

Rethinking Affect in Education from a Societal-Historical Perspective: The Case of Mathematics Anxiety

Wolff-Michael Roth
University of Victoria, Canada

Margaret Walshaw
Massey University, New Zealand

Abstract

Affect tends to be treated in educational research as a factor external to but influencing cognition even in those approaches that ally themselves with cultural-historical approaches that denounce the separation of affect and intellect. In this study, we use the case of mathematics anxiety to exhibit and exemplify the ways in which affect tends to be theorized. We then present the radical alternative that L. S. Vygotsky initially proposed and that was further developed by scholars that advanced his idea of unit analysis. There are several consequences for the measurement of affect and its relations to other dimensions of activity.

Keywords: affect, unit analysis, society, history, dynamics

Introduction

Contemporary research reports tend to paint a picture of active classroom communities consisting of engaged learner discussants and facilitating teachers, all of whom speak in calm and modulated voices. Reports of classroom environments like these can be deceiving because they cover over affects such as frustration, panic, hostility, and tears, as well as blushes, laughs, confidence, elation, and enthusiasm that are always embedded within the setting. Affective responses are vital elements of, and are intrinsic to, classroom life—yet they generally are not captured by the small print of the classroom research contract. This can be seen in the following vignette from a fourth-grade classroom, which appeared in a book-length cultural-historical analysis of mathematical activity (Roth & Radford, 2011, pp. 36–38):

VIGNETTE: The children have been asked to model the process of saving \$3 a week beginning with a start up of \$6. In the first step, the children use goblets and plastic chips to represent the first six weeks of the process. They are then asked to fill up two rows of a table of values that is to guide them to write the saved dollar amounts as $3 + 6$, $3 + 3 + 6$, . . . $3 + 3 + 3 + 3 + 3 + 3 + 6$, and then to translate these expressions into the equivalent, shortened expressions $1 \times 3 + 6$, $2 \times 3 + 6$, . . . $6 \times 3 + 6$. Aurélie, after some attempt, says in a plaintive voice, ‘like this doesn’t make sense.’ She asks her two classmates at the same group of table how to do the task. She then pounds the desk repeatedly and throws herself against the backrest. She says, ‘I don’t understand. And I will never understand’ (p. 38) and places her head on folded arms upon the table. In the end, she copies the results from another student at the table group.

In reflecting on Aurélie’s actions, we became concerned about the way in which anxiety shapes, is shaped by, and precludes mathematical activity in ways that traditional approaches to research on affect does not capture. In this paper we therefore develop a theoretical

explanation for the work that anxiety does within the mathematics classroom. If, as we suggest, affect saturates every aspect of mathematical activity, then it will have to feature more significantly in classroom research than it currently does. Historically affect was featured in educational research, of course; yet, typically, research has treated affect as though it were an entity that negatively influences thinking (Roth, 2007). More recently, discursive accounts have built on the idea of affective responses as discourses to explore the politicisation of affect (e.g., Evans, Morgan, & Tsatsaroni, 2006). But are discursive approaches capable of providing a full account of affect?

This question is legitimate given that affect is intimately tied to the ‘flesh not originally constituted’ and, therefore, eludes any attempt to theorize affect as the result of a constitution (Henry, 2000; Leont’ev, 1983). We are not drawn to the claim advanced within traditional work that affect is an inner experience. We wonder if education has been looking for affect and its origin in the wrong place. Could there be a better explanation—e.g., studied from the perspective of ‘societal relations [*obščestvennij otnošenje*]’ dear to Vygotskij (2005)—that would help us understand how and why, for example, anxiety emerges within the mathematics classroom? If so, what would a perspective that prioritizes the characteristics and outcomes of societal relations look like?

Anxiety, as explained through a societal-historical theoretical approach that focuses on societal relations can add enriched understanding to our knowledge about anxiety within the mathematics classroom. Such an understanding might provide a coherent explanation for a sentiment that has been (i) experienced by many in everyday life and (ii) reported in recent empirical research (Lyons & Beilock, 2012): it is the *anticipation* of learning mathematics, rather than the actual performance of mathematical tasks, that is painful to many students. That is, to return to our vignette, Aurélie’s anticipation of future mathematical activity (‘And I will never understand’) may be a more important entry to understand the function of affect than what she experiences as frustration, expressed in her fist’s pounding the table, her throwing herself against the backrest of her chair, and the plaintive ‘I don’t understand.’

