

Educating for Complex Thinking through Philosophical Inquiry

Models, Advances,
and Proposals for the New Millennium

edited by Marina Santi, Stefano Oliverio

Liguori Editore

Impariamo a pensare
Collana diretta da A. Cosentino, M. Santi, M. Striano

Marina Santi, Stefano Oliverio (eds.)

**Educating for Complex Thinking
through Philosophical Inquiry**

*Models, Advances, and Proposals
for the New Millennium*

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Comitato scientifico: Dario Antiseri, Franco Cambi, Daniela Camhy, Irene De Puig, Maria Luisa De Natale, Mario De Pasquale, David Kennedy, Walter Kohan, Luca Illetterati, Felix Garcia Moryon, Francesca Pulvirenti, Carlo Sini.

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Evaluating Complex Thinking: Hypotheses for a Protocol for the Assessment of Complex Thinking Abilities

Maura Striano*

1. *The structure of complex thinking*

In his work *Thinking in Education* [1991; 2003], Lipman introduces a model of thinking which he considers to be the true and most valuable outcome of any educational process: it is a form of reflective thinking, in that it is aware of its own processes, self-correcting and applicable to any content area, which can be described as high-order thinking in that it works by making use of high-order skills and produces valued outcomes.

High-order thinking is often identified with critical thinking, but Lipman points out that the latter can be acknowledged as only one of the three dimensions of the kind of thinking he refers to, and its hallmark is not to be found in its high-order performances, but rather in its tripartite structure in which critical, creative and caring dimensions are equally important and interdependent. That is why he defines his model as complex thinking since it is a form of multidimensional thinking that can only be evaluated in terms of complexity, scope, intelligible organization of complex fields of experience, as well as «recognition of causal or logical compulsions and ‘qualitative intensity’» [Lipman 1991: 94].

According to Lipman, complex thinking is characterized by some specific features which orient its performance in the different fields of experience: a) it tends towards/

* Università degli Studi di Napoli Federico II.

moves inside complexity; b) tries to reduce and understand complexity referring to series, orders, types, families and classes; c) possesses unity, integrity and coherence; d) deals with evidence; e) refers to causes, connections, implications, relationships; f) tends towards intelligibility; g) has a wide spectrum of applications; h) is comprehensive, pervasive and multi-dimensional; i) is multilogical; j) and is multi-perspectival.

In the schema below we can see how these features can be articulated into different specifications according to the different dimensions involved: for example, the critical dimension requires that thinking is governed by specific criteria since its task is to construct valid judgements according to the contexts and the situation taken into account (to which it must be particularly sensitive) through a self-corrective procedure, which helps to correct partiality.

On the other hand, the creative dimension requires that thinking is not governed by specific criteria but only sensitive to them, while it is completely governed by the context, which offers different opportunities and resources to construct new forms of judgment and is also geared more towards transcending than towards correcting itself.

The caring dimension requires, instead, that thinking refers not to criteria but to substantial and procedural considerations, according to the context and the situations (to which it must be extremely sensitive), since its task is to formulate and orient practical judgments which require constant metacognitive and reflective control and monitoring.

From this schema we can clearly see that complex thinking, according to Lipman's model, is a form of contextually situated and distributed thinking which emerges in different fields of experience and performs inquisitive and deliberative processes.

This implies that it cannot be observed or evaluated outside the contexts (which are constitutive of its emergence) and independently from the individuals who perform it, even if it transcends contexts and individuals and

formulates general judgements, according to a paradigmatic procedure.

Lipman’s model is particularly interesting from a pedagogical point of view because it shows that human cognitive potential can be developed in its higher expression and function by activating and cultivating multidimensional processes of thinking since an effective, true educational work is not to be focused on specific abilities, skills or competences but rather on the integrated development of the three cognitive dimensions identified.

