MATH HABITUS, THE STRUCTURING OF MATHEMATICAL CLASSROOM PRACTICES, AND POSSIBILITIES FOR TRANSFORMATION

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Abstract

In this paper, I discuss the social philosopher Pierre Bourdieu's concept of *habitus*, and use it to locate and examine dispositions in a larger constellation of related concepts, exploring their dynamic relationship within the social context, and their construction, manifestation, and function in relation to classroom mathematics practices. I describe the main characteristics of habitus that account for its invisible effects: its embodiment, its deep and pre-reflective internalization as schemata, orientation, and taste that are *learned and yet unthought*, and are subsumed by our practices, which we understand as something that "goes without saying." I also propose that, similarly to Bourdieu's concept of linguistic habitus, a math habitus is made up of a complex intertwining of collective and individual histories that turn into "nature," which structure all individual and collective action and inform mathematical classroom practice. I suggest that individual math dispositions may be liable to reconstruction through the reconstruction of the collective math habitus, which follows from opening spaces for dialogue, problematization and reconstruction of the unthought categories of the *doxa*. This requires that students acquire new concrete and symbolic means with which to challenge their current sense of mathematics as a discipline, and mathematical practice *tout court*. Finally, I argue that community of inquiry, employed as a pedagogical model, provides an avenue for both: for opening those spaces for reflective dialogical inquiry into concepts and questions whose meanings and references have so far been taken for granted, and for acquiring critical thinking and dialogical skills and dispositions that are a necessary means for participating in such reflective inquiry that offers significant promise for reconstructing individual and collective habitus in school settings.

Key-words: mathematical habitus; community of inquiry; reconstruction

Habitus matemático, a estruturação das práticas da sala de aula de matemática, e as possibilidades para a transformação

Resumo:

Neste artigo, eu discuto o conceito de *habitus* do filosofo social Pierre Bourdieu, e o uso para localizar e examinar disposições numa constelação mais abrangente de conceitos relacionados, explorando sua relação dinâmica no contexto social, e suas construções, manifestações, e função em relação às práticas na sala de aula de matemática. Eu descrevo as mais importantes características do habitus que contam em seus efeitos invisíveis: sua incorporação, sua internalização de esquemas profundos e pré-reflexivos, orientação, e gosto que são *aprendidos e no entanto não-sabidos*, e que são subsumidos por nossas práticas, que nós compreendemos como algo que "se passa sem dizer". Eu também proponho que, de modo similar ao conceito de habitus linguístico de Bourdieu, um habitus matemático é feito de uma complexa concorrência de histórias coletivas e individuais que se transformam em "natureza", que estrutura toda ação individual e coletiva e informa a prática das salas de aula de matemática. Sugiro que as disposições matemáticas individuais podem ser confiadas à reconstrução por uma reconstrução do habitus matemático coletivo, que se segue da abertura de espaços para o diálogo, a problematização e a reconstrução das categorias impensadas da *doxa*. Isso requer que os estudantes adquiram meios concretos e simbólicos novos com os quais podem desafiar o seussenso usual da matemática como disciplina, e da prática matemática *tout court*. Finalmente, argumento que a comunidade de investigação, usada como um modelo pedagógico, fornece uma avenida para ambas: para a abertura desses espaços para a investigação dialógica reflexiva em conceitos e questões cujos sentidos e referências foram até agora tomados por garantidos, e para adquirir pensamento crítico e capacidades e disposições dialógicas que constituem meios necessários para participar de tal investigação reflexiva que oferece uma promessa significativa de reconstrução do habitus individual e coletivo nos dispositivos escolares.

Palavras-chave: habitus matemático, comunidade de investigação, reconstrução.