This paper is designed to show how affect may be theorized so that it is an integral aspect not only of the classroom but also a constitutive and therefore irreducible moment of action. Troubling the enclosed definition of the individual, we develop implications of the ‘concrete human psychology’ advanced by Vygotsky for formulating a notion of the anxious individual and his or her relation to the social and the conceptual. For a focused presentation and discussion, we use mathematics anxiety to exemplify and typify the research on affect more generally.

Characterizing Mathematics Anxiety

Traditional research on anxiety in mathematics has deepened our understanding through empirical work. Such work is often framed by explanations offered within meta-analyses or provided by scales intended to measure anxiety and, thereby, constituting it as a *factor* in/of mathematical activity. Work utilizing existing scales or informed by work reported within meta-analyses includes investigations into the relationship between mathematics performance and anxiety (e.g., Fennema & Sherman, 1976; Richardson & Suinn 1972) and on the factors associated with mathematics anxiety (e.g., Faust, Ashcraft, & Fleck, 1996; Sloan, Daane, & Giesen, 2002). The relationship of mathematics anxiety to behavior, cognition, and physiology (e.g., Johnson & van der Sandt, 2011; Rayner, Pitsolantis, & Osana, 2009) has been explored from the perspective of both teachers and students.

Such psychologically oriented research has made significant inroads into understanding anxiety and its relationship to achievement and other factors. These kinds of explanations

attain prescriptive force by accentuating the ways in which anxiety is embodied within the ‘mind’ of the individual. In these approaches, affect tends to be treated in the way Hartman and Sternberg treat it in their BACEIS model: as a second system that parallels the cognition system within an internal supersystem (Hartman, 2001). For example, Wolters and Pintrich (2001) use (test) anxiety as a variable to account for variance in cognitive strategy use during mathematical performance. In such psychological approaches, therefore, anxiety is external to and independent from cognition. By way of example, cognition and affect are poles apart in Sternberg’s (2001) recommendation that test takers operate ‘suppression of anxiety and other emotions that can interfere with test performance’ (p. 254). Few researchers, however, name the wider practices and discourses within which students with mathematics anxiety engage within the classroom.

Sociological perspectives ascribe a greater weight to the role of social processes and cultural practices to affective responses (Di Martino & Zan, 2010). Affective responses within a specific setting come into play as the dynamic involving cognitive, physiological, and motivational processes. Rather than privileging the mind, such approaches maintain that emotional reactions toward mathematics are not derived merely from a physiological or cognitive response but emanate consciously or unconsciously from the feedback that an individual receives. As sociologists of emotion suggest, in interaction (rituals) with others, signs of anxiety manifest themselves in a variety of forms accessible to interaction participants and, therefore, recursively influence the (face-to-face) interaction rituals constitutive of societal relations (Collins, 2004; Turner, 2002).

In exploring relationships between students and the settings in which their mathematical activities are conducted, traditional psychological and sociological analyses of affect have provided valuable insights into the self-social relation. However, we note in this work a resistance to embrace the key tenets of the body of work that might help us understand the affective experience more comprehensively. *Post*-humanist traditions instead propose societal relations as lying at the heart of anxiety. They demand that we interrogate the assumption that an individual possesses a pre-given capacity. Societal-historical currents within this tradition, in particular, that of Vygotsky’s, refuse to see the individual as fixed, stable or unitary. Instead, the individual is seen as formed by unstable contours and is individuated provisionally rather than definitively. Formulations, like these, are capable to escape the cognate trappings that dichotomize the individual, the social and the conceptual. In the following, we propose Vygotsky’s work as a means to develop understanding of the affective experience. It is precisely because of the huge respect for Vygotsky’s work within education—and the present disconnect with his ideas revealed in the work of scholars of affect—that we want to show how a reading that captures the full integrity of Vygotsky’s ideas, allows us to advance our understanding of the experience of anxiety in relation to mathematics learning. We expand the starting points Vygotsky has provided and articulate the ways in which his ideas have been taken up especially in societal-historical school developed by his student and colleague A. N. Leont’ev and further developed in the Berlin school of *Critical Psychology*.