Critical thinking	Creative thinking	Caring thinking
Governed by criteria	Sensitive to criteria	Regards substantial and procedural consideration (i.e. decisions and choices, dilemmas)
Tends towards the formulation of judgements	Tends towards the formulation of judgements	Tends towards the development of practice, finding solutions to problematic situations (i.e. inter-personal conflicts) [RN: check]
Self-corrective	Self-transcendent	Metacognitive (inquiry into inquiry)
Sensitive to context	Governed by context	Sensitive to contexts

Referring to a Vygotskian matrix, Lipman shows that the development of complex thinking always occurs in a context and within an area of potential development [Vygotsky 1978; 1986], with the help of scaffolding devices and with the aid of language, considered to be the primary source for cognitive development; he also makes it clear that high-order cognitive functions first develop on an inter-individual basis and are then internalized on an

intra-individual basis since individual thinking is for a considerable part an internalization of what has occurred within a group or several groups to which the individual belongs, through a movement from a social to an individual dimension. That is why Lipman points out that we should consider thinking as a “social fact” and try to understand which kind of social fact it represents [Lipman 1991: 51].

On this basis, we can see thinking as strictly connected with dialogue which is, indeed, the generating matrix of any process of reflection, since people involved in a dialogue are induced to concentrate, reflect, consider several possible alternatives, listen, carefully analyse definitions and meanings, acknowledge options which have not previously been taken into account and perform various kinds of mental activities that are triggered because of the specific context; moreover, people internalize dialogue, and when they do so, they internally reproduce argumentations, confutations, reflections, deduce inferences, identify assumptions, challenge their reasons and perform intellectual interactions with themselves [Lipman *et al.* 1980: 22-23].

According to a Deweyan matrix, Lipman also makes it clear that complex thinking is, indeed, what Dewey [1910/2008] considered to be reflective thinking, conceived as a process which «involves not simply a sequence of ideas, but a consequence – a consecutive ordering in such a way that each determines the next as its proper outcome, while each in turn leans back on its predecessors»; it is, indeed, a «stream or flow» which in its developing «becomes a train, chain, or thread» [Dewey 1910/2008: 183]; therefore reflective thinking is a troublesome process which «involves willingness to endure a condition of mental unrest and disturbance» requiring that any forms of judgment be «suspended during further inquiry»; in this perspective, it is deeply connected with empirical inquiry which is one of the two «essentials» of thinking [Dewey 1910/2008: 192].

As Lipman states, complex thinking «tends towards complexity» because it avoids formulations or simple so-

lutions. It is always challenged by what is complicated and problematic and is fascinated by complexity intended as variety, infinite diversification and individualization; complex thinking, indeed, is never satisfied with simple explanations and definite solutions, but tries to broaden the inquiry perspectives; it is open to making use of different logical procedures, is always self-correcting and strives towards unity, integrity and coherence. It moves inside complexity but tries also to reduce complexity, in order to understand it and to gain a deeper knowledge of it. This form of thinking is, therefore, deductive and inductive, quantitative and qualitative, narrative and paradigmatic, comprehensive and pervasive and is constantly challenged by evidence and empirical reality, which constitutes its performing «arena» [Lipman 1991: 94].

Lipman also points out that complex thinking is «multilogical» and not «monological», since it is capable of using different logical tools and pathways; it is, however, also «multiperspectival» since it is open to including a wider and wider number of perspectives and points of view.

In synthesis it is characterized by the following features:

- ✓ It refers both to substantial consideration as well as to procedural consideration of experience;
- ✓ It tends towards the solution of problematic situations;
- ✓ It is metacognitive (makes inquiry into the process of inquiry itself);
- ✓ It is not abstract, but tends towards the development and the enrichment of action and practice;
- ✓ It is deeply sensitive to context.

On this basis, we can see that complex thinking is deeply imbedded in human experience and is committed to making meaning of it in a continuous process of inquiry.

That is why Lipman proposes the use the pedagogy of the “community of inquiry” as the best educational strate-

gy for the development of complex thinking, pointing out that the community should be involved not in any process of inquiry, but in a philosophical one. This is particularly significant, in that philosophical inquiry is a particular kind of speculative practice, which combines the three areas of human experience (logic, aesthetics, ethics) which are the fields of emergence and application of the three dimensions which compose complex thinking.

