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on the relevance of cognitive neuroscience for community of inquiry

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abstract
Community of inquiry is most often seen as a dialogical procedure for the cooperative development of reasonable approaches to knowledge and meaning. This reflects a deep commitment to normatively based reasoning that is pervasive in a wide range of approaches to critical thinking and argument, where the underlying theory of reasoning is logic driven, whether formal or informal. The commitment to normative reasoning is deeply historical reflecting the fundamental distinction between reason and emotion. Despite the deep roots of the distinction and its canonization in current educational thought, contemporary cognitive neuroscience presents a fundamental challenge to the viability of the distinction and thus to any effort that sees education for reasonable judgment to be based on the remediation of cognition in isolation from its roots in the emotions. Cognitive neuroscience looks at the deep connections between emotion and memory, information retrieval, and resistance to refutation. This conforms with earlier studies in experimental psychology, which showed resistance to changing beliefs in the face of evidence, including evidence based on personal experience. This paper will look at the recent research including speculations from neurological modeling that shows the depth of connection between, emotions, memory and reasoning. It will draw implications for dialogic thinking within a community of inquiry including systematic self-reflection as an essential aspect of critical thinking.

keywords: community of inquiry; cognitive psychology; reason and emotion.

sobre la relevância da la neurociência cognitiva para la comunidad de investigación

resumen
La comunidad de investigación se ve a menudo como un procedimiento dialógico para el desarrollo cooperativo de enfoques razonables de conocimiento y significado. Esto refleja un profundo compromiso con el razonamiento normativo que está presente en una amplia gama de enfoques del pensamiento y el argumento crítico, donde la teoría subyacente del razonamiento se basa en la lógica, ya sea formal o informal. El compromiso con el razonamiento normativo es profundamente histórico y refleja la distinción fundamental entre la razón y la emoción. A pesar de las profundas raíces de la distinción y su canonización en el pensamiento educativo actual, la neurociencia cognitiva contemporánea presenta un desafío fundamental a la viabilidad de la distinción y, por lo tanto, a cualquier esfuerzo que considere que la educación para un juicio razonable se base en la remediación de la cognición aisladamente de su raíces en las emociones La neurociencia cognitiva analiza las conexiones profundas entre la emoción y la memoria, la recuperación de información y la resistencia a la refutación. Esto se ajusta a estudios anteriores en psicología experimental, que mostraron resistencia a las creencias cambiantes frente a la evidencia, incluida la evidencia basada en la experiencia personal.

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Este texto analizará la investigación reciente que incluye especulaciones de modelos neurológicos que muestran la profundidad de la conexión entre las emociones, la memoria y el razonamiento. Dibujará implicaciones para el pensamiento dialógico dentro de una comunidad de investigación que incluya la autorreflexión sistemática como un aspecto esencial del pensamiento crítico.

palabras clave: comunidad de investigación; psicología cognitiva; razón y emoción.

sobre a relevância da neurociência cognitiva para a comunidade de investigação

resumo
A comunidade de investigação é mais freqüentemente vista como um procedimento dialógico para o desenvolvimento cooperativo de abordagens razoáveis de conhecimento e significado. Isso reflete um profundo compromisso com o raciocínio normativamente fundamentado que é difundido em uma ampla gama de abordagens para o pensamento e o argumento críticos, em que a teoria subjacente do raciocínio segue a lógica, formal ou informal. O compromisso com o raciocínio normativo é profundamente histórico, refletindo a distinção fundamental entre razão e emoção. Apesar das raízes profundas da distinção e de sua canonização no pensamento educacional atual, a neurociência cognitiva contemporânea apresenta um desafio fundamental à viabilidade da distinção e, portanto, a qualquer esforço que considere a educação como um juízo razoável baseada na remediação da cognição isolada das suas raízes nas emoções. A neurociência cognitiva analisa as conexões profundas entre emoção e memória, recuperação da informação e resistência à refutação. Isso está de acordo com estudos anteriores em psicologia experimental, que mostraram resistência à mudança de crenças em face de evidências, incluindo evidências baseadas em experiências pessoais. Este artigo examinará a pesquisa recente, incluindo especulações de modelagem neurológica que mostra a profundidade da conexão entre emoções, memória e raciocínio. Ele vai trazer implicações para o pensamento dialógico dentro de uma comunidade de investigação, incluindo a auto-reflexão sistemática como um aspecto essencial do pensamento crítico.

palavras-chave: comunidade de investigação; psicologia cognitiva; razão e emoção.