A Societal-Historical Approach to Affect

From Element (Factorial) Analysis to Unit Analysis Capturing the Dynamic of Affect

In our introductory quotation to this section, Vygotsky articulates the intellectual and the affective-volitional as two sides of consciousness and their separation as a profound error psychologists have made. Today, almost exactly 80 years after he wrote this statement in the opening chapter of his book *Myšlenie i Reč*, the separation of the intellectual and affective-

volitional sides of mathematical activity is still common. Vygotsky, however, considers the two as sides of the *same* coin, which means that the two sides cannot be understood independently. They are manifestations of a higher unit rather than elements to which the unit can be reduced. In this first chapter, using the analogy of a chemical compound water, Vygotsky argues that the properties of water cannot be understood on the basis of the properties of hydrogen and oxygen that are part of its composition. Similarly, the properties of hydrogen and oxygen cannot be understood based on the properties of water.

Critics of the elemental analysis suggest that the relationships between variables in the factorial approach can only be spurious because they do not represent the *inner* connections within the unit or system considered (e.g., Il'enkov, 1977). Vygotsky, instead, is interested in a form of analysis that reveals the movement from a person's needs and interests to the directions of her thinking and, simultaneously, the movement from the dynamic of thinking to the behavioral dynamic 'in concrete *activity* [*deyatel'nosti*] of the personality' (Vygotskij, 2005, p. 679, emphasis added). Here, we point out that the word 'activity' does not sufficiently retain the *societal* character of human relations that Vygotsky has emphasized (Roth & Lee, 2007). There is therefore 'a *dynamic* system of sense that represents the *unit* of affective and intellectual processes. *Every idea* contains in transmuted form an affective human relation to reality' (Vygotskij, 2005, p. 679, emphasis added). Here, Vygotsky specifically notes the unity of affective and intellectual *processes*, which are but two sides of the same coin (unit), such that every idea, an intellectual process, always also contains an affective coloring.

As an integral part of a process, affect therefore has itself the character of a process, forever changing in and as a result of practical activity. This is shown by the analysis of the events including and surrounding Amélie, where students and teacher continuously manifest emotions and, in this, affect the emotions of others (Roth & Radford, 2011). When this affective tone of activity is not considered, Vygotsky concludes, thinking comes to be an independent stream of thoughts thinking themselves that are no longer intimately connected with and integral to the fullness of everyday life and the concerns of real, concrete people. Thinking, in fact, becomes an epiphenomenon. In developing these ideas further, Leont'ev (1983), suggests the need take up the *category* of activity as the overarching unit that integrates the inner and outer, the practical material, intellectual, and affective planes of everyday life, whether it be work, leisure, or schooling.

Societal Relations are the First Instantiations of all Higher Psychological Functions

As Vygotsky specifically writes in a chapter about his attempt to work towards a 'concrete human psychology,' *societal relations* constitute the lynchpin to understanding all higher-order psychological functions and human personality (Vygotskij, 2005). It is important to retain that social relations—those between two or a group of persons—are determined by societal relations rather than societal relations being build up from the ensemble of social relations. Human relations—which are always characteristic of society because it is in and through them that society is constituted—are what later come to be seen as the higher psychological functions. That is, from the perspective of the individual, it is *as* societal relations that higher psychological functions first exist. Development constitutes an individualization of societal relations (rather than a socialization of the individual). Therefore, the 'psychological nature of man' is '*the totality of societal relations, shifted to the inner and having become functions of personality and the forms of its structure*' (Vygotskij, 2005, p. 1023). Vygotsky does not characterize the relations as 'social' but explicitly identifies them as 'societal,' which, in turn, became an important aspect of the activity theoretical endeavor that continued Vygotsky's approach (Leont'ev, 1983).

