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Emotions as an orienting experience

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In this article, I first introduce data collected from 38 prospective elementary teachers after an intensely negative emotional experience preparing to play a game called Around the World. From these data emerges a picture of these prospective teachers being deeply affected by this experience. To try to understand these changes I present a theory by Leont'ev. This theory, based on Vygotsky's cultural historical theory, looks at the relationship between motives, activity, and emotions. Using this theory, I argue both theoretically and empirically that what has actually changed for these prospective teachers are their motives. More specifically, the hierarchy of their motives. The results contribute to work in mathematics education that anchors emotions in a theoretical framework and links them to other constructs in the affective domain.

Keywords: Emotions, participationist, motives.

INTRODUCTION

In the spring of 2010, Kim Beswick visited my EDUC 475 class for a day. EDUC 475 is the mathematics method course for prospective elementary school teachers. Each section of the course usually has 30–35 students, 90%–95% of whom are female. On the particular day that Kim visited we were discussing basic operations on single digit numbers – addition, subtraction, multiplication, and division. The goal of the lesson was to get the students to experience methods of teaching these operations other than memorization and rapid recall, which is the only method familiar to many of them.

Although the lesson has this goal, this only defined the general direction I wanted to go in. During the actual lesson I draw on a large repertoire of activities and discussion points that tumble out in a, more or less, improvised order. This allows me to more effectively respond to my perceived needs of the specific group of students at that specific time.

As it was, many of prospective teachers I was teaching the day Kim visited, although seeing the merit to the many alternative methods I was modelling, were still not ready to abandon the 'drill' method of teaching fluency of the basic facts. Many had mentioned at the beginning of this lesson, as well as in the previous lesson, that they had regularly used *The Mad Minute* during their practicum. This was problematic to me. *The Mad Minute* is a test, usually given once a week, where students are challenged to answer 30 questions in one minute. Their scores on these tests are often recorded in some public fashion and the top achieving students are rewarded for their achievements. The possible negative consequences of this method are many, yet it continues to be practiced for its efficiency, simplicity, and tradition ... and parents like it.

To emphasize the potentially negative consequences of this method I did something I had never done before. After the pre-service teachers returned from a break I gathered them around me. I told them that we were going to do a basic facts activity. The way this activity would work is that I would point at one of them and ask them a basic multiplication question (3×4 , 6×8 , etc.) and they would have two seconds to respond. If they responded correctly in that time they would be allowed to sit down. If they failed to give response, or their response was incorrect, they would remain standing and I would come back to them after I had gone all the way around the class. This would continue until all the students were sitting.

This game, as it is referred to by practicing teachers, is called *Around the World*, and is often used, in conjunction with *The Mad Minute*, as a way for students to practice their basic facts. Unfortunately, it has the same sort of public shaming qualities that the *Mad Minute* does.

The pre-service teachers gathered around me were, as a group, visibly uneasy. There were a few who seemed excited at the prospect of playing a 'game' and the thrill

of competition. But the vast majority were horrified at what was about to happen. When the tension had built to a crescendo I pointed at the first prospective teacher and, instead of asking a basic multiplication question, asked, “How are you feeling right now?” And then, to the whole group, “How are all of you feeling right now?”

The relief in the room was tremendous, and the ensuing conversation was beyond anything I had expected. The experience of almost having to play *Around the World* was transformative for these soon-to-be teachers who talked about how they NOW understood how negative this game—and *The Mad Minute*—could be. For over an hour they talked about their past experiences, sharing the negative impact these types of ‘games’ had on them as learners. A few of them shared their positive experiences with these types of activities, but even then quickly acknowledged that their enjoyment was not worth the price of misery that the rest of the students had to pay. We discussed why parents liked these ‘games’ and ways, as future teachers, to deal with that. In the end they vowed, individually and as a group, that they would never do this to their future students.

After the class, in debriefing the activity with Kim, we both concluded the obvious – the prospective teachers had had a powerful emotional experience and that that experience had caused wide sweeping changes in their intended practice (Liljedahl, 2008). But, we also concluded that we currently had no theoretical framework to make sense of this experience.

In mathematics education research in general, and in affective research in particular, emotions remain a largely unresearched and not-well-understood construct. The little research that exists are “sidelights rather than highlights of the studies” (McLeod, 1992, p. 582).