Habitus matemático, estructuración de prácticas del aula de matemática, y posibilidades para la transformación

Resumen:

En este artículo, discuto el concepto de *habitus* del filósofo social Pierre Bourdieu, y lo uso para localizar y examinar disposiciones en una constelación más amplia de conceptos relacionados, explorando su relación dinámica en el contexto social, y sus construcciones, manifestaciones, y función en relación a las prácticas en las clases de matemática. Describo las más importantes características del habitus que cuentan en sus efectos invisibles: su incorporación, su profunda y pre-reflexiva internalización como esquemas, orientación, y gusto que son *aprendidos y sin embargo no-sabidos*, y que son subsumidos por nuestras prácticas, que comprendemos como algo que “pasa sin decir”. Propongo también que, de manera similar al concepto de habitus lingüístico de Bourdieu, un habitus matemático es hecho de una complexa concurrencia de historias colectivas e individuales que se transforman en “naturaleza”, que estructura toda acción individual y colectiva e informa la práctica en las clases de matemática. Sugiero que las disposiciones matemáticas individuales pueden ser confiadas a la reconstrucción por una reconstrucción del habitus matemático colectivo, que sigue de la apertura de espacios para el diálogo, la problematización y la reconstrucción de categorías impensadas de la *doxa*. Esto requiere que los estudiantes adquieran medios concretos y simbólicos nuevos con los cuales pueden desafiar su sentido habitual de la matemática como disciplina, y de la práctica matemática *tout court*. Finalmente, argumento que la comunidad de investigación, utilizada como un modelo pedagógico, ofrece una avenida para los dos: para la apertura de estos espacios para la investigación dialógica reflexiva en conceptos y cuestiones cuyos sentidos y referencias fueran hasta ahora tomados por garantidos, y para adquirir pensamiento crítico y capacidad y disposiciones dialógicas que constituyen medios necesarios para participar de tal investigación reflexiva que ofrece una promesa significativa de reconstrucción del habitus individual y colectivo en los dispositivos escolares.

Palabras clave: habitus matemático, comunidad de investigación, reconstrucción.

MATH HABITUS, THE STRUCTURING OF MATHEMATICAL CLASSROOM PRACTICES, AND POSSIBILITIES FOR TRANSFORMATION

Student dispositions are now considered to be important ingredients that facilitate or impede student mathematical learning. They are sometimes framed as "productive" (or not) dispositions (National Research Council, 2001), and are often associated with cultural background, home environment and socio-economic status (Barton, 1993; Raymond, 1997), students' beliefs, attitudes and values (Lane, 1999; Perkins, Jay, & Tishman, 1993), and students' beliefs about what constitutes mathematics and mathematical school practices (Ahmed, 2007). Often dispositions are linked to behavioral features related to previous experience, or even to genetic factors. And Skovsmose (2007) points to a further link between students' dispositions and background in what he calls "students' foreground"—that is, how students perceive future opportunities for action and success as provided by their specific social, and cultural context.

Given the importance of understanding dispositions and their role in informing classroom math practices and student participation, and given the fairly diverse vocabulary in use regarding dispositions, I will adopt the social philosopher Pierre Bourdieu's concept of *habitus*, and use it as an analytic tool to examine dispositions as they are located in a larger constellation of related concepts, exploring their dynamic relationship within the social context, and following that, their construction, manifestation, and function in relation to doing mathematics in the classroom. I will also introduce the concept of a "collective math habitus" as a way of characterizing the dispositional set of any given group of mathematics students, and explore some methodological possibilities for the reconstruction of this collective habitus through dialogical classroom practice.

Habit and habitus: Learned and yet untaught

A habit, according to John Dewey (1922), is an acquired dispositional set--ways of acting or responding in specific situations. But a habit does not presuppose mere repetition as one might think, nor does it necessarily imply specific actions. As Dewey insists, habit is "a projective and dynamic trait" that waits to be manifested, but it also can mean what he calls "standing predilections (p. 41)." For example, it is not uncommon to see math students with an acquired disposition to "follow the teacher's directives" in working on math problems to show a wide range of behaviors, from expressing the preference to be told what specific path or set of math procedures they need to follow in order to find the answer of the given problem, to showing aversion to tackling questions or tasks on their own, to avoiding any initiative for fear of making mistakes.