introduction

Community of inquiry, in the sense relevant to those interested in philosophy with children, is most often seen as a procedure for the cooperative development of reasonable approaches to knowledge and meaning based on classroom dialogue. Its roots in the work of Matthew Lipman and Ann Margaret Sharp are well known and its deeper roots have been explored by a number of scholars. A recent effort to ground community of inquiry in a richly articulated theory of dialogical teaching, supported by a broad survey of supporting theoretical and empirical studies, includes the following apt characterization: "dialogic teaching and learning requires an underlying commitment to rational thinking as a mechanism for formulating better judgments" (Reznitskaya & Gregory, 2013). This reflects a deep commitment to normatively based reasoning that is pervasive in a wide range of approaches to critical thinking and argument, where the underlying theory of reasoning is logic driven, with logic broadly construed: whether formal logic as in Lipman (1974) or the more nuanced approach found in informal logicians such as Douglas Walton (1996).

The commitment to normative reasoning is deeply historical reflecting the fundamental distinction between reason and emotion that is found in Plato and Aristotle and reflected in the seminal early modern philosophy of Bacon and Descartes. Despite the deep roots of the distinction and its canonization in current educational thought (Bloom et. al. 1956) contemporary cognitive neuroscience presents a fundamental challenge to the viability of the distinction and thus to any effort that sees education for reasonable judgment to be based on the remediation of cognition in isolation from its roots in the emotions.

The disconnect between reason and emotion is evident in Lipman's earliest work. There is no leading idea on the emotions in the manual for *Harry Stottlemeier's Discovery*, nor is there a listing for emotion in the index of *Thinking in Education*. In his discussion of 'roadblocks to reasoning' the focus is on the need for remediation of logical skills (Lipman, 1991, pp. 31-32). Even in his discussion of racial prejudice, where he sees community of inquiry as a 'cognitive/affective strategies' he sees the problem in terms of 'social disorganization' rather than rooted in the emotional life of the participants. (op. cit. pp. 257-258). And this, despite the clear role of biasing emotions in the analysis of prejudice in a key work that he cites, Hamilton (1981). An example of the sorts of studies done, Hamilton reports experiments with identical photos of social settings, doctored so that they appeared as either white or black subjects, and found perception, memory, inference and judgment to be strongly biased depending on the apparent race of the people in the photos. Research in belief and attitude change generalized the findings associated with social bias. People were found to show resistance to changing beliefs in the face of evidence, including contradictory evidence based on personal experience (Eiser, 1984). The cognitive model of belief maintenance seemed unsupportable.

The connection between reasoning and emotions, postulated as early as Freud, continues to be an active area of research. Research indicates that our past associations affect our ability to alter all beliefs (Jacoby, et. al, 1989). A study of political beliefs showed resistance to argument that challenge our memories and commitments: "the persistence of misinformation might better be understood as characteristic of human thinking" (Lewandowsky et al., 2012, p. 114). Much of the available research relevant to the role of emotions in cognition focuses on bias and stereotyping. For example, the studies of unacknowledged bias indicate "influence of implicit stereotypes on judgment and behavior." (Blair, Ma, & Lenton 2001, p. 828). Unacknowledged, such attitudes may remain disconnected from a person's avowed beliefs: "Dissociations [between implicit and explicit attitudes] are commonly observed in attitudes toward stigmatized groups, including groups defined by race, age, ethnicity, disability, and sexual orientation." (Greenwald & Krieger 2006, p. 949). Such implicit biases create emotional disturbance when in the face of social pressure such views are put into question. "When one denies a personal prejudice (explicit bias) that co-exists with underlying unconscious negative feelings and beliefs (implicit bias] leading to diffuse negative feelings of anxiety and uneasiness." (Dovidio and Gaertner 2005, p. 42).

Problems with a cognitive account of reasoning were already apparent in the earlier literature on reasoning, which focused on performance errors, reasoning that fails to meet normative standards from both deductive and inductive logic (Kahneman, Slavic &Tversky, 1982, Wason & Johnson-Laird, 1972). Counter-normative reasoning, arguably effective in making quick judgments in real time, was found to be pervasive (Nisbett & Ross, 1980). Whatever the failures of accounts of reasoning that fail to see the complex basis for cognition, cognitive neuroscience points to the essential grounding of rational thought in extra-logical mechanisms. Cognitive neuroscience indicates deep connections between emotion and memory, information retrieval and resistance to refutation.