From this perspective, it is important to consider the opening vignette not as something specific to *this* classroom and the particular task in which Aurélie is involved, but as an aspect of a societal activity, schooling, here concretized in a particular way by Aurélie, her peers in the group of desks, and her teacher. In Vygotsky's approach, both affective and intellectual expressions are a function of the societal nature of schooling, here enacted in the form of society-specific relations with the teacher and peers. If there are particular affects such as trait anxiety that come to be pinned to Aurélie, then, from Vygotsky's perspective, these are the results of societal relations that have been shifted to the inner sphere and have become forms of her personality and functions of its structure.

Affect as One Manifestation of the Category (Unit) of Experience [pereživanie]

Central to Vygotsky's approach was the search for categories, that is, minimum units of analysis that contain all the aspects of the whole, which, in the societal-historical approach, is theorized to be society. All the dimensions that psychologists tend to study as factors are treated as mere—always one-sided and, therefore, partial—manifestations of the whole. In a lecture on the role of the environment in the development of children (Vygotskij, 2001), Vygotsky proposes the category (unit) of *pereživanie*, a term that translates into English both as 'experience' and 'emotion.' We use the term experience all the while retaining that it is shaded in its entirety by affectual tonality. He defines it as one of those analytical units that do not lose the properties characteristic of the whole: '*An experience [pereživanie] is the unit where, on the one hand, in an indivisible form, the environment that is experienced is represented—experience always refers to something that is outside the person—and on the other hand, is how I, myself, am experiencing this*' (Vygotskij, 2001, p. 75–76, original emphasis). Experience with all of its affective colorings, Vygotsky emphasizes, always refers to something both outside and inside the person. But because it is a unit, the outside cannot explain the inside, in the same way as the inside cannot explain the outside. Considered on their own, the two are but manifestations of the higher unit. Important in this quotation are the terms 'moment' and 'trait,' which emphasize the character of experience as indivisible unit. Vygotsky therefore uses the term experience as a category (unit) to include the practical material setting and personal characteristics, including the intellectual, affective, and practical. Because experience also includes others, that is, societal relations, affect simultaneously obtains individual and collective dimensions. Most importantly, the category refers to an event. Experience, and, with it, affect, therefore 'should be understood as changeable, dynamic' (Vygotskij, 2001, p. 81). It is in, through, and as a result of experience that persons develop. This understanding, therefore, allows us to anticipate that experiences such as those in which Aurélie is involved will be formative: These are part of the 'totality of societal relations' (Vygotskij, 2005, p. 1023) that Aurélie has been part of and lived through. Traditionally operating researchers might find that she provides particular responses or sets thereof that are consistent with his approach to anxiety.

Integrating Experience and Societal Relations

The key to Vygotsky's reformulation involved *societal* relations, which he conceptualized by means of the category of experience [*pereživanie*]. However, in his text within which the constitutive role of societal relations is developed, Vygotsky does not refer to experience. Moreover, in his text on the role of the environment, he refers to the role of the *societal* group in development only once. It was his student Leont'ev who subsequently formulated the category of activity as the minimal unit that retains all the characteristics of society (Leont'ev, 1983). By way of example, the different human activities such as making (manufacturing) tools, farming (growing food plants), animal husbandry, and so forth, have emerged, at a societal-historical level, through the division of labor from simply need-

satisfying activity. In the course of history, human societies have evolved the institution of schooling that reproduced the cultural forms of knowledge and hierarchical structures characteristic of society (Roth & Lee, 2007). What are essential to society's development, as proposed by the activity theoretic approach, are the integrated but 'complicated' relations between different planes and classes of emotions. Both Leont'ev and Vygotsky therefore emphasize the irreducibility of societal relations, societal groups, and societal activity all of which are completely pervaded by affective tonality.