2. Complex thinking between experience and reflection

Complex thinking is, referring to a Deweyan perspective, triggered by empirically situated situations that need to be explored through a continuous process of reflection aimed at clarifying and defining the elements at stake, to develop ideas and hypotheses, to identify problems, and to formulate solutions which need to be refined, tested and validated over and over again.

Thinking is a function of human experience which is complex in nature and therefore requires a tool that enables it to be explored, taking into account all its ambiguities, contradictions, discontinuities, undeterminations, nuances, and possibilities of development; it can be, therefore, conceived as a process emerging from experience in that it is fostered by a doubt, a perplexity, and is supported by a continuous tendency towards clarification, explanation and understanding, which leads to developing an increasingly articulated, consequential and sophisticated chain of reasoning and frame of meanings.

Complex thinking begins the unification of scattered impressions by organizing discrete elements of experience into groups and this creates a basis for the construction of structures of meaning.

In this perspective, it functions like Dewey's reflective thinking, which «confers upon physical events and objects a very different status and value from that which they

possess to a being that does not reflect»; through thinking they assume, instead, «a definite individuality» according to the meanings they are used to conveying [Dewey 1910/2008: 194].

From this point of view, Lipman is also very close to Bruner, who identifies four means of meaning-making which are supported by different forms of thinking: a) establishing, shaping and maintaining intersubjectivity; b) relating events, utterances, and behaviours to the actions taken; c) construing of particulars in a normative context (referring to meanings relative to obligations, standards, conformities and deviations); d) making propositions through the application of contextual, logical and syntactic rules (including rules of inference and logic and such distinctions as whole-parts, object-attribute and identity-otherness) which help to construct clearer understandings of the reality.

As Bruner has pointed out, human thinking can both be syntagmatic and narrative, as well as paradigmatic according to the different perspectives it takes [Bruner 1986; 1990].

Supports everyday reasoning	Supports scientific reasoning
Vertical orientation	Horizontal orientation
Sensitive to context	Free from context
Idiographic	Nomothetic
Sintagmatic	Paradigmatic
Validated referring to coherence and consistency	Validated referring to falsification
Constructs stories	Constructs rules and laws
Intensional	Extensional

Thinking supporting everyday reasoning is intensional, focused on the single context and experience; it is substantially committed to a search for meaning and understanding more than a search for causes or reasons. On the other hand, thinking supporting forms of scientific reasoning is extensional, tends to transcend single contexts and situations, and is committed to a search for explanations, universal causes and general laws.

In both cases, thinking is deeply committed to meaning construction, negotiation and sharing within a cultural and social context and is therefore to be considered a meaning-making device.

Indeed, both of the forms of thinking depicted by Bruner are involved in what Lipman considers to be complex thinking and cannot be separated within its processes, but are deeply interwoven and integrated in the three dimensions in which it is articulated.

They must, therefore, both be taken into account when we come to focus on the performances of complex thinking in different fields of experience and try to analyze and evaluate them.

3. Complex thinking skills at work

Cognitive skills are defined by Lipman as «the ability to make cognitive moves and performances well» [Lipman 1991: 74].

Building on Bloom [Bloom *et alii* 1956] he distinguishes between low-order and high-order cognitive skills in terms of complexity, scope and the intelligible organization of a complex field, the «recognition of causal or logical compulsions and ‘qualitative intensity’» [Lipman 1991: 94].

Complex thinking is sustained by high-order thinking skills, which help organize the fields of experience through a deep exploration that gives them a meaningful structure through different cognitive processes and tools.

High-order skills (but also low-order skills) cannot be isolated, but are orchestrated in thinking processes and

work interactively within a continuous process of inquiry. That is why Lipman does not believe that single skills can be enhanced and developed with specific exercises and training in that skills emerge contextually and are strictly connected with the processes they support.

The abilities identified by Lipman are of different kinds. He indicates reasoning skills (such as deductive, inductive and analogic reasoning); inquiry skills (such as observation, description and narration); concept formation skills (definition, classification, etc.); and “translation” skills (understanding, listening, writing and drawing).

To these skills, he adds specific dispositions, which are fundamental for the involvement in complex thinking processes (disposition to wonder, to ask for reasons, to judge using criteria and to ask questions).