As living creatures –organisms in an environment--we cannot exist without habits. The lenses through which we perceive, interpret and experience the world necessarily have habitual sediments. Our thoughts and perceptions are filtered through habit, and habit participates as much in the formation as in the execution of an idea, since it represents the already acquired and organized experience that we carry. In forming a judgment about a statement, for example, we may have a disposition to critically examine it and its assumptions in relation to existing data, which Dewey would call a disposition for reflective thinking; or we may foreclose any possibility of its critical appraisal and make a judgment on the basis of what we have already decided is true (1910). Habit/disposition can be rigid or flexible, as Dewey (1922, 1938) indicates, and the crucial component seems to be the degree to which our already organized experience positions itself within current unfolding experience.

Dewey's concept of habit and its modus operandi has many parallels with Bourdieu's concept of "habitus." Unlike Dewey's, Bourdieu's account is sociological, and he utilizes systemic description—he assumes that the individual, family, school, neighborhood are all embedded subsystems of a still larger social system, and that each subsystem influences and is influenced by the others. As he puts it, habitus is

". . . a system of lasting, transposable dispositions which, integrating past experience, function at every moment as a matrix of perceptions, appreciations, and actions and makes possible the achievement of infinitely diversified tasks, thanks to analogical transfers of schemes permitting the solution of similarly shaped problems“ (1977, p. 95).

The first sources of influence on habitus-formation are the primary socializing agents--mainly family and the closely surrounding social environment, and later on, school. Since habitus is molded by individual experience within the social milieu—an ensemble of linguistic, cultural, and class-based practices--it is logical that the individual is disposed to see the world in the same way as the larger social subgroup, and especially the primary one, the family. In this sense the concept of habitus may be seen as close to the concept of culture, but expressed on a more personal level; in fact it may be described as individually internalized culture. Thus a math habitus or set of student dispositions towards mathematics is influenced very early by parental views, familial stories and proverbial wisdom, and images of mathematics delivered by media. Martin (2009), illustrated this by describing how race influences student's mathematical identity- a concept he uses that resembles habitus. He notes that, "racialized forms of experience"--experiences in which the socially constructed meanings of race impose themselves on individuals--structure the way in which personal mathematical experiences and opportunities to learn are perceived, and thus unfold in the future. As Martin further observes, "The widening gap between those who are mathematically literate and those who are not coincide, to a frightening degree, with racial and economic categories" (Martin, 2003, p. 14).

One point of specific importance that Bourdieu highlights is the critical issue of whether habitus encounters experiential contexts that vary and are dissimilar to previous ones, and thus is forced to change, or whether new contexts more or less confirm already established categories of perception, world view, and action. If the former, since habitus is chronologically organized, the habitus acquired in the family can be restructured by school experience, and thus diversified. In the case of the latter, if school experiences are trivial and repetitive, habitus can grow more rigid and overly determined by beliefs commonly shared by the school culture. Thus, habitus is invariably produced on a trajectory of new encounters.

As conceived by Bourdieu, habitus is both a reproductive and a structuring mechanism through which all sense-making and interpretations of the world are made, and thus both produces and reproduces cultural meanings. Seen superficially, habitus may be understood as a rather mechanistic process, but on a deeper level it reveals itself as both a spontaneous and "directive determination" that works in any given situation. Bourdieu (1977) refers to it as an "intentionless invention of regulated improvisations" (p. 79). The relations between habitus, social context, and individual are somewhat reminiscent of Dewey's position expressed in *Art and Experience*: "Through habits formed in intercourse with the world, we also in-habit the world. It becomes a home, and the home is part of our everyday experience" (Dewey, 1934, p. 104) Both views have obvious kinship with the embodied cognition paradigm articulated by Varela, Thompson, and Rosch (1992), according to which agents and environment mutually specify and co-determine each other, and thus have a "conjoint history."

Although Bourdieu's habitus is somewhat reminiscent of other concepts such as socialization or enculturation, habitus differ from those in some important ways. Firstly, a central aspect of habitus is its character of *embodiment*. A narrow reading of habitus might interpret it as functioning to replicate models or roles, but in fact it represents a perceptual and classificatory structure that assures coherent ways of perceiving and acting, as well as cognitive and evaluative structures that do not function at the level of explicit and discursive knowledge, but which organize the individual's vision and interpretation of the world. The individual's actions are, according to Bourdieu, " . . . 'regulated' and 'regular' without being in any way the product of obedience to rules, they can be collectively orchestrated without being the product of the organizing action of a conductor" (Bourdieu, 1990: p. 53)