As such, we decided that we needed to recreate the phenomenon and to gather data on it.

METHODOLOGY

So, in the spring of 2012, working with a new group of 38 (35 female and 3 male) EDUC 475 students, I recreated the *Around the World* activity. As mentioned, EDUC 475 is an elementary mathematics methods of teaching course. It runs for 13 weeks and is comprised of 13

lessons – one each week. Each lesson is four hours long and is typically designed around a number of activities and resultant discussions. Between lessons, students are assigned readings and prompts to be responded to in a reflective journal. As with the previous class, many of the prospective teachers in the current class had acknowledged that they had used *The Mad Minute* or the *Around the World* activities during their practicum, either on their own initiative or at the urging of their sponsor teacher.

As such, in the fourth week of classes I once again ran the *Around the World* activity. This time, however, instead of immediately going into a discussion I did something different. As the tension built to a crescendo I pointed at a student and asked her how she felt, and then I immediately asked her, and all her classmates, to sit down and write in their journal how they felt at that moment. The students wrote for 10–15 minutes. We then had a whole class discussion much as I had led for the class two years prior.

At the end of the class they were assigned a further journal prompt:

Discuss your experience in today’s class around the issue of multiplication. What did you feel when I sprung the “stand up and get ready to answer multiplication facts” activity? What sort of self-reflection did you go through? How do you feel now after we debriefed it?

Towards the end of the course, the students were given a further writing prompt potentially related to the *Around the World* activity and discussion.

Now that this course is almost over what is something that you will NEVER do in the teaching of mathematics? Why? What is something that you will ALWAYS do? Why?

Taken together, data consists of the relevant entries from the written journals of these 38 prospective teachers. These data were analysed using a constant comparative method (Glaser and Strauss, 1967) to emerge themes pertaining to their emotions and the effect of those emotions, both short term and long term.

RESULTS

For the most part, the game of *Around the World* created a very negative emotional experience for these prospective teachers.

Fear

Fear, in one of its many forms, was one of the most commonly expressed emotions immediately after the activity.

Misha Terrified! I can't do mental math very quickly and I don't like being the centre of attention when under scrutiny. The only thing I could think was "I'm going to be the last one standing". I don't want to look slow in front of my peers and teacher. Through my education career I sit in my seat praying not to be called on.

Allison Mortified. I don't like to be wrong or feel embarrassed in front of my peers. It can be extremely difficult to get the answer right as I'm too busy thinking about me, or what they are saying to care about the problem. Eventually I feel I'd just guess to get it over with.

Anxiety

The other emotion frequently expressed is anxiety.

Beth Heart racing anxiety! The thought of being picked on and not knowing gives me the heebie jeebies, especially in a subject that is probably my weakest. Being that it is multiplication and is something that I probably would get right doesn't really help shake the feeling you get when you know that there is pressure to perform. [...] If I feel like this at 23 how would a kid feel?

Jocelyn I am feeling really anxious and nervous. I am worried about being embarrassed about not being able to answer the multiplication question in front of the class and I am also really worried about being the last person standing.

Nervousness

Nalah I felt nervous because I might not know the answer to the multiplication question he might ask. [...] While we were standing there waiting for Peter to ask, I was thinking back to grade two and three and how we played the game *Around the World*, and how nerve racking it was.

Defeated

Anne It also reminded me of a time when my grade three teacher called me to the front of the class to answer a question. She knew I wouldn't know it, but I had to do the walk of shame to the board only to admit to the whole class that I didn't know the answer. I dreaded going to class. I just remember being in class and feeling defeated by math.

TEACHER CHANGE

These very negative emotions were not fleeting. Despite the fact that during the course we engaged in over 50 activities and discussions, and read over 400 pages mathematics education literature, six weeks after the *Around the World* activity, 24 of the 38 prospective teachers in the course chose to discuss this specific activity, and the emotions it triggered, when responding to the prompt about something they would never do in their teaching.

Misha Something that I will NEVER do in the teaching of mathematics is put students on the spot and force them to answer questions. Like many other people, I have experienced embarrassment from being put on the spot and answering incorrectly. I understand how low it can make; a student feel and I don't want to be the one to make my class feel that way.

Sofia In teaching math I will never use the Mad Minute to drill students on their multiplication tables. The costs to many students outweigh any benefits to a minority of students.