As previously said, the above-mentioned skills and dispositions cannot be analyzed, enhanced and evaluated individually, neither can they be isolated and separated from one another or from their context, but they must be considered as integrated and interacting within this context; moreover, they cannot be developed individually and apart from the process of thinking they support.

Outside these processes, independently from a specific empirical situation, these skills cannot be assessed or observed. They need to be operationalized in a situation where they can be detected through the observation and metacognitive verbalization of the inquiry processes performed. This also means that they can only be enhanced and implemented through continuous practice in an inquiring, interactive social context where their growth can be analysed and evaluated according to specific criteria.

4. A device to identify and evaluate complex thinking skills

Taking into account the above described conditions, it is clear that a device to assess and evaluate complex thinking

skills must be first of all focused on its three dimensions (critical, creative, caring) in order to capture its wholeness; second, it must be helpful in activating and tracking the thinking processes inside which the different high-order skills can be identified.

For this reason, it cannot be composed of items constructed in the form of questions to be answered (assuming that there is one right answer), but should be constructed introducing un-determinate situations to be explored and understood in order to make meaning of them, thus generating the emergence of complex-thinking processes.

The complex-thinking-skills assessment device here proposed is designed to be used with 10-16 year old students and is articulated into three parts, according to the three dimensions of thinking identified by Lipman.

Each dimension includes several sections which help to identify specific areas of functioning of thinking within the three dimensions.

Each section contains a series of items specifically designed to activate reflective processes within a particular dimension of thinking

Every single item is constructed as a short narrative introducing a problematic situation within a situated context to be explored individually; each situation elicits reasoning and reflection in order to construct hypotheses, explanations and understandings which are to be verbalized, together with the thinking processes put to work. Each situation can be analyzed and understood in different ways and no right answer is therefore expected; the evaluation is constructed not on the basis of the answers given to the items, but on the basis of the cognitive performances observed, recorded and analyzed.

Part One

Dimension 1. Critical thinking.

Lipman offers an excellent definition for critical thinking, which is to be considered «skilful, responsible thinking

that facilitates good judgment because it (1) relies upon criteria, (2) is self-correcting, and (3) is sensitive to context» [Lipman 1995: 146]. We can see that Lipman integrates the concept of *standards* (criteria to measure achievement), *skills* (especially cognitive) and *personal judgment* (making wise choices).

He considers personal judgment as a sort of «micro-cosmic version» of a person since judgments express and manifest personal attitudes, beliefs, choices, dispositions and styles; they are therefore highly representative of the individual personality which emerges, in particular when the individual – who is free to choose among different alternatives and to decide which one is the better – is confronted with a dilemma or a problem.

Indeed, the above-mentioned definition should be viewed as a reference point describing the essential features of critical thinking, considered as a dynamic learning process that can be stimulated by a variety of formal and informal activities. It therefore requires individuals to be proactive, determined to work through complex problems and be open-minded to explore alternative ideas and solutions.

Critical thinking has the following features: a) it formulates judgments; b) it is guided by criteria and standards; c) it is sensitive to context; and d) it is self-correcting.

Critical-thinking performances include the following cognitive actions: analysis; comparison; judgment; reflection; synthesis; finding relationships; and evaluation.

Section 1

Judgment construction

Sample Item

Mario did not study so he got a D. His father gave him a punishment: for a week he will not be allowed to go and play football with his friend.

Say if you believe that:

Mario's father did the right thing (according to what criteria?)

Mario's father did not do the right thing (according to what criteria?)

Section 2

Definition of criteria and standards

Critical thinking implies that each judgment depends on criteria and that the whole process of inquiry and understanding is constructed on a series of judgments. Criteria are indeed applied in every mental act even when they are not explicit. Critical thinking helps to identify and modify the criteria on the basis of which judgments are constructed or to define new criteria.

Sample item

Giorgio says: I am very worried because the teacher is going to test me in mathematics. I have been looking at other kids' tests and I noticed that very few of my classmates got a good grade. It is too difficult to understand the criteria the teacher is using to evaluate them!