My first task is to show why neuroscience has exceptional epistemological power as a basis for understanding human cognition. That done, I will offer a brief overview of recent developments that show the deep connection between reasoning and the emotions. Finally, I will draw implications for dialogic thinking within a community of inquiry. I will be using a model drawn from my analysis of physical chemistry as a paradigmatic exemplar of a successful inquiry project. I use the model to look at cognitive neuroscience in order to indicate its potential scope and power. I then apply the model to community of inquiry in response to the fundamental entanglement of reason and emotion. My efforts here, to counter the early and perhaps persistent focus on logical reasoning in those interested in philosophy with children, should be seen to support the work of Ann Margaret Sharp, whose focus on the role of emotions in education is among the most welcome directions towards which the theory and practice of community of inquiry should be directed (Sharp, 2007).

why neuroscience?

The basis of neuroscience is neurophysiology, a natural science that offers the potential for a level of warrant that is characteristic of the most deeply entrenched theories that inquiry has produced, the branching structure of interlocking explanations grounded in physical chemistry that connects, through explanatory relationships, scientific understanding that ranges from micro-physics to organic chemistry, from the material sciences through which we build our bridges to the micro-chemistry through which we biopsy suspicious moles. The physical and chemical understanding of the living brain offers a foundation for psychology that has enormous potential for explanatory power, even if confronting the formidable complexity of the bio-chemical structures that the current understanding of the nervous system increasingly exposes. The explanatory power of a physicalist account of the mind is apparent in the epistemological structures upon which physical chemistry is based. I have attempted to capture image of that power in a model of emerging truth (Weinstein, 2013) based on the structure of physical chemistry. This is a departure from the standard analysis of scientific method in terms of deductive or inductive logic, which I believe has consequences for the goals and procedures within community of inquiry. I turn to this in the final section of the paper.

Physical chemistry exhibits an explanatory structure that includes three highly intuitive epistemological properties: consilience breadth and depth (Weinstein, 2011). These three are the core of the epistemological power of scientific theorizing seen as productive of emerging truth. The first, consilience, requires that theories are increasingly supported by a body of evidence that is improving in scope and detail. Breadth requires that a theory explains an increasing number of diverse phenomena, and depth requires that a theory is reinterpreted in terms of by higher-order explanatory frameworks that connect it to other theories of increasing breadth and increasing evidentiary adequacy. These epistemological characteristics, were first exemplified by physical chemistry in the mid 1800's. And despite a history of false starts, misleading empirical data and over-stated arguments, with the elaboration of the periodic table of elements in the 20th century, physical chemists were able to offer a unified and highly coherent body of branching explanatory structures, that ranges from micro-physics to cosmology, from the basic properties of matter to the complexity of the living cell (Sceri, 2007). Cognitive science, viewed through the epistemological perspective that looks to consilience, breadth and depth seems, even in its infancy, to exhibit similar potential for explanatory power (Weinstein, 2015).

Cognitive science begins with a level of theoretic articulation exemplified by Chomsky (1957) and called on the resources of logic and computer science. This mirrors the epistemological context of early atomic theory. Cognitive scientists, like early chemists had a basic theoretic perspective that permitted mathematical articulation. Rather than look at behavior alone. Cognitive scientists built theoretic models that accounted for the behavior in terms of functional models based on theoretic constructs (Gardner, 1987). This placed cognitive science in a position of indefinite growth. And the promise of increasingly sophisticated computer simulations of mind offered possibilities for the description of the complex theoretic structures put forward. Complex descriptions that require computer modeling for their articulation offers a test of consilience unlike anything in the prior history of psychology. Computer simulations of interactions employed theoretic constructs based on a vastly increased knowledge of the structure of the brain, available through powerful advances in instrumentation, brain scans of various sorts. This enabled the analysis of the range of cognitive behaviors.

We do not know which theories in cognitive science are correct, but if they can be developed consistent with the available evidence they have the potential to grow in scope and detail as the theoretic predictions of ever-finer models of complex systems can be ascertained through computer simulations corresponding to the increasingly detailed experimental knowledge of the brain. Like early physical chemistry, we don't know which theories in cognitive science are true, but if a theory continues to yield important explanations, the potential for a growing and all-encompassing theoretic structure of psychology becomes plausible.

In the history of physical chemistry, the increasing degree of articulation in the details that chemical theories explained-- what we call 'consilience,' was combined with breadth, that is, with the scope of a theory. Cognitive science is, if nothing else, exceptionally broad in the scope of its concerns. The *Cambridge Handbook of Cognitive Science* (Frankish and Ramsey, 2012) lists eight related research areas that reflect different aspects of cognition, including perception, action, learning and memory, reasoning and decision making, concepts, language, emotion and consciousness. In addition, they list four broad area that extend the reach of cognitive science from human cognition standardly construed to include animal cognition, evolutionary psychology, the relation of cognition to social entities and artifacts and most essential, the bridge between cognitive science and the rest of physical science: cognitive neuroscience. Each of these is a going concern, and none of them is free of difficulties. Yet in all cases there is a sense of advance, of wider and more thoughtful articulation of theoretical perspectives that address a growing range of cognitive concerns.