Those internalized structures become embodied, and function in a deeper, practical and often pre-reflexive way. It is what Bourdieu (1977) calls "the socially informed body," and "…its tastes and distastes, its compulsions and repulsions, . . . in a word, all its *senses*, that is to say, not only the traditional five senses—which never escape the structuring action of social determinism—but also the senses of necessity and the sense of duty, the sense of direction and the sense of reality, the sense of balance and the sense of beauty, common sense and the sense of the sacred, tactical sense and the sense of responsibility, business sense and the sense of propriety, the sense of humor and the sense of absurdity, moral sense and sense of practicality, and so on." (p. 124)

Secondly, habitus is a *relational concept*. Neither is it solely determinative of an individual's acts, nor can it effectively exist without been situated in a social context. What seems to be important in structuring action is the relationship between the individual's habitus and the specific current social context. Bourdieu's concept of "field," as a metaphor for describing the space or "plane field" that this relationship inhabits, indicates "a structured space of positions" in which the positions in question and their interpretations are determined to a great extent by the "capital" individuals possess (Bourdieu, 1991, p. 14). In the field of the classroom, an individual's capital is manifested either as "cultural capital" as evidenced by acquired knowledge and/or skills, or the "symbolic capital" of prestige, honor, or recognition. Thus, any individual's attitude or action is a result of the structuring of the ways of perceiving, appreciating, and interpreting produced by the habitus in the specific context/field, which in turn is informed by the presence or absence of the two forms of "capital." And finally, habitus does not function at the level of *explicit, discursive consciousness*. Its internal structures become embodied and are at work in a deeper, practical and often pre-reflexive way in any social situation.

Out of this relationship between habitus and specific context or field, as Bourdieu describes it in his account of the Algerian Kabyle tribal practices, is born a sort of "practical sense" of the context, and a "feel" for what is acceptable and valued—for what is seen as legitimate or not-- which he calls a "feel for the game." Thus, ultimately the social structures of the larger cultural context tend to become translated into *embodied social structures* (Bourdieu, 1984, p. 467), which in their turn produce practices in tune with the social structures that generated them, and which serve to reproduce and transform those very same structures through time. As such, they are embodied internalized schemas that operate at a preconscious level, and represent a sedimentation of experience that manifests as bodily gestures, tastes and preferences, and designate as much a way of being in the body as tendencies, propensities, and inclinations.

The internal dynamics of habitus, which include simultaneously *structuring* and *structured forces* – a perceptual and classifying structure that generatively shapes action-- are somewhat reminiscent of the dialectical dynamics at play in Dewey's notion of the relationship between habit and impulse. In Dewey's view (1922), the creative tension between the two defines the action as either more habitual or more creative; that is, habit "disciplines" impulse, allowing the latter to take advantage of routine actions, and impulse energizes habit and thereby promulgates creative action. Understood as a dynamic process, habitus must then be seen as always in a process of reconstruction. The idea that it is possible for preexisting schemas, produced as a result of previous experiences, to be modified when faced with sufficiently new configurations that do not "match" the current habitus, such that they require a revision of previously formed schemata is, in fact, a view quite similar to Jean Piaget's paired process of "assimilation" and "accommodation" that operates in the ongoing reconstruction of cognitive schemas (Piaget, 1977).

Math habitus and its workings: From the "rules" of mathematics to the sense of mathematics

Similarly to Bourdieu, who construes linguistic habitus as a subset of dispositions acquired in the course of learning to speak in contexts like family, school, and peer group, I will use the term "math habitus" as a subset of dispositions acquired in the course of learning mathematics in different contexts. Hence, the dependency of math habitus on gender, class, race, culture, discourse and like characteristics of the internalized external social structures is inescapable. These dispositions will inform subsequent mathematical practices, the expectations for those practices, and the values that students ascribe to the products of such practices. The values of the products of mathematical practice--whether ideas, intuitions, math expressions, strategies, etc -- are always appraised. Some products are valued more than others in a given context/field. In street mathematics, for example, informal mathematical strategies may be valued more than formal ones, which might not be the case in a school context, and the same strategies may represent different kinds of "capital" in different contexts.

