The Argumentative and the Interpretative Functions of Thought: Two Adaptive Characteristics of the Human Cognitive System

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RESUMEN

La búsqueda del significado, teniendo presente un objetivo, caracteriza toda la actividad del sistema cognitivo humano en todos sus niveles: percepción, lenguaje, razonamiento. La *función interpretativa* es una característica inherente a todo proceso de razonamiento y es una característica adaptativa del sistema cognitivo humano en general. En consecuencia, estamos de acuerdo con los autores por lo que respecta a la relación privilegiada entre lenguaje y pensamiento que ellos subrayan en la función argumentativa del pensamiento. Sin embargo, de acuerdo con nuestro punto de vista, comprender, esto es: interpretar, precede a la argumentación. Algunas investigaciones sobre la solución de problemas en grupo se discutirán a partir de esta perspectiva.

PALABRAS CLAVE: *psicología del pensamiento, función interpretativa, lógica, razonamiento.*

ABSTRACT

The search for meaning, in view of an objective, characterizes every activity of the human cognitive system at all levels: perception, language, reasoning. The *interpretative function* is a characteristic inherent to all reasoning processes and is an adaptive characteristic of the human cognitive system in general. Then, we do agree with the authors regarding the privileged relationship between language and thought that they underline in the argumentative function of thought. However, in our view, understanding, alias interpreting, precedes arguing. Research on group problem solving will been discussed from this perspective.

KEYWORDS: *Psychology of Thought, Interpretative Function, Logic, Reasoning*

In their book Hugo Mercier and Dan Sperber deal with the *double enigma of reason*: on the one hand the extraordinary development of typically human cognitive abilities and on the other the problem of error that characterizes most of our reasonings. Given the interactional nature of reasoning, they propose that the solution lies in its social, argumentative

function, considering the argumentative-persuasive goal to be the core feature of thought, rather than the true validity of the logical approach to the study of thinking.

Focusing on argumentative discussion with the interactions this entails, the book offers genuine insight into the strengths of reasoning as well as an account for its (alleged) failures.

On the one hand, the authors acknowledge intuitive inferential mechanisms common to other animals, thus lightening reason with respect to rationality with a capital R; on the other, they recognize the specificity of the social function of reason to humans, thus determining the evolutionary quirk and justifying the development of meta-representational capacity and abstract reasoning as typically human.

In particular, reason is opportunistic, eclectic (we would say *intentional*), in the sense that it is purpose-oriented; we use reasons to justify ourselves and to persuade others. Therefore, its development has been characterized and determined by the centrality of the communicative interaction. Consequently, reason is not bound to formal norms, indeed the authors reject the standard view of a reason that ideally works like logic. In other words, they recognize the inadequacy of attempting to explain human reasoning by adopting formal logic, a de-psychologized discipline, as a normative schema. In so doing, they seem to accept the instances of the paradigm shift that has taken place in the psychology of thought over the last ten years. However, they continue to attribute logic a rhetorical role in reasoning, a role which consists in helping to simplify and schematize intuitive arguments, in order to be more persuasive.

This echoes what we have called the *logical bias* of the psychology of thought [Bagassi & Macchi (2016)]. The paradox, the logical bias of the psychology of thought, derives precisely from the fact that a depsychologized discipline was assumed as a model.

It is worth noting that the development of formal logic became a gradual process of "depsychologization" of logical language and of disambiguant simplification compared to natural language, intentionally pursued and programmatically declared by modern logic.

In fact, logic and natural language share a common aim of transmitting meaning efficaciously or, in other words, of communicating, of expressing thought. However, the ways these two language forms use to achieve this objective differ significantly: logic achieves univocal communication through simplification, eliminating any meanings that might interfere with the univocal meaning to be communicated, whereas natural language exploits the expressive richness of words, while avoiding

slipping into chaos and tripping over misunderstandings, by relying on the pertinence of the meaning to the context.