Societally Motivated Activity as Minimal Unit of Analysis and Category

Leont'ev, while retaining the emphasis on affect and societal relations, has defined societally motivated activity as that unit that retains all the characteristics of society. For both Vygotsky and Leont'ev, personality is a function of the totality of societal relations in which a person has participated in the course of his/her biography. The assumptions underpinning the societal-historical approach to mathematics anxiety that we articulate here based on our reading of the tradition that Vygotsky has initiated, include (a) anxiety occurs as part of a layering of complex systems of relationships, (b) characteristics relating to the personal (e.g., age, gender, ethnicity, social class), environmental (e.g., parental support), dispositional (e.g., attitudes and self-esteem), situational (e.g., instructional approach, classroom factors, the curriculum) and historical (e.g., earlier mathematics experiences) planes do not simply mediate students' reactions; and (c) anxiety, as other forms of affect, is part of the societal relations in concrete settings that constitute its origins.

Leont'ev's work, relevant to the present discussion, has been developed further within the discipline of Critical Psychology (Tolman, 1994; Tolman & Maiers, 1991). In the critical-psychological version of the societal-historical approach that articulates a 'concrete human psychology,' anxiety is a reflection of the impediments to realize actions, which leads to a diminishing of quality of life. For example, Holzkamp (1983) relates anxiety to the agent's limited control over conditions and impediments to the realization of actions, and in which the field and the conditions are always exposed in and relevant to other-oriented situations. 'Frustration,' distress, or *anxiety*' (p. 214, emphasis added), are affective reflections of unexplained premises concerning the reasons and possibilities to overcome the truncation of agency. That is, anxiety, as other affective manifestations, reflects the fact that the person experiences herself as being unable to gain control over the conditions and, in so doing, deal with the problem at hand. Discussing the evolutionary antecedents of the associated human emotional states, Holzkamp uses the example of the classical experiment in which rats that abandon going after food when failure to reach the correct door—randomly changed so that learning the correct path is impossible—are penalized in the form of an electric shock.

Anxiety, then, can be grounded in the unexplicated and unexplained premises with respect to the reasons for the impediments and the possibilities to overcome those to achieve the intended goals (Holzkamp, 1993). For this reason, 'overcoming suffering and anxiety, and the human quality of satisfaction is not obtainable merely by actual satisfaction and protection, but only by achieving control over the resources of satisfaction' (Holzkamp, 2013a, p. 21). Related to our introductory episode, this is clearly seen in a contrast between Aurélie and her classmate, Mario. The latter continues to engage in the face of considerable frustration, and, in the process, opens up action possibilities that eventually lead to the intended goal and positive emotional assessment of having succeeded (in the face of adversity). The former, however, abandons the task, having conceptualized her situation in the phrase 'I will never understand,' and, never achieves control over the situation. Holzkamp (2013b) is highly critical of research that uses independent or moderator variables such as "high-anxiety" or "low-anxiety" persons' (p. 83), because these 'are, strictly speaking, *not interpretable* in terms of standard experimental hypothesis formations' (p. 83). Such

“personality features,” which are themselves strongly in need of conceptual and empirical explanation, are here hypostasized as an “ultimate” explanatory basis’ (p. 83–84).

Deepening the Analysis of the Episode to Elaborate the Societal-Historical Approach

Having provided a general introduction to the societal-historical approach of theorizing affect, we now return to the classroom episode to develop further dimensions of this approach by staying close to the data. In reporting on the example of Aurélie provided at the beginning, Roth and Radford (2011), in a chapter within *A Cultural-Historical Perspective on Mathematics Teaching and Learning*, devoted to emotions, show how affect both constitutes the context for action and is, in turn, shaped by action. In developing these ideas, they cite the work of Holzkamp-Osterkamp (1975, 1976), who, we noted above, has engaged with the conceptualization of anxiety. We draw on this example because the authors do not analyze Aurélie’s case in detail, nor do they write specifically about anxiety.