The math habitus of an individual player in the math context/field is the negotiating mechanism--the organizer--enabling the individual to react to the context/field in a coherent manner, with a practical sense of what is appropriate, necessary, possible and valued, but also to be generative of her own interests, tastes, and manner of working. Thus, each individual's participation in mathematical practices can be understood as the product of the relationship between habitus and context/field. The context is a product of a *double structuring*: it is made sense of through a habitus that has already been socially structured. Within this double structure, following Bourdieu (1977), the individual's participation in school math practices is guided by an inevitable positioning of herself in relation to the distribution of different kinds of capital resources (knowledge, skills, prestige, etc.) and by her interpretation of the position that she occupies in the field. By way of this interpretation of the context, which is experienced as the reality of her school life, she acquires what Erving Goffman (1951) calls a "sense of one's place," which in turn determines what constitutes "sensible" and "reasonable" conduct in the given situation.

This "sense of one's place" can be manifested differently in different cases. Often, what students perceive as a "sensible" action in a math context/field is inaction. Alan Schoenfeld (1988), for example, points at how individual beliefs about the "sense of one's place" likely shaped by one's "mathematical world view," orient and predetermine students' engagement in problem solving. Those who believe that one either knows or doesn't know how to solve a problem upon encountering it are more likely to give up even trying to solve a novel problem than those who believe that one solves problems through engaging, assaying, persevering, and using heuristics. On the other hand, Skovsmose (2007) describes a case of "a sense of one's place" manifested as what he calls the "ruined foregrounds" of South African students, by which he means students' cancelling or denying their opportunities for actions as a result of a perceived lack of realistic opportunities for successful or meaningful participation in learning activities.). In both cases, students' actions were self-cancelled as a result of the encounter between a field and their operative habituses.

Bourdieu developed the concept of habitus in part as a means of countering the unjustifiable stress on action as a result of "conscious" intensions or decisions and "authentic" choice. Using his concept, then, a student's participation in classroom mathematical practice, the position she occupies, her interests and motivations, her determination to be successful in school, her school-related intentions, decisions and choices, her quality of attention—all of these and more can be seen as implicated in and oriented by her math habitus. This view renders the "equal opportunity" discourse in math education problematic, as individual choice is discovered to be so deeply influenced by race, class, and other factors.

Zevenbergen (2005), for example, clearly illustrates that students who were placed in different ability groups in Australia had very different math habituses that mirrored in a striking way their respective placements, which may provide an explanation for why the majority of lower placement students are unable to move upward. Dixon (2002) estimates that 88% of UK students get "caught" on the same level until they leave school, and both the stream and the corresponding habitus turn into a "psychological prison." (Boaler, 2005).

As Bourdieu (1977) would have it, a student's math habitus does not determine particular actions, but orients her towards particular goals and strategies. Acting on her intentions (determined by previous experiences), her practices tend to reproduce the dominant social views, and the symbolic and material orders of the social world she lives in. Key aspects of those views and orders appear "natural" through their "adherence to the established order." Since they are embodied, they operate beyond any external legitimation of the social order, having become part of the taken-for-granted, "natural" world (in Bourdieu's parlance, the *doxa*). Classroom practices thus tend, in spite of students' intentions and decisions--or, in fact, through them--to reinforce the social structures and institutionalized views that produce them (p.164). For example, since a dominant view of mathematics in Western society is of a "cold, objective, rigid, fixed, logical, absolute, inhuman, abstract, remote and ultra-rational"

(Ernest, 1991) discipline, it is no wonder that students' "embodied sense" of mathematics mirrors such a negative image.