Jocelyn Now that the course is over, I have discovered that I will never make my students

do any sort of drill or mad minute that may deflate their confidence and cause them to want to avoid mathematics. I realize what effect ‘mad minute’ exercises had on me as a math student and when Peter simulated a mad minute situation, I felt terrified and extremely anxious. I would never want my students to feel that kind of panic and fear. As a teacher, I hope to foster a love for learning mathematics and want to create an environment whereby my students feel confident and safe.

Even those who were originally excited by the game talked about the negative emotions they say their classmates experience.

Alison To be honest, I was excited to play the game. But I can see how an activity like this could bring high levels of anxiety for students in a class that are insecure about their amount of knowledge or skills with respect to what is being quizzed on the spot. I did not feel panicked because I am confident that my multiplication skills are fine. [...]Something I will NEVER do when I teach math will be multiplication drills. It traumatizes children that are not finding this activity successful, and it could give them a bad taste for math for the rest of their life.

Of the 14 who did not speak of the *Around the World* activity explicitly in their response, 12 made commitments that were tangential to some of the ideas that cascaded from subsequent discussions on the learning of basic facts in general, and assessment in particular.

Anne I will NEVER use assessment as a way to rank students.

Khaly I’m not afraid of mathematics any more, to learn or to teach. I also think that mathematics can actually be fun. I am excited to teach my new students (when I get my first class). Show them that math is not as scary as it seems.

Taken together, 36 out of the 38 prospective teachers, despite many having used it in their practicum, vowed to never use *Around the World* (or the *Mad Minute*) in their future practice as teachers. For them, their own experience with this activity had triggered very negative emotions, sometimes reminding them of similar activities and emotions from when they, themselves, were children. These emotions were not only enduring, but also instrumental in changing things in the prospective teachers’ practice.

But what exactly is it that has changed for these teachers? This is my research question. Given that they don’t actually have a classroom in which to enact these changes we cannot say that it is their practice that has changed. Perhaps it is their intended practice that has changed? But what is backstopping this intention? Intentionality is a reification of deeper constructs. The question is, what is the construct that grounds these intentions, that was deeply affected by the emotional experience that these teachers had when being placed in a position of having to play *Around the World*? To answer these questions we need to look more closely at emotions.

EMOTIONS

Emotions, as theoretical construct in mathematics education, are seen as the fleeting and unstable cousins of beliefs and attitudes (McLeod, 1992). They are either a reaction to an experience (McLeod, 1992) or a reaction to an interpretation of an experience (Mandler, 1984). Regardless, emotions are acknowledged to affect learning in general (Zan, Brown, Evans, & Hannula, 2006) and cognitive processing in particular (Hannula, 2002). Over time, negative emotions can reify into more stable and disassociated manifestations of fear, phobia, and hatred (DiMartino & Zan, 2012; Tobias, 2009), each of which will have an effect on actions (Hannula, 2002; Tobias, 2009).

That emotions exist, and that they simultaneously emerge from, and shape experience, is clear. That these emotions then regulate future actions is also clear. What is not clear, however, is how this happens. What psychological mechanisms link emotions to actions? The answer to this lies not in the abstract.

The variety of emotional phenomena and the complexity of their inter-relations and sources is well enough understood subjectively. However,

as soon as psychology leaves the plane of phenomenology, then it seems that it is allowed to investigate only the most obvious states. (Leont'ev, 2009, p. 168)

That is, emotions must always be considered in the context of the phenomena in which it occurred.

EMOTIONS AND ACTIVITY

Consider a wolf in the wild. This wolf has a vital need to eat, and this need to eat drives him to hunt. These hunts result in him catching mice, rats, and rabbits. This then shifts the abstract need to eat into a concrete need to eat mice, rats, and rabbits. Then one day, he catches, for the first time, a duck. This, in turn, changes his need to include ducks in his menu of things he eats. And so on. Each time the wolf, through his hunt, encounters a new animal that he can eat, his needs change.

For Leont'ev (2009), such is the relationship between needs and activity. As humans, our vital needs, abstract and unrefined, drive our activity to satisfy these needs. These activities, grounded in phenomena, in turn gives an object to the needs.