There is no hierarchical order between natural and logical language forms; in the sense that the former is inferior or subordinate to the latter. They simply reflect different needs: in the former, the need is to ensure the efficacy of the communication; in the latter, it is to guarantee the rigor of the inferential process. Logical discourse derives from common (or natural) discourse by a process of differentiation that, in a certain sense, establishes it as a specialist discourse. The two languages are differentiated (and in this sense different), but not in the sense of being completely separate or lacking a common basis — and even less in the sense that they represent the opposition of rationality/irrationality [Mosconi (1990)]. This is precisely why we cannot agree with Mercier and Sperber on the residual rhetorical role that logic maintains in reasoning, as a simplifying tool for persuasive purposes; the price would be losing the complexity-richness of thought, in other words the informativeness, that in itself is not contemplated by logic. In cases of conflict between logical principles and content (belief bias), simplifying through logic means neglecting the contingent, the specific and considering only formal relationships. Whereas thought is of necessity contextualized, drenched in content, implicit presuppositions, beliefs, intentions and deals with reality in all its complexity.

That context, in particular the social context, is of fundamental importance also for the authors emerges from their conception of the Bias of reasoning, explained as a form of reasoning that would be adequate if placed in its natural, social context. The Confirmation Bias, for example, would not be a reasoning bias but an attentive focus effect in favor of what is named in the rule, in observance of relevance in communicative interaction.

From our point of view, it becomes relevant not only what is explicitly named by the rule, but also what is *implicitly* transmitted by the content and, once again, by the context.

At this point it is worthwhile to reflect on the strange case of the "logical aberrations" ("*not p*" and "*q*" selected cards) demonstrated, with great spirit of innovation by Mosconi and D'Urso (1975), Mosconi (2016), using the same deontic version of the *selection* task adopted by Johnson-Laird et al ("if a letter is sealed, then it has a 50 *lire* stamp on it*"; selected cards: "sealed letter" and "40 *lire* stamp"). This time, Mosconi and D'Urso asked their subjects to check the *inverse* rule ("if a letter is *open*, then it has a *40 lire* stamp on it"). In this case also the mainly select-

ed cards were "sealed letter" (*not p*) and "40-lire stamp" (*q*) but this time they (*not p* and *q*) were a non-sense from a logical perspective, even though they represented the crucial cases of potential violators in that context. It is worth noting that the two most selected cards were the same as those that were chosen in Johnson-Laird et al.'s original experiment, but in Mosconi and D'Urso's experiment they represented nonvalid cases.

What this appears to mean is that independently of their logical function (*p* and *not q* vs. *not p* and *q*), the cases that are crucial for testing the rule in this specific situation ("sealed" and "40 lire") are those selected on the basis of the logic of pertinence and usefulness, rather than on formal logic or on the matching bias. When we adopt the relevance criterion, we are processing information on explicit and implicit levels of knowledge, exceeding the logical layer of the conditional sentence. These paradoxical results can be understood only if we consider the implications of the specific content and the relevant rule in that context. When reasons of logic and reasons of natural context diverge, argumentation following the dictates of logic does not play a rhetorical role of schematization and, therefore, of simplification of reasoning, but, if anything, it produces useless, superfluous choices.

Actually, reasoning *always* goes beyond the logical level of meaning and so requires an intensive search for as much information as possible. Thus, logical meaning is only one of a number of possible interpretations, the less relevant and therefore the less likely to be assigned if the "logic" intent of the task is not adequately transmitted.

We do agree with the authors regarding the privileged relationship between language and thought that they underline in the argumentative function. However, in this conception, language would have a function of expressing reasons and meta-representing relationships between reasons and conclusions.

Language also serves for this purpose. Take for example the saying "he expresses his *own* thought," where what we mean is that the person's fully formed thought, the concept, is externalized in written or spoken language. But language is much more than a vehicle for expressing thought: it serves to think.

Language does not come after, nor does it spring from or emerge as distinct from thought, of which it is a translation or a phonographic materialization, in other words, a sort of "packaging for export." When we say "I can't find the words," what we really mean is that our thought has

not yet acquired a form that can be communicated. It is still embryonic, nebulous, still only a wish or a need.

More generally, we consider language and thinking as two sides of the same cognitive activity, which realizes in the communication, close to the concept of effective communication of ancient rhetoