3), which, once the qualitative shift in experience was made (Figure 2, #4), led to new a new form consciousness entailing a different trajectory in the continuous education of the personality (Figure 2, #5).

A final example of the use of the historical-genetic method exists in an ethnographic study of the conceptual change that a scientific research group underwent during one of its research projects combined the qualitative description of the five steps with the model in the form of Figure 2 (Roth, 2014). The scientists had begun a research project to calibrate a Nobel Prize winning theoretical model for local use by fish culturists to specify the best date for releasing the salmon they hatch into the wild. Initially, the scientists “force-fitted” the incoming data to the existing model until, eventually, some alternative models emerged in a team meeting. The team continued to hold on to the standard model until, during a relatively short period of time, their entire discourse changed to the new theoretical model. The team subsequently went through a period of consolidation. The nature of the continued growth before and after the qualitative transition from the old to the new concept differed (i.e., trajectories #1 and #5, Figure 2,

were different). In this situation, the phenomenon under investigation was not an individual but a research group.

Discussion and Implications

The purpose of this essay is to contribute to the revitalization of investigating human growth phenomena in the cultural-historical tradition, including the concept of *neoformation* (Cole, 2009). Here, the term is used to refer to a process, also called morphogenesis, rather than to the product(s) thereof. This study does not limit itself to the one-sided use of the concept in Vygotsky's work, especially its use to name the *product* of morphogenesis, but generalizes the concept and shows that it is applicable in a broad range of developmental phenomena where qualitatively new forms emerge. I sketch the five phases and points that the historical-genetic method has to describe to provide a full account that quantity has indeed been transformed into quality and that a dialectical turnover to a new formation has occurred. The case I make for neoformation (process) is not meant to suggest that researchers should impose the dialectical principle on their phenomena, thereby reifying the law and concept in a new case. Instead, is important to find any dialectical principles in the phenomena through analysis and its description (Marx & Engels, 1975).

Theoretically, the concept of neoformation is grounded in the dialectical materialist law of the transition of quantity into quality. This law enables us to integrate otherwise dichotomous approaches to developmental psychology. This study thereby contributes towards a general psychology—which is dialectical materialist and Marxist (Vygotsky, 1997a)—that subsumes quality and quantity as *manifestations* of the *unit of measure* and makes the law of the transformation one of its “general principles and categories” (p. 330). The method is explicit not only in his description of the very beginning in the life of a person, where everything takes a qualitatively new form, but also in his descriptions of

the phases and stages in child development, articulated in terms of gradual changes and the crisis-like transition leading to the emergence of qualitatively new psychological forms.

Vygotsky applied the concept to a small range of phenomena and denoting the end product of a process of morphogenesis. The concept, as suggested here, especially to denote a process, is applicable to a broad range of developmental features and different classes of research objects. Thus, for example, the same concept can be used in the development of adults as well, for example, the emergence of new forms of consciousness (as in the case of Leandro) or experience (as in the case of the Iclander). Anthropogenesis was a neoformation at the level of the human race; and neoformation was occurring when a completely new conception was arising within a research group. We can learn from Vygotsky nevertheless: about the *mechanisms* of such changes, which we will also find in other aspects of human psychology, such as in the (personality) development of adults, in the changes of forms of experiences, and so forth.

A good candidate category to be used in developmental research is that of experience (*perezhivanie*), which denotes the subject–environment relation—i.e., practical activity together with the intellectual and affective reflections of that activity. Such an encompassing category, with the associated encompassing unit of analysis, is appropriate for a “dialectical psychology,” “the object of [which] is not mental phenomena but something more complex and whole, that contains the *mental and organic* as part” (Vygotsky, 1997a, p. 120, emphases added). The category of experience, therefore, is consistent with the concept of the leading activity, which takes place in the external (social, material) environment, but which is reflected in consciousness and affect (subject pole). The morphogenesis may also be studied in the context of conceptual development not by simply asserting that something is in the mind of the person but by showing how phenomena that *are* the societal relations that later appear in the responses or contributions of individuals. That focus on soci(et)al relations in human development is

another one of those pressing issues that Cole (2009) identifies as requiring further research.