The fact is that in the subject's needy condition, the object that is capable of satisfying the need is not sharply delineated. Up to the time of its first satisfaction the need "does not know" its object; it must still be disclosed. (Leont'ev, 2009, p. 161)

This recursive relationship between needs and activity, each driving the other, expands and refines both the object of need, and the need itself, forming what Leont'ev (2009) refers to as *concrete-objective needs*. This, in turn, changes the subsequent action.

[..] it is understood that changing the concrete-objective contents of needs leads to a change in methods of their satisfaction as well. (Leont'ev, 2009, p. 162)

Sometimes, however, this recursive cycle shifts the need from the object to the activity itself, forming what Leont'ev (2009) calls an *objective-functional need*. These needs, such as the need to work, to be productive, or to be creative, for example, do not displace the original needs that spawned them, but come alongside them as additional new needs. It is important to note,

however, that not all objective-functional needs come from a newly acquired focus on activity. Likewise, not all vital needs are based on objects. In a cultural historical framework, action oriented needs can be part of the milieu. For example, the need to be subservient, to strive for physical perfection, or to always clean, can be *a priori* embedded needs within a person's specific cultural upbringing. Regardless, activity and "the satisfaction of the need" helps to delineate it.

For Leont'ev (2009), these delineated concrete-objective and objective-functional needs, in their ideal and reflected forms, are what he calls *motives*. And despite the fact that the language on needs and activity are shot through with willfulness and implied consciousness, our motives are not always known to us. Further, our activities are multi-motivational.

Such breaking down is the result of the fact that activity necessarily becomes multi-motivational, that is, it responds simultaneously to two or more motives. (Leont'ev, 2009, p. 169)

They organize themselves in hierarchies, and these hierarchies define, to a great extent, an individual's personality.

A division of the function of sense formation and simple stimulation between motives of one and the same activity makes it possible to understand [sic] the principal relationships characterizing the motivational sphere of personality: the relationships of the hierarchy of motives. This hierarchy is not in the least constructed on a scale of their proximity to the vital (biological) needs in a way similar to that which Maslow, for example, imagines: The necessity for maintaining physiological homeostasis is the basis for the hierarchy; the motives for self-preservation are higher, next, confidence and prestige; finally, at the top of the hierarchy, motives of cognition and aesthetics. (Leont'ev, 2009, p. 170)

Finally, for Leont'ev (2009), *emotions* act as an internal signal within this relationship between our motives and the actions that work satisfy them. That is, despite the fact that motives could be unknown to an individual, when they are realized there is an emotional response that signals that success has been achieved.

Here we are speaking not about the reflection of those relationships but about a direct sensory reflection of them, about experiencing. Thus they appear as a result of actualization of a motive (need), and before a rational evaluation by the subject of his activity. (Leont'ev, 2009, p. 166–167)

These emotions have the potential, then, to reorganize the hierarchical order of these motives.

For example, a businessman has a goal to earn more than \$100,000 in his job as a sales manager. One day, his boss calls him into his office and tells him that he is receiving a raise and will now be earning \$110,000 per year. The man is elated. Later on that same day he overhears that his colleague has also been given a raise and will now be earning \$120,000. Suddenly, a feeling of dread comes over him. Reflecting on this negative emotional response the man comes to see that what he really wanted was to be the best sales manager in the company. Earning over \$100,000 a year was not the primary goal. The primary goal was to be the best sales manager in the company. But that goal was hidden from the man.

In this example, the man's surprising emotional reaction to hearing that his colleague was making more than him left him with an "emotional residue" (Leont'ev, 2009, p. 172) that moved him to engage with his hierarchical structure of motives, and to try to figure out what it is that is really driving him. In so doing, a motive that he was not previously aware of revealed itself. This results in a re-orientation of motives, which is tantamount to a re-orientation of his personality – all of which is triggered by his emotional response to an experience.

As such, in Leont'ev's (2009) framework, emotions serve as the orienting mediator between action and motives, and between motives and personality. In short, an emotional response to a specific experience draws the attention of the individual to their motives and allows them to begin the cognitive process of re-orienting their motives hierarchy.

EMOTIONS AROUND THE WORLD

Leont'ev's theory of emotions, motives, and personality, situated within the cultural-historical paradigm of individualized activity theory allowed me to look

anew at the data from the prospective teachers playing *Around the World*.