This embodied sense of mathematics is reminiscent of how, in his ethnographic study of the Kabyle (1977), Bourdieu identifies, what he calls "the sense of honor" as no more or less than an acquired disposition, which is "inscribed in the body" and in the cognitive schemas that produce actions, not through rationalization or through following explicitly articulated rules or by choice. In a similar way, an acquired sense of mathematics engenders a commonsensical image of mathematics that appears as self-evident in the society or smaller social group. It is an unconscious sense, and thus produces no felt need to be rationalized further. Moreover, there are second-order strategies at play through which students may try to "put themselves in the right," to paraphrase Bourdieu's words, by adhering to what such "common sense" prescribes. Some teachers describe their students as "enjoying" assigned worksheets made up of similar and quite repetitive practice problems, which might be interpreted as exhibiting conformity to what those students believe mathematics demands, and thus exhibiting a purely "disinterested interest" (Bourdieu, 1977 , p. 177), or an interest in completing the tasks whatever they may be, rather than a personal interest in the mathematics they are engaged with. Such an embodied sense of mathematics is reinforced by traditional school experiences, in which students are often lectured, given math procedures to follow without being asked to actively participate in making sense of the mathematical activity, or to search for connections with their previous mathematical knowledge. What then are the possibilities for the reconstruction of this traditional habitus? So far, I have discussed the construction of the individual's math habitus, but given that an individual is always part of a social system comprised of other individuals, and since I am interested in the ways math classroom practices are collectively constructed, and in possibilities for their reconstruction, I will next discuss the relationship between the collective habitus and the practices of a group of students placed in the context of school mathematics.

Thinking the unthinkable: Collective math habitus and construction and reconstruction of mathematical classroom practice

A math habitus, being a dynamic intertwining of past and present learning experiences, may be thought of as a product of both collective and individual trajectories. Bourdieu conceives of habitus as a multi-dimensional concept, applicable at the level of society in general, in its more complex, differentiated specifications in the classroom, in the individual, and in a multitude of specific contexts/fields such as the linguistic or the mathematical. All the individuals participating in a given culture carry dispositions that have been structured by that same culture, and this accounts for coherence and shared world-view among its participants. As Bourdieu (1977) remarks:

> Since the history of the individual is never anything other than a certain specification of the collective history of his group or class, *each individual system of dispositions* may be seen as a *structural variant* of all other group or class habitus, expressing the difference between trajectories and positions inside or outside the class. (p. 86)

Those structural variants may be thought of as comprising the matrix of the habitus of the group that shares a social space, and they engender the practices arising there. In any given math class, the collective (group) math habitus, produced as internalized cultural schemes, is constantly changing as a result of interactions within the group. As Bourdieu has indicated, the habitus, the social context/field that it encounters, and the practices in the field form a dynamic system, in which they mutually influence and structure each other. Practices are informed by the group habitus and the school context with its curriculum, pedagogy, and school culture. The material and symbolic schemes of the habitus unconsciously conspire to reproduce power relations, which are enacted through "symbolic violence" (Bourdieu, Passeron, 1977, p. xi)--that is, through the imposition of what constitutes common sense in the group—the taken-for-granted, the judgment or reaction or behavior or attitude that appears "natural," and constitutes what, as we have seen, Bourdieu calls *doxa*, which imposes and maintains a closed system of order.

One of the most powerful of the invisible mechanisms that work to reproduce the doxa and to maintain a given order is the tendency of the habitus-context-practice complex to produce *a sense of reality*, and in turn a *sense of limits,* which in turn produces practices adjusted to the social structures that shape the very system that produces them, and thus serve to *re*produce those very structures in time (1977). This circularity maintains the collective "self-evident" beliefs of the group, which leaves a large body of unquestioned "doxic" material undisturbed. The doxic material in a math group can be extensive. There are certain questions and issues that are almost never discussed, and those that are discussed are mostly predictable. A usual complaint among teachers is that the first question that students ask is "Why do we have to study this math concept?" which many instructors understand as impertinent or challenging. In fact this is not only an important question to ask, but there is a host of others related to this one: How is this concept related to other concepts that we have studied? for example, or Do we see this concept manifested in other domains? What meaning does it have in these domains? How are these different meanings related?

And beyond all these questions there are other more general ones like: What is mathematics? What is problem solving? What counts as mathematical practice? Who decides what will be in the curriculum? Is it acceptable to cross subject boundaries in school? If not, why not? Why are such boundaries maintained? Who decides what questions will be discussed in class? Who gets to ask the questions that will be discussed? What are the respective roles of student and teacher? What are the rights and responsibilities of students and teachers?

A traditional math classroom usually maintains a quite predictable doxic order. The tacit "taken-for-granted-ness" of the social world assumes that the teacher is "the one who knows" and the student is "the one who learn," the teacher is "the one who asks the questions," and the student is "the one who answers," the teacher is "the one who talks," the student is "the one who listens," the teacher is the one who is "in charge," the student is "the one who is not," the teacher is "the powerful," the students are "the powerless" (Freire, 1970). In conforming to the sense of reality shared in such a classroom, students are simply behaving in ways they think they must, and thus foreclosing on possibilities for more deliberative and differentiated action. Doxa--the ensemble of taken-for-granted, unquestioned truths--solidifies the "sense of one's place", and “the feel for the game,” and silently defines the sphere of what may be openly contested and discussed. Misrecognition is not simply imposed on the students as well as the teachers, but is a condition for maintaining and reproducing the stability of the habitus-context-action system. In adopting strategies such as listening silently, accepting the imposed questions or topics without objecting, working on an endless number of worksheets filled with “practice math problems,” students believe they are doing what they must be doing in order to accumulate symbolic capital--the collectively recognized good credits that ensures their math “success.”

This effectively perpetuates the collective misrecognition of the reality that engenders such strategies. The students in such a system have no means of rejecting the imposed definition of reality, since what accounts for this mutual complicity is not a group conspiracy, but the involuntary tendency to “think with the body” and to “know without concepts” (Bourdieu, 1984: p. 471) It is tacit knowledge (Polanyi, 1966), developed through experience that has not reached the level of explicit knowledge, and that students in the group have mutually confirmed with and for each other.

It is, therefore, only when this tacit dimension is shaken, and the group’s horizon is pushed beyond the boundaries of doxa to include alternative, competing views to the group’s shared construction of reality, that there are chances for reconstruction of the entire group’s habitus-context-practice system. Bourdieu’s proposal for diverging from or interrupting doxa is reflexivity (Bourdieu, Wacquant, 1992). His challenge is for reflection on the unthought categories that undergird the ontological foundations of individual and collective action. Since these are not immediately accessible rules or conscious classificatory categories but rather schemata, orientations, tastes, Scott Lash (1994), working from Bourdieu, suggests that we reinterpret reflexivity as learning to see our own concepts not as objective categories but as interpretative schemata, embodied and only partially if at all conscious. To do so, we must assume from the start that our concepts are provisional, and always subject to questioning and revision. In the context of mathematics education, this might mean to begin by questioning what we assume are basic concepts in math teaching and learning practice. It implies questions like, What does it mean to be a math learner? What skills and dispositions does math learning involve? What is problem solving, and how does one engage in it? What are the characteristics of a good problem solver? What does it mean to be "successful" in doing mathematics? What does good mathematical practice look like?

Students need to acquire both concrete and symbolic strategies and tools in order to be able to question and critique the sense of reality that is indirectly imposed by habitus, and in order to interrupt the circularity in the habitus-context-action system that maintains it virtually unchanged, and it is the teacher's obligation to help them acquire the necessary means. It is she who is in the best position to interrupt the taken for granted and introduce alternatives to the traditional models of mathematical school practice, to the traditional models of learning and teaching, to the traditional views of mathematics as a discipline, and to the traditional model of practice-problems that are so prevalent in the "normal" curriculum. Such an introduction of alternatives at least invites thinking of competing possibilities for teaching and learning. But acquiring symbolic means or symbolic power also necessitates a new, dialogical pedagogical model, in which the student's intervention assumes a symbolic value equivalent to the teacher's.

I have explored elsewhere (Kennedy, 2009, 2012a) the use of the pedagogical discourse model known as community of inquiry (CI) in the mathematics classroom as a regular dimension of any given curriculum. CI is a post-Socratic communal speech model that is egalitarian, distributive, and potentially empowering, and that helps students acquire critical thinking and dialogical skills and dispositions that allow them to participate in meaningful collective dialogue (e.g. Lipman, 2003; Splitter and Sharp, 1995; Lampert, 1990). I have also advocated for using CI as a setting in which taken-for-granted concepts and beliefs are problematized and collectively reconstructed (Kennedy, 2012b; Kennedy, Kennedy, 2011). Elsewhere, I have outlined a few possible directions for including philosophical inquiry in the practice of classroom mathematics through concept work; philosophical inquiry into the common, central and contestable concepts that are common to the various disciplines; aesthetic inquiry in mathematics;