By my observation, I can state that:

- a) The teacher never asks a kid to start from the contents which he or she prefers to discuss;
- b) The teacher requires that kids solve a problem writing the procedure on the blackboard;
- c) The teacher poses questions regarding procedures;
- d) The teacher never uses a low standard of evaluation, but she never uses a very high standard either.

Can you help Giorgio to find out the criteria and the standards that the teacher uses to evaluate performance in mathematics?

Section 3

Sensitivity to context

If critical thinking implies sensitivity to context, it is only through the direct encounter with a particular situa-

tion that we can discover the contexts to which we can be sensitive. What is considered to be right or wrong, for example, is to be decided on the basis of reasoned justifications which take into account different contexts.

Sample item

Yesterday Mario and Paolo had a fight in the school-yard. The teacher punished both. Mario is mad at her because he says he does not deserve this. He says he had a fight with Paolo because Paolo only backs off if he recognizes that somebody is stronger than he is. Moreover, Paolo had opened Mario's bag and stolen his food and money.

How do you judge the teacher's position? What reasons do you think she has applied for her decision?

How do you judge Mario's position? Do you believe the context and the situation justify his behaviour?

Section 4

Self-correction

Self-correction is that part of inquiry which leads us to seek reasons and, specifically, good (the best) reasons in order to validate beliefs and actions.

Maria is mad at her friend Francesca because she refused to lend her a blouse for a party. Daniela and Giada ask her what happened. Giada suggests some reasons for Francesca's behaviour and asks Maria which ones would be good reasons. There is at least one case that Maria would accept as a good reason. So Maria decides to ask Francesca for her reasons. Francesca says that her grandma had given her that blouse as a present and that the same night of the party she would be visiting Francesca, and would be very happy to see Francesca wearing the blouse. Maria accepts Francesca's reason and corrects her judgment.

Do you think it was a good reason? Why do you think this reason is convincing for Maria? What reasons do you believe Maria would not accept as good reasons?

Part Two.**Dimension 2. Creative thinking.**

The creative dimension of thinking helps to overcome dichotomies and oppositions referring to criteria (even opposing and conflictual) which do not govern thinking but challenge it to find new interpretations, to define new hypotheses and to depict new scenarios; creative thinking is always transcending itself, and goes beyond consolidated and standardized procedures and beyond schemas, frames of reference and criteria. Creative thinking also helps to build bridges, to transfer and translate concepts to different contexts using high-order pathways which help us to jump between dominions which are closely connected, but very far one from the other. Critical thinking is founded, in particular, on analytical skills, which support intellectual flexibility and the acknowledgment and use of different kinds of resources.

The features of creative thinking are: a) sensitivity to criteria; b) self-transcendence; c) formulation of judgments; and d) dependence on context. The cognitive actions performed within creative-thinking processes are: imagining; creating; inventing; breaking schemas; and going beyond.

*Section 1**Sensitivity to criteria*

Pietro loves to construct cribs with his grandpa at Christmas. This year they want to construct an animated crib: it will have people doing things and moving, a flowing river, and lightning. Mario would like to include music and voices, but if you introduce music, there will not be enough electricity for the movements, and if you stop the movements, having voices and music would make no sense.

Can you help Pietro find a solution to introduce voices and music and keep the movement going?

Section 2

Judgment construction.

It is Mother's Day and the school is organizing a show. Mario cannot decide whether he will wear a red shirt his mother bought for him, which he likes very much, or a blue shirt, which is the school colour and the teacher would like the kids to wear. Mario wants to give a sign of affection to his mother and also wants to give a sign of his belonging to the school.

What shirt should Mario wear on this occasion?

Dimension 3. Caring Thinking.

What Lipman defines as caring thinking is a dimension of thinking within which cognitive processes are used to appreciate and judge (in the sense of giving value), express emotion and give affection, act, identify norms of behaviour and empathize. 'To appreciate' means to take into account what is meaningful and considered to be important and valuable, and to take care of it.