The key to the epistemological power of cognitive science is its foundation in neuro-science, which gives depth to even speculative theories. Speculations of instantiated neural mechanisms have systemic power much greater than their evidentiary weights. For their enterprise, bridging between fundamental pre-cognitive processes such as physiological control and emotions to build the functional potential for memory and cognition offers deep structural warrants when supported by reliable evidence and accepted theories. Although speculative and possibly inadequate physiologically based theories offer enormous potential epistemic power. Their materialist assumptions point to the deep reduction to physiology, neurobiology, biochemistry and electrochemistry, offering a coherent ontology consistent with the rest of science. And this is despite the enormous gap between the simple models of neurological activity proffered and the brute facts of the living brain: 30 billion neurons making countless trillions of connections and sensitive to a wide array of known biochemical agents, with more perhaps to come.

cognition and emotions

There are neural mechanisms that account for persistence of biasing phenomena such as the persistence of beliefs in the face of counter-evidence (Eiser, 1984, Jacoby, et. al, 1989) and implicit bias (Dovidio and Gaertner 2005). The prefrontal cortex which processes conscious thought and the so-called "executive functions," planning, goal setting, evaluation, and cognitive control is connected to other parts of the brain organizing input together into a coherent whole. Under the prefrontal cortex is the orbitofrontal cortex, which broadly supports self-regulation: physical, cognitive, emotional and social. These regions combine inputs to create the image of our physical body as well as perceptions of the external world and mental constructs (Dehaene, 2014). An interesting detail relevant for social cognition are so called "mirror neurons," neurons that fire both when you act and when you perceive another performing the same action and which allow us to infer or predict others' intentions (Iacoboni, et. al. 2005). Research indicates that mirroring of emotions, the degree of empathy we show others, is modifiable by real or perceived social relationships supporting ethnic or gender stereotypes (Amodio & Devine, 2006). There is evidence that biasing emotions reach deep into our biographies and are expressed in implicit biases. Evidence indicates that "early and affective experiences may influence automatic evaluations more than explicit attitudes. In addition, there is growing evidence that systemic, culturally held can bias people's automatic evaluations" regardless of their expressed personal opinion. (Rudman, 2004, p. 81). Childhood based biases cause strong reaction such as fear of unfamiliar others, which has been correlated with activation in the amygdala (Dunham, Baron, & Banaji 2008).

Biases interfere, on a neural level, with the ability to experience others. When "European-American subjects looked at the face of another European-American, there was a larger neural response than when they looked at African-American faces (Lebrecht, et. al., 2009, p. 3). The result: "people do not mentally simulate the actions of [members of] outgroups. Their mirror-neuronsystems are less responsive to outgroup members than to ingroup members" (Gutsell and Inzlicht 2010, p. 844). Such results have been generalized in a theory of the "automaticity" of higher mental functions sees ordinary cognition as dependent on environmental and social factors (Bargh & Ferguson, 2000). Evans (2008) offers a complex image of the interaction between what he terms unconscious and conscious cognition, seeing a variety of distinct and possibly incompatible systems. The work continues with the development of neural models that indicate the integration of cognition and emotion through abstract structures based on the known physiology of the brain. We turn to two such accounts, the ambitious attempts of Thagard and Aubie, (2008) and Damasio (2010) to bridge the gap between abstract structure and available physiological knowledge.

Thagard and Aubie draw upon both neurophysiology and computer modeling. This enables both theoretic depth and the possibility of increasing adequacy, even if the latter is no more that computer simulations of simplified cognitive tasks. They cite ANDREA, a model which "involves the interaction of at least seven major brain areas that contribute to evaluation of potential actions: the amygdala, orbitofrontal cortex, anterior cingulate cortex, dorsolateral pre-frontal cortex, the ventral striatum, midbrain dopaminergic neurons, and serotonergic neurons centered in the dorsal raphe nucleus of the brainstem" (Thagard and Aubie, 2008, p. 815). With ANDREA as the empirical basis, they construct EMOCON, which models emotional appraisals, based on a model of explanatory coherence, in terms of 5 key dimensions that determine responses: valance, intensity, change, integration and differentiation (pp. 816ff). EMOCON employs parallel constraint satisfaction based on a program, NECO, which provide elements needed to construct systems of artificial neural populations that can perform complex functions (p. 824ff. see pp. 831 ff. for the mathematical details). This points to the potential power of their approach. Computer models, even if gross simplifications, permit of ramping up. A logical basis with a clear mathematical articulation has enormous potential descriptive power as evidenced by the history of physical science.