Acting as Condition for Changing Affect

In the societal historical approach that has been articulated and elaborated successively by Vygotsky, Leont’ev, and the critical psychologists, as we show above, affect is a reflection of a self-moving phenomenon: societal activity. That is, societal activity produces and, in so doing, reproduces and transforms itself, including the affective tonality. That is, any practical or intellectual action is associated with and characterized by affect and, in its unfolding, reproduces and transforms affect. Affect is a manifestation of activity, its condition, unfolding, and result. This has immediate theoretical consequences. Thus, because of this mutual dependence of anxiety and action, the students and the teacher in the mathematics classroom have to act to have any hope of getting out of negative affective situations in the face and despite of the negativity experienced. That is, they can get out of a frustration and its influence on other affective moments only through their actions. However, acting does not guarantee the amelioration of the affective tonality but may, in fact, aggravate the situation. Thus, Mario, another student working in the same group as Aurélie, and Jeannie, the teacher, persist in the face of the high levels of their mutual frustration and, in the end, turn out to be satisfied when lack of understanding (on the student’s part) and lack of an appropriate teaching strategy has been overcome. On the other hand, Aurélie does not persist; she does not act. Because of the interconnection of affect and action, it is not surprising therefore that Roth and Radford would report continued expressions of frustration, non-engagement, and final accomplishment of the task as revealed when Aurélie copies from her peer, Thérèse.

The authors repeatedly use the term ‘disengaged’ to describe what Aurélie is expressing in and with her voice and body. The authors note: ‘Emotion therefore constitutes an index of the possibility Aurélie anticipates to have about obtaining control over the activity and achieving a successful outcome: realizing the object/motive’ (p. 38). That is, they suggest, ‘when there is a high to perfect likelihood that success will not be attainable then the emotional valuation will be negative and there [sic] is less likely for it to pursue the activity’ (p. 38). The authors use drawings to show how Aurélie continues to articulate for everyone to witness a negative tonality of the personal moment of experience. The current experience, at the intellectual plane, comes to be expressed as ‘I don’t understand.’ Pounding on the desk, throwing her head against the backrest, and lounging in the chair are manifestations of consciousness related to the affective dimensions of the present state of the task within the activity of schooling. However, this experience, generally, and its affective tonality, specifically, bears on subsequent experiences (Dewey, 1938/2008; Vygotsky, 2001),

especially when the expression ‘And I will never understand’ becomes a self-fulfilling prophecy. Moreover, because Aurélie does not have a choice to opt out of mathematics, she can anticipate that non-understanding will reproduce itself with consequences on her grades and grade reports. Anxiety would be that moment of the overall affective coloring that reflects the *anticipation* of undesired future events and the emotional reflections that go with them.

From Loss of Control over Conditions to Defensive Learning

Anxiety, as frustration, according to Holzkamp-Osterkamp (1975, 1976), is an affective expression that is tied to the need for control over the environment. In fact, the readiness for anxiety is part of the orientation to and exploration of the environment, are conditions for learning and the expansion of control (i.e., agency) that can be found among higher animals, including humans. We can then understand anxiety to be part of a series of affective qualities that reflect the relationship between the individual and its anticipation of having/gaining control over conditions and the difference between desired outcome and possibility of not achieving it. Thus, anxiety before mathematics examinations is the reflection of a possible loss of control over the task conditions and, as a result, failure rather than success. It is a sort of performance anxiety akin to the stage fright that actors experience before going on stage. In this perspective, anxiety is a form of regulation of curiosity- and exploration-related behavior, as a ‘phylogenetically developed *emotional form of evaluation of “risk optimization”* within *processes of “autarchic learning”*’ (Holzkamp, 1983, p. 145). Anxiety, therefore, affords the achievement of a middle ground between information loss arising from flight and overly incautious approaches of the new and unknown. It presupposes that there is something unknown to, possibly unmanageable by the individual who experiences this form of affect.

In Aurélie’s case, she tells her peers—and, through the recording, she tells us analysts as well—that she does not understand what the task is demanding of her. She disengages, as Roth and Radford (2011) repeatedly tell their readers, from the task, physically by moving away from the desk or placing her head as if resting or sleeping. Even more so, she tells to everyone within hearing range that she will *never* understand. At the time of the recording, Aurélie is in fourth grade. Even if she were beginning to conceive that she will never understand and developed the desire to drop out, she has no option but to participate in mathematics lessons until the subject becomes optional or, in the worst-case scenario, until she drops out of school. Coming to mathematics class then means confronting not only the present lack of control over conditions, and, therefore, occasional failure, but continued and perhaps increasing loss of control and, continuing experiences of failure.