Lipman believes that emotions are peculiar forms of judgment and forms of thinking and therefore are part of the cognitive processes that lead to specific reactions and behaviours, as well as to specific judgments and actions. Some actions (conceived as meaning-making performances) are, indeed, specific ways of thinking and are part of the texture of complex thinking, which is not to be conceived in an abstract way, but in a very tangible one. Actions are always to be considered according to their consequences and implications, and this requires thinking in a responsible way. Furthermore, it is extremely relevant to caring-thinking processes as it refers to a general framework of expectations, norms, values which represents the meaning framework of every reason and every action.

Caring thinking helps individuals to put themselves in the shoes of another, to construct forms of dialogue, to understand the other's reasons not only on a logical basis, but also on an empathic basis as well, and to formulate judgements according to a specific context and situation.

Caring thinking has the following features in that it is articulated in different expressions: a) evaluative thinking; b) adaptive thinking (seeking appropriateness and pertinence); c) active thinking (committed to care and preservation); d) empathic thinking; and e) normative thinking. The different cognitive actions implied are: to give value (evaluating); to take the other's position and point of view; to take care of something or someone; to make ethically oriented choices; to feel/have compassion; to listen; to wait; and to accept.

Section 1.

Evaluation

Mario has received a lot of presents for his birthday. The present which he liked the best is an old book with a worn cover.

Why?

- a) It is a precious antique;
- b) It is a book his grandpa gave to his mother and his mother gave to Mario;
- c) It is.....;

What is the value of the book for Mario?

Section 2

Adaptiveness

Maria and Giuseppina are visiting a friend in the hospital. Maria is beautiful. She is tanned and athletic. For this occasion she has chosen to wear a baggy, old tracksuit and she has tied her long hair back. As a present, she has chosen a CD by Zucchero, whose music she knows her friend likes very much.

Giuseppina is not as beautiful, but is very lively and attractive. She wants to wear a short, red dress and take some candy to her friend.

Which do you believe is the most suitable choice for the situation?

Section 3 Activeness

Mario loves bonsai. He has a lot of them. One day he discovers that the bonsai his grandpa gave to him is sick. This makes him very sad, also because his grandpa died some days before. He has put new soil into the vase, he has positioned the bonsai near the light but it does not seem to be recovering. What can Mario do to stop the bonsai from suffering and dying?

Section 4 Empathy

Every morning Antonio takes a walk with his dog before going to school. One day he notices that the dog refuses to go in the same direction. Antonio tries to force it to move on, but the dog starts to whimper and does not move. Antonio has been trying to remember if something had happened...but he can find no reason for his dog's behaviour.

What could he do in order to understand his dog's feelings?

Section 5 Constructing norms

If we all separate our garbage, there will be less and less waste and we will save energy and materials. But my sister does not understand this. Since the separate garbage containers are far from our house, when my mother gives her different bags for paper, plastic and non-recyclable garbage she puts them all in the first trash can she finds on the street. I tried to make her understand but she says that it is too far to walk to the separate garbage containers.

How can I make her understand that if everybody does as she does, the environmental situation will only get worse?

5. A protocol for identification, assessment and evaluation of complex thinking skills

The assessment process of complex thinking skills requires us to follow a protocol using a specific procedure:

- a) The process needs to be articulated in several individual assessment sessions (which should last 45 minutes each);
- b) An adequate setting for the assessment sessions with no disturbing outside interference is essential;
- c) The answers to the items are to be audio recorded and accompanied by written notes from the interviewer, in order to identify and analyze the cognitive and metacognitive processes performed;
- d) The audio recordings are to be transcribed and transformed into a written text;
- e) A textual analysis of the written material (transcripts and notes) needs to be made in order to identify relevant passages which depict the emergence of specific performances and skills;
- f) The cognitive and metacognitive performances will be evaluated according to specific criteria (capacity to move inside complexity; capacity to reduce and understand complexity; unity, integrity and coherence of thinking; capacity to deal with evidence; capacity to refer to causes, connections, implications and relationships; capacity to make intelligible one's own thinking processes; capacity to transfer ideas and solutions to different situations; capacity to move within all three dimensions of thinking; capacity to use different logical patterns; and capacity to take different perspectives).

At the moment the complex-thinking assessment device is being tested in a series of elementary and junior high school classes in Italy, and data are being collected and compared in order to proceed with its validation.

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