Damasio (2010) has a similarly ambitious program. He begins with the brain's ability to monitor primordial states of the body, for example, the presence of chemical molecules (interoceptive), physiological awareness, such as the position of the limbs (proprioceptive), and the external world based on perceptual input (extroceptive). He construes this as the ability to construct maps and connects these functions with areas of the brain based on current research (pp. 74ff.). This becomes the basis for his association of maps with images defined in neural terms, which will ground his theory of the conscious brain.

Given that much he gives an account of emotions elaborating on his earlier work, but now connecting emotions with perceived feelings. As with the association of maps and images, Damasio associates emotions with feeling and offers the following account: "Feeling of emotions are composite perceptions of (1) a particular state of the body, during actual or simulated emotion, and (2) a state of altered cognitive resources and the deployment of certain mental scripts" (p. 124). As before he draws upon available knowledge of the physiology of emotional states but the purpose of the discussion is not an account of emotions *per se*, but rather to ground the discussion of memory, which becomes the core of his attempt at a cognitive architecture (pp. 339ff.). The main task is to construct a system of information transfer within the brain and from the body the brain. The model is, again, mediated by available physiological fact and theory about brain function and structure. The main theoretic construct in his discussion of memory is the postulation of 'convergence-divergence zones' (CDZs), which store 'mental scripts' (pp. 151ff.). Mental scripts are the basis of the core notion of stored 'dispositions,' which he construes as 'know-how' that enables the 'reconstruction of explicit representation when they are needed" (p. 150). Like maps (images) and emotions (feelings) memory requires the ability of parts of the brain to store procedures that reactivate prior internal states when triggered by other parts of the brain or states of the body. Dispositions, unlike images and feelings are unconscious, 'abstract records of potentialities' (p. 154) that enable retrieval of prior images, feelings and words through a process of reconstruction based in CDZs, what he calls 'time-locked retroactivation' (p. 155). CDZs form feedforward loops with, e.g. sensory information and feedback to the place of origination in accordance with coordinated input from other CDZs via convergence-divergence regions (CDRegions) by analogy with airport hubs (pp. 154ff.). Damasio indicates empirical evidence in primate brains for such regions and zones (p. 155) and offers examples of how the architecture works in understanding visual imagery and recall (pp. 158ff.).

Damasio like Thagard and Aubie offer speculative models that reference current physiological knowledge, rely on concepts from computer science and information theory and bypass the deep philosophical issues that are seen by many to create an unbridgeable gap between the mental and the physical short of deep metaphysical reorientation (Chalmers, 1996). Yet, whatever the ultimate verdict on these two authors, the rich program in cognitive science persists and has a strong appeal. The reason is the potential strength of the warrants, that is to say, if such models prove to be correct the epistemic force of the warrants that support them will be enormous, swamping the force of alternative approaches that rely on, for example, psychological evidence alone.

cognitive neuroscience and community of inquiry

The consequences of neurophysiology and the cognitive science it supports for community of inquiry point to a direction already undertaken. That is, the movement from a logical account of reasonableness to a richer human-centered sense of how to support the process the community of inquiry may be seen to engender. Matthew Lipman's broad agenda including critical, creative and caring thinking when seen within a dialogical community of inquiry includes an essential human element and the decades of cognitive psychologists now supported by advances in understanding the neural mechanism tells us that cognition, reasoning, evaluating evidence and even identifying the critical questions that need to be asked is a human process that engages with complex activities of the brain. And as such transcends the normative ideal of reasonableness no matter how construed. On the psychological level, there is deep engagement with concepts based on neural overlap between the executive functions associated with complex reasoning and the power of connections among ideas, cemented through emotional responses that govern every aspect of the cognitive process. This causes emotional components in what we see, what we remember, how we remember and how deeply entrenched the ideas are within complexes of ideas that form the basis for our sincere beliefs and what we do with them.

Philosophical community of inquiry must address the values inherent in dialogical practices if it is to be more than expressive. Some commitment to normativity is required and the *is* of emotional connections must be weighed against the *ought* of any disciplined philosophical practice that uses normatively compelling procedures to achieve normatively sanctioned ends. How then to bridge between the logical and epistemological intuitions that govern normatively constrained discourse and the brute fact of emotional entanglement. This is a challenge to any naturalistic account of thinking, if only because it tends towards relativism and Harvey Siegel (1987) an advocate of normatively driven critical thinking has, to my mind, shown the incoherence of such a view. Siegel's arguments are simple, any argument for relativism is either merely relatively true or incoherent, since if the argument for relativism is more than merely relatively true than not all arguments are merely relatively true. The point for education is that we must struggle towards some objective reasonable standpoint, one for which giving reasons is required (Siegel, 1988). But how is this possible if all cognitive functions associated with reasoning are conditioned by emotional weights, if the very cognitive mechanisms that support our functions are distorting and biasing the evidence as we collect it, qualifying our memories and information processing, determining the weight of our commitments through organizing schema with which the brains encodes, stores and selectively retrieves? All of this impinges on the executive functions that drive our reasoning. Our arguments express who we are in the most profound sense.