inquiry into the benefits and the limitations of the mathematical instrumentarium; ethical inquiry into the uses of mathematics and in economy and society; and epistemological inquiry aimed at the reconstruction of mental beliefs/habits (Kennedy, 2012c). Community of philosophical inquiry, as described in Lipman's Philosophy for Children program, can be used to invite children to pose questions of their own about mathematics, both in its internal relations and its relation to the world—and to encourage students to enter into dialogue with its epistemological assumptions, thereby taking steps towards demystifying mathematics and reconstructing critical core beliefs. Introducing these critical speech and thinking tools and new discourse models to students promises to enhance their symbolic power, and can open new spaces for inquiry into the questions that the doxa has already presumed to have answered, thereby initiating a process of reconstruction of both individual and collective habitus. Such reconstruction is only possible through the emergence, by way of critical group dialogue, of new, collectively constructed meanings that are injected back into subsequent dialogues, inquiries, and actions, and in turn drive new inquiries, and actions. This process returns us to Dewey and his notion of a creative, mutually informing relationship between impulse and habit as a way of negotiating the looping back of new meanings in CI, and their participation in the complex, mutual adjustment between habitus, context and action.

Thus, it follows that epistemological and philosophical inquiries can play a crucial role in optimal educational practice, given their tendency to put in motion the reconstruction of the collective--and thus the individual--doxa and habitus, and in turn the field of the classroom and the actions that habitus and field engender there. And it goes without saying that the teacher's habitus is as bound to be populated by as many unthought concepts and categories as her students'. As such, the pedagogy of CI is educational for both, and promises an ongoing recognition, problematization, and reconstruction of her own prereflective cognitive and perceptual material.

Conclusion

In this paper, I have discussed Pierre Bourdieu's theory of practice in relation to the construction of mathematical habitus, and the double structuring that distinguishes it: any given habitus is structured by social and institutional principles and rules, and structures in turn not just the behavior, but the entire cognitive and perceptional world of the individual. I described the main characteristics of habitus that account for its invisible effect: its embodiment, its deep and pre-reflective internalization as schemata, orientation, and taste that are *learned and yet unthought*, and are subsumed by our practices, which we understand as something that "goes without saying."

I have also suggested that, similarly to Bourdieu's concept of linguistic habitus, a math habitus is made up of a complex intertwining of collective and individual histories that turn into "nature," which structure all individual and collective action and inform mathematical classroom practice. Like any collective habitus, the math classroom habitus is a synchronization of the habituses of individuals who work together long enough to confirm or reject their sense of reality, and their "feel for the game." One of the ontological characteristics of a group's habitus is the doxa—the roughly demarcated territory of the group's beliefs, which is characterized by the assumptions allowed by, the suspended doubt that follows from a naïve adherence to the group's *illusio*, or myth of reality, whether that be the reality of the world, of the classroom, of mathematics as a discipline, of the characteristics and requirements of mathematical practice, of what constitutes mathematical intelligence, and so on.

I have also suggested that individual math habitus may be liable to reconstruction through the reconstruction of the collective math habitus, which follows from opening spaces for dialogue, problematization and reconstruction of the unthought categories of the doxa. This requires that students acquire new concrete and symbolic means with which to challenge their current sense of mathematics as a discipline, and mathematical practice *tout court*. Finally, I have argued that community of inquiry, employed as a pedagogical model, provides an avenue for opening those spaces and acquiring those means through reflective dialogical inquiry into concepts and questions whose meanings and references have so far been taken for granted. CI is also a pedagogical tool that can be used to help students acquire the critical thinking skills and dispositions that are a necessary means for participating in such reflective inquiry. Bourdieu's theory of practice supports the belief, growing among thoughtful educators, that dialogical philosophical inquiry--in this case inquiry into the concepts and assumptions related to mathematics and also to classroom mathematical practice--is a necessary dimension of best practice, and offers significant promise for reconstructing individual and collective habitus in school settings.

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