From a societal-historical perspective, the orientation towards control over conditions as an individualized experience quality is in fact a symptom of the individual’s isolation from the collective provisions, that is, the obstruction of quality of life that can be achieved in societal life (Holzkamp, 1993). As long as the need for control over conditions remains in the foreground individual’s experience, ‘the frustration, anxiety etc. associated with it blocks the access to the content-related richness of societally mediated possibilities of subjective experience’ (p. 218). This richness can be experienced only when the actual lack or loss of control is not equated with threats to identity and subjectivity. That is, when loss and lack of control does not threaten the individual mathematics learner, the associated exposure to the conditions can be experienced without frustration, anxiety, or fear. In fact, the loss/lack of control can then be lived as a natural quality of life and world experience.

In the end, Aurélie does not actually work through the example in the way her class mate Mario does. Mario is also frustrated and who apparently struggles, but despite and with negative emotions, continues and succeeds, giving full expression to his successful

achievement and positive affect. The continuation laden with negative emotion leads to an overturning of the negative to a positive emotion. Noting the considerable frustrations in the process, Roth and Radford (2011) reveal that Mario ends up stating, ‘me, I now understand’ (p. 89). The authors note that in his case, the ‘activity itself *may* transform the level of control over the situation and therefore the quality of life, which Mario expresses at the end in the utterance “Me, I now understand”’ (p. 105). In contrast, Aurélie produces the correct answers on her sheet but only because she copies what Thérèse sitting next to her has done. That is, copying, which in examination situations would be termed ‘cheating,’ is a form of action that averts being punished (in the form of a low grade). From the perspective of students, copying, cheating, and plagiarizing are rational and intelligible responses to threats in the context of an environment where it is the grades one receives rather than knowing that counts. Some students will in fact become increasingly better at producing the right answers without understanding the task: They engage in defensive learning, which is motivated by the anxiety/fear to be negatively affected (fail, be punished, be exposed, laughed at) (Holzkamp, 1993). Holzkamp positively discusses curricular approaches where students work together and help each other in small groups, suggesting that anxiety will diminish while being ‘an expression of solidarity in social learning’ (p. 549). Although Aurélie, Mario, and Thérèse worked at the same set of desks, they did not appear to work together—Mario says so when the teacher asks them whether they are having a group discussion (Roth & Radford, 2011, p. 51). That is, the kind of support that working together *could* give to Aurélie, thereby encouraging her to remain engaged despite the (temporary) lack of control, and, in and through the activity, might well turn the cognitive-affective situation around as it had done for Mario.

Discussion and Conclusion

In this article, we propose to rethink and retheorize affect so that it becomes but a manifestation of higher order units (categories) rather than being a mere factor, inherently external to the phenomenon of interest. We use mathematics anxiety as an example of the research being conducted today, which we contrast with a radical alternative original proposed by Vygotsky and further developed by members of the school he founded. We presented a view drawing on a number of important ideas conceived by Vygotsky that led him to radically reformulate the relation of affect to intellect (cognition) in irreducible everyday experience. In the proposed societal-historical approach, thinking, acting and feeling are assumed to be entwined with and constituted by the individual’s relation with history and culture. Environmental, dispositional, and situational characteristics do more than *mediate* students’ affective responses, such as anxiety; they are its origins. Applying these ideas to the classroom leads us to propose that affect occurs as part of, and constitutes one reflection of, a layering of complex systems of relationships—past, present, as well as potential—and within constantly changing circumstances and conditions. This relational nature of Vygotsky’s ontology is often overlooked within mathematics education. Underscoring societal relations allows us to shift our attention away from the stable individual-as-being and towards the societally, culturally, and historically dispersed nature of the individual person, who never is fixed. It prompts the proposal that our capacity to act, think, and feel anxiously in formal mathematics situations is produced by mutually reinforcing societal activity and practices.