I find a solution in a better understanding of how successful inquiry works. How despite the vagaries of the individuals involve, their jealousies, their cultural and professional prejudices, the limits on individual's knowledge and competence, and despite the biases manifested in institutional policy and practice added to the litany of emotional barriers to reasoning, a science like chemistry has managed to achieve the highest degree of epistemological warrant, increasing both practical application and theoretic understanding. Scientists, seen in aggregate as communities of inquiry, form institutions that modulate individual differences through a focus on the evolving ideas and practices. Scientists may be illogical or even crazy, but science must be coherent and successful. Scientific communities were part of the original conception of community of inquiry in pragmatists such as Charles Sanders Peirce, but it may seem a dubious model for the philosophical community of inquiry. And so, we must be suspicious of the logical and dialogical apparatus that is drawn from an objective search for knowledge.

Given my analysis of chemical inquiry much of the traditional logical concern is replaced by the triad of epistemological criteria: increasing consilience, breadth and depth over time. How can this be applied to philosophical communities of inquiry? Breadth and depth seem to have an intuitive connection to the emerging inquiry as dialogue continues. Breadth refers to the range of topics, depth to the reinterpretation based on conceptual advance. An obvious problem is consilience, in science, increasingly adequate empirical generalizations. Successful scientific inquiries form chains of experiments, models, explanations and applications. These increase over time in detail and variety, which results, among other things, in increase in empirical knowledge. More important these empirical results and the theories that explain them are supported by chains of explanations, new frameworks for understanding and advancing knowledge. Notice that this is not some even flow of success even in the most successful inquiry projects. The history of chemistry shows inconsistencies, lack of evidence and ignorance of appropriate methods. All of which were apparent to those engaged in the inquiry (Scerri, 2007). Yet inquiry persisted with the concomitant growth of breadth and depth of understanding. Can this be generalized for philosophical community of inquiry in the broad array educational contexts to which those interested in philosophy with children are concerned? And to return of the focus of the paper, how does standards such of these enable us to resolve our predicament given the complexity of cognitive functions that neurocognitive science describes. What I will try indicate is how the scientific metacriteria can replace the standard logical concerns, whether formal or informal.

Given the idiosyncrasy with which our evidence is obtained and stored the most our arguments can be taken for are suggestions, possible avenues for the continuing inquiry. They enter into the dialogues as points of view, contributions that claim relevance to the ongoing inquiry. This is exemplified in the history of chemistry, where passionate dialogues over time and distance slowly evolved as key ideas were transported and modified into new configurations and more productive inquiry. Like science, standpoints in the philosophical community of inquiry are suggestions, opportunities for engagement, and so instead of logical or epistemological flaws we can look for the location from which a dialogical move is made. Dialogue seen as contrasting points of view presented for consideration enable responses across the range of speech acts and in so doing create modify or remove cognitive/emotive constructions by the participants as the dialogue moves forward. As the group forms and reforms perspectives the scope of the dialogue expends, offering examples and making analogies, explaining and challenging perspectives, connecting with other issues, exploring new information. The analogue to breadth and depth in scientific inquiry is the variety of opinion and its configuration and reconfiguration as people, through dialogue in a community of inquiry, see in each other’s perspectives something worth considering and the value of striving for deeper understand of themselves and the issues they embrace.

I think there is no easy analogue to consilience. But consilience should be seen as more than empirical confirmation. Looking again at the history of chemistry, as the inquiry progressed empirical outcomes were transient and open to modification. Until the discovery of isotopes there was no hope of finding empirical results that uniformly conformed to the theory (Scerri, 2007, pp. 41-41). Rather, the ability to improve empirical adequacy reflecting conceptual growth and deepening understanding (Scerri, 2007, pp. 176ff). Communities of inquiry must learn to live with incompleteness. Psychologists tell us part of the reason why this is the case for humans in general and scientific communities of inquiry are no exception. Even the most successful inquiry, physical chemistry, shows the inevitability of local inadequacy. False steps abound as each scientist reflects her local situation, his opportunities, her competence, his experiences, her commitments. Truth is not there to be seen in particular positions. Prout's hypothesis, which correctly saw hydrogen as the unit basis of the periodic table of elements was rejected on the available evidence as 'pure illusion' (Scerri, p. 41). If we judge by chemistry, truth emerges slowly, if at all. So, in the community of inquiry each individual perspective is to be considered, accepted, modified, challenged, disregarded, reevaluated, remembered for later, temporarily forgotten or even gone forever. The value in the science is in the process and its outcomes. Local inadequacy is the rule not the exception. How can a philosophical community of inquiry hope for more?