The approach provides us with new insights to a frequently used Vygotskian concept: the *zone of proximal development*. All too often the term appears to be mobilized in the literature to denote cumulative rather than revolutionary changes; and Vygotsky himself has not shown how to integrate it with Marxian dialectics (e.g., Elhammoumi, 2015). A very promising avenue of research appears to exist in the following operationalization. In the mathematics of catastrophe theory, the graph in Figure 2 constitutes a cross section of a more complex situation. Other cross sections only show one branch, corresponding to the left branch (Figure 2, [1]). When there is only one branch, then a transition is impossible. The existence of a second branch, as on the right in Figure 2, is a function of both the biography of the individual and the environment (e.g., Roth, 2016). For some combinations of individual and environmental variables, there is only one branch; for others, there are two branches. When there is only one branch, there would be no zone of proximal *development* because any form of *obučenie* [teaching | learning], that is, local change in psychological (learning) or environmental (teaching) conditions only is associated with *incremental* change in one behavioral characteristic. This aspect has actually been observed in gesture studies (e.g., Alibali & Goldin-Meadow, 1993). Such studies show that children exhibiting verbal explanations consistent with gestures are not ready for *development* through teaching, whereas those who exhibit different strategies in their verbal and gestural descriptions are ready for teaching, as a consequence of which they develop. The present description of neoformation, as a process where a child operates at the level of the earlier developed form allows the crisis-like transition to the developmentally new form. In this way, the framework described in this study exhibits how the dialectical method can be used to solve the existing ambiguities in the relation between Marxian dialectics and the concept of the zone of proximal development.

Coda

In this essay, an argument is presented for the usefulness of neoformation, a little-used concept from Vygotsky's discursive repertoire. Neoformations are integral aspects of change in human lives, denoting those crisis-like instances where experience (*perezhivanie*) changes to a qualitatively new form. Neoformations go hand in hand with, and suddenly arise from, continuous changes that characterize the different periods of human life that are separated by instances of crisis-like change. It is suggested that neoformations are not limited to childhood and adolescent development but occur throughout the human lifespan. There is a vast field of potential applications for the concept.

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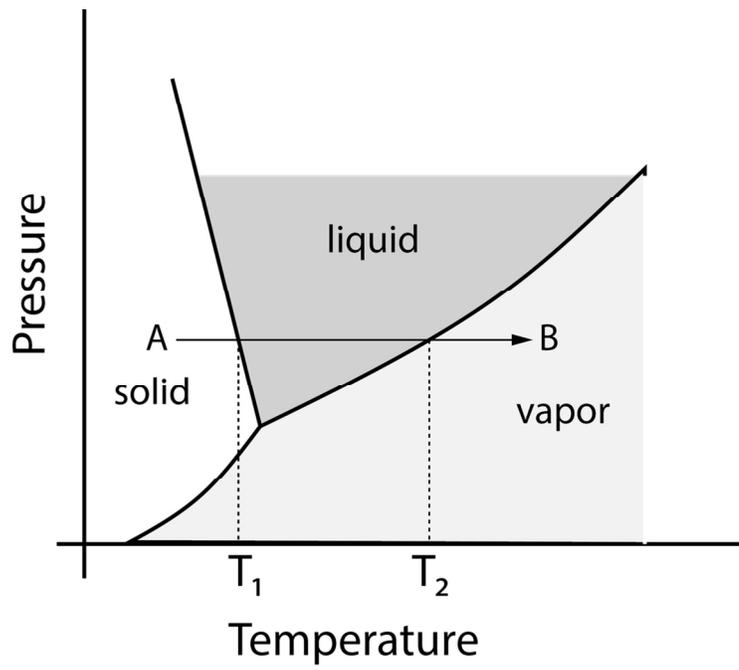


Figure 1. Phase diagram for H₂O