Taking a different stance from other approaches to anxiety, our Vygotskian pathway asks: What if affective states were always linked to action and agency? The approach we offer honors the social, the discursive, the physical, and the temporal, both past and present,

unsettling the inside/outside polarity that characterizes traditional approaches to affect. In our approach, affect does not equate to beliefs or feelings. It denotes continual becoming, always anticipating. It is relational and contingent as well as dispersed. The immediate consequence of this framing of affect is that it can no longer be measured in the way research traditionally has done because it is continuously changing even in the course of the testing activity intended to pin some specific measurement value to it. That is, the test intended to measure affect misses the affective nature of the testing activity itself; and it misses capturing the dynamic aspect of activity and experience, which manifests itself in the continuously changing affect. It therefore behooves researchers to state the conditions and levels of abstractions made to reduce affect integral to activity to a factor inherently external to that activity.

Bringing a societal-historical approach to bear on the study of affect involves identifying perceived negative influences and understanding the ways and means by which those influences emerge and are negotiated by the individual within social, discursive, temporal, and the psychic dynamics. What is pivotal to our expression of affect are the mutual and relational effects of the societal and the individual within his/her setting, time, and space. When affect is treated as a one-sided manifestation of experience [*pereživanie*] (paralleling other manifestations such as intellect and practical dimensions [see also Dewey, 1938/2008]), it points to something markedly different from a state, a condition, a representation, or a power struggle. It points to the realization that affect is a reflection of individuals interacting dynamically with layers of societally, culturally, and historically perceived-as-negative tools or influences pertaining to the relevant subject matter (mathematics in our case example). In the broader interpretation these influences might not be restricted to face-to-face interactions with others: they might be inclusive of artifacts, technologies, words and symbol systems, environmental designs, and interaction rituals, and so forth.

One important consequence of the societal-historical approach is that affect and emotions, generally, and anxiety, specifically, can no longer be neatly packaged and attributed to the individual. Instead, as manifestations of whole units, including the categories *experience* [*pereživanie*] and *activity* discussed here—but also including those that prominently appear elsewhere in the works of Vygotsk and Leont'ev, such as *consciousness* and *personality*—affects pervade those units and, when considered individually, constitute one-sided manifestations of the whole. Because these units all refer us back to society, theories of frustration, anxiety, and other forms of affect need to include the discussion of the *societal* context and the societal nature of the activity [*deyatel'nost'*] in which a person is involved. Anxiety, then, no longer can be the reflection of an individual, as traditional approaches determine it to be, but is a reflection of society and the societal relations in which the individual is a constitutive part. Aurélie's frustration, and the anxieties that she might eventually manifest when experiences such as those in the vignette repeat themselves, is as much influenced by society and the kinds of demands it makes and the situation it creates for the children, as it is of the children themselves.

The move from the individual to societal relations in which individuals are necessary and integral parts has considerable consequences. This is so because an analysis that focuses on societal relations and understands these to be, as Vygotsky suggested, the first instantiation of all higher psychological functions and of personality, also allows us to bring into the analysis the societal inequities. Because all inequities have their source in society come into focus when we study societal relations, we come to understand new ways how anxiety is produced in and through societal activity and how this brings about the effects we see (e.g., girls, African American, immigrants, or aboriginal students dropping out of mathematics).

The relational nature of the societal-historical approach thus allows us to address the issue of decontextualization which appears to put limits on the study of affect within education. By

way of explanation, our approach is grounded in the understanding that words such as troubled, worried, panicky, heated and withdrawn, whilst associated with affect, generally, and anxiety, specifically, can never fully capture its nature. Approaches that conflate or reduce experience [*pereživanie*] to speech (e.g., ‘interpretation’) draw on a model that assumes words and speech are innocent carriers of an interior meaning. The very terms in which anxiety is articulated in such approaches are haunted by terms that preclude it from confronting the problem of representation. Acknowledging the indeterminacy of speech, our approach views words associated with the emotive register as simply ways of giving expression to an experience. It provides us with the tools for taking up the challenge of understanding the fullness of affect in irreducible experience [*pereživanie*].

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