Immersed in philosophical inquiry, dealing with questions that transcend both experience and understanding the value is in the act of inquiry itself, the commitment to inquiry and care for the diversity and sensitivity of points of view in the dialogue. The intellectual task is to be open to possibilities of reinterpretation, indications that the inquiry can be deepened, extended or applied. This is closer to Vygotsky than Piaget, Paulo Freire than Robert Ennis, closer to Ann Margaret Sharp's evolution than Matthew Lipman's starting point. But it is not some relativist alternative to clear logical thinking. For it is based on an objectively supportive paradigm, the function of communities of inquiry in areas of science where, both originally and hopefully in the future, they can serve for an alternative concept of how order is obtained without imposing the pseudo-discipline of, often poorly understood concepts from logic, whether formal or informal. Formal logic rules are not easy to apply when the concern is actual discourse. Informal fallacies reflect complex argumentative structures; Douglas Walton writes entire books on particular fallacies (Walton, 1992 is an example). Formal logic has moved beyond its fetish with consistency; paraconsistent and defeasible logics work with contradictions and challenges (Bremer, 2005). But the adequacy with which logic is understood and applied in classroom dialogues is the least of the problem. For what is the effect of a logical challenge on interlocutors? "You are being illogical" is tantamount to exclusion from the discourse. How is creative and caring thinking supported by using fallacy labels as rhetorical thrusts? Does brandishing logical dicta lead to sensitive and nuanced criticisms of oneself and others? This leads us into murky waters

The test of a community of inquiry is how it flourishes. In science flourishing is obvious from great success, but only over time and in retrospect. The history of science points to conceptual growth as well as empirical adequacy as indications of potential success. The former readily imports into philosophical communities of inquiry in terms of my criteria of breadth and depth, extending tendencies already apparent in the theory and practice of community of inquiry as if moves away from logic driven evaluations of dialogue, evaluating the richness of the interactions, the growth of understanding. But the latter, consilience, moves us into another arena. Consilience connects science to the world of human action. Science is characterized by activity, both in its process and in its outcomes. A traditional philosophical community of inquiry has no material goals beyond the clarification of ideas. But the model of science calls for some application of the discussion to definable projects that reflect the discussion and more controversially to projects that extend beyond the realm of thought and constitute some intervention in the world. Science points community of inquiry to useful and tangible outcomes. Reminiscent of John Dewey, a community of inquiry seeking to address external issues of school, community and society, sees dialogue as supporting tangible efforts to make a difference. Consilience, the accomplishment of external goals thus, as in science, becomes a check to the weaknesses and extravagances that characterize the image of thought and deliberation that cognitive neuroscience exposes. As in Paulo Freire communities of inquiry see the necessary connection between dialogue and acting in the world. And so, emotions move from being blocks to rational discussion to being goads to accomplishing worthwhile goals.

references

Amodio, D.M., & Devine, P.G. (2006). Stereotyping and evaluation in implicit race bias: Evidence for independent constructs and unique effects on behavior. *Journal of Personality and Social Psychology, 91,* 652-661. doi:10.1037/0022-3514.91.4.65233

Blair, I.V., Ma, J.E., & Lenton, A.P. (2001). Imagining stereotypes away: The moderation of implicit stereotypes through mental imagery. *Journal of Personality and Social Psychology*, 81, 828-841.

Bloom, B. S., Engelhart, M. D., Furst, E. J. Hill, W., Krathwahl, D. *(1956). Taxonomy of educational objectives: The classification of educational goals.* New York: David McKay Company.

Bremer, Manuel (2005). *An introduction to paraconsistent logics.* Frankfurt: Peter Lang.

Chalmers, D. (1996). *The conscious mind*. New York: Oxford University Press.

Chomsky, N. (1957). *Syntactic structures.* The Hague: Mouton.

Damasio, A. (1995). *Descartes' error: emotion, reason and the human brain.* New York: Harper.

Damasio, A. (2012). *Self comes to mind: Constructing the conscious brain.* Random
House, LLC.