All of these teachers wanted to be good teachers. This was one of their many motives. But they also wanted to please parents, have their students be good at basic multiplication facts, and to not make their students anxious or fearful, to name a few. These many goals were organized into hierarchies, unique to each prospective teacher. For the most part, these prospective teachers were not aware of many of their motives. Instead, they were fixated on their current goals of learning how to teach mathematics, getting good grades, and/or having their knowledge experience acknowledge. The "emotional residue" left from their experience playing *Around the World* helped them to see some of these motives. And it helped them to re-orient them.

In what follows I provide a brief case study on one of the prospective teachers—Tara—selected for her clear articulation of motives in her writings. Tara's case is analysed through the lens of Leont'ev's theory on motives, emotions, and personality (2009).

Tara

Immediately after the *Around the World* activity Tara wrote that she was feeling a little anxious.

Tara I'm feeling a little anxiety, because [she] did not want to look stupid if [she] got it wrong.

However, she also saw merit in this activity.

Tara As a teacher I see the value in this activity. Students must be 'switched-on' and engaged. It forces them to use their brains and everyone must participate. The likelihood of everyone getting the correct answer is unlikely so no one will feel bad if they don't get to sit down. It also creates a competitive environment and opportunity for kids to shine.

The hierarchy of motives from Tara's post-activity journal indicates that students being 'switched-on' is one of the primary motive for her as a teacher (see Figure 1).

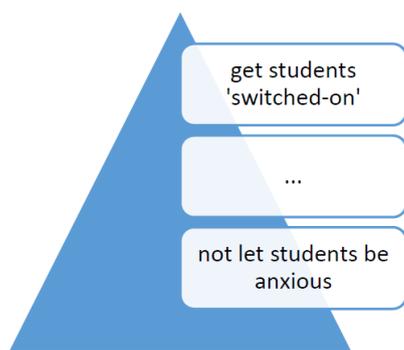


Figure 1: Tara's initial hierarchy of motives

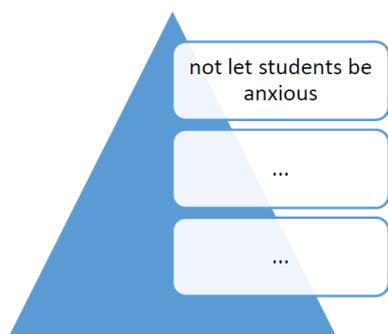


Figure 2: Tara's final hierarchy of motives

Later that night, when responding to the journal prompt her motivations had changed somewhat.

Tara Today when Peter sprung the “stand up and get ready to answer multiplication facts” activity, my first feeling was fear and anxiety. I was worried I’d get the answer wrong and look stupid in front of the class. [...] This exercise made me think about my own classroom, how or whether I would use an activity like this. I think I would, that being said, would my students feel the same anxiety I did? Most likely they would, but I think after getting into the game they would enjoy the competition. The environment I plan to create in my class would assure them that I was not having them do this activity to humiliate them but to use mental calculation and practice their skills.

Tara’s new hierarchy of motives (see Figure 2) can now be seen as having concern for her student’s anxiety at the top and the motive to ‘switch-on’ students has dropped away. The few hours that she had to reflect on her experience with the activity and the *emotional*

residue it left has seemingly caused her to re-orient her motives.

And this residue endures. At the end of the course Tara continues to talk about her motive to not let students become anxious, although not quite as explicitly.

Tara I will never just stand at the front of a class and ‘teach’. [...] Basically, I won’t be afraid to teach outside the box ... the traditional box that I learned in and that we all know so well. I want to inspire my students. [...] I now know math doesn’t have to suck ... the way it did for me in grade school.

CONCLUSION

So, what is it that changed for Tara and for the rest of the prospective teachers who ‘played the game’ of *Around the World*? One possible explanation is that it was their motives. More specifically, their hierarchies of motives were re-oriented – re-oriented by the emotional residue left after the intensely negative experience of being told that they would be playing *Around the World*. For 36 out of 38 of these prospective teachers, such a re-orientation resulted in a motive to not cause their students anxiety took its place as the primary motive at the peak of the hierarchy. This was not a new motive, but rather a motive that promoted up the ranks as a result of their emotional experience. And even after six weeks, and after 50 activities and 400 pages of literature, the concern for student anxiety remained as the primary motive. Leont’ev’s (2009) theory allowed us to view emotions, not as fleeting abstract notions, but as robust and powerful contributors to the motives and future action cycle.

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