Dunham, Y., Baron, A.S., & Banaji, M.R. (2008). The development of implicit intergroup cognition. *Trends in Cognitive Sciences,* 12, 248-253. doi:10.1016/j.tics.208.04.006

Dovidio, J.F., & Gaertner, S.L. (2005). Color blind or just plain blind? The pernicious nature of contemporary racism. *The Nonprofit Quarterly*, 12, 40-46.

Eiser, J. R. (1987). *Attitudinal Judgment*. New York: Springer-Verlag.

Evans, J. (2008). Dual-processing accounts of reasoning, judgment, and social cognition. *Annual Review of Psychology, 59*, 255-278.

Gardner, H. (1987). *The mind's new science*. New York: Basic Books.

Greenwald, A.G. & Krieger, L.H. (2006). Implicit bias: Scientific foundations. *California Law Review*. 94, 945-967.

Gutsell, J.N. & Inzlicht, M. (2010). Empathy constrained: Prejudice predicts reduced mental simulation of actions during observation of outgroups. *Journal of Experimental Social Psychology*. 46, 841-845.

Hamilton. D. J. (ed.). (1981). *Cognitive Processes in Stereotyping and Intergroup Behavior. Hillsdale, NJ: Erlbaum.*

Iacoboni, M., Molnar-Szakacs, I., Gallese, V., Buccino, G., Mazziotta, J.C., & Rizzolatti, G. (2005). Grasping the intentions of others with one's own mirror neuron system. *PLoS Biology*, 3, (3): e79.

Jacoby, L. L., Kelley, C. M., Brown, J., & Jaseschko, J. (1989). Becoming famous overnight: Limits on the ability to avoid unconscious influences of the past. *Journal of Personality and Social Psychology*, 326-338.

Kahneman, D. Slavic, P. and Tversky, A. (1982). *Judgments under uncertainty:heuristics and biases.* New York: Cambridge UP.

Lebrecht, S., Pierce, L.J., Tarr, M.J., & Tanaka, J.W. (2009). Perceptual other-race training reduces implicit racial bias. *PLoS ONE,* 4, 1-7.

Lewandowsky, S., Seifert, C., Schwarz, N., & Cook, J. (2012). Misinformation and its correction: Continued influence and successful debiasing. *Psychological Science in the Public Interest, 13*(3), 106-131.

Lipman, M. (1974). *Harry Stottlemeier's discovery*, Upper Montclair, NJ: IAPC.

Lipman, M. (1991). *Thinking in education*. Cambridge: Cambridge University Press.

Nisbett and Ross, 1980. *Human inference*. Englewood Cliffs, NJ: Prentice Hall.

Paul, R. (1990). *Critical Thinking*. Rohnert Park, CA: CCTMC.

Ramsey, K., & Frankish, W. M. (2012). *The Cambridge handbook of cognitive science.* Cambridge: Cambridge University Press.

Reznitskaya, A and Gregory, M (2013): Student thought and classroom language: Examining the mechanisms of change in dialogic teaching. *Educational Psychologist*, 48:2, 114-133

Rudman, L.A. (2004). Sources of implicit attitudes. *Current Directions in Psychological Science.* 13, 79-82.

Scerri, E. R. (2007). *The Periodic table: Its story and its significance*. New York: Oxford University Press.

Sharp, A. (2007). Education of the emotions in the classroom community of inquiry. *Gifted Education International*, 22(2-3), 248-257.

Siegel, H. (1987). *Relativism refuted*. Dordrecht: Reidel.

Siegel, H. (1988). *Educating reason*. New York: Routledge.

Thagard, P., & Aubie, B. (2008). Emotional consciousness: A neural model of how cognitive appraisal and somatic perception interact to produce qualitative experience. *Consciousness and Cognition, 17*(3), 811-834.

Walton, D. (1992). *Slippery slope arguments*. Oxford: Clarendon Press.

Walton, D. (1996). *Argumentation schemes for presumptive reasoning.* Mahwah, NJ: Erlbaum.

Wason, P. and Johnson-Laird, P. (1972). *The psychology of reasoning*: Cambridge, MA: Harvard UP.

Weinstein, M. (1994). The psycho-logic of race prejudice. *Analytic Teaching,* 14:2.

Weinstein, M. (2002). Exemplifying an internal realist theory of truth. *Philosophica*, 69:2002(1), 11-40.

Weinstein, M. (2011). Arguing towards truth: The case of the periodic table. *Argumentation, 25*(2), 185-197.

Weinstein, M. (2013). *Logic, truth and inquiry*. London: College Publications

Weinstein, M. (2015). Cognitive science and the model of emerging truth. In Garssen, B. Godden, D., Mitchell, G. & Snoeck Henkemans, A. (eds). *Proceedings of the 8th International ISSA Conference, ISSA, 2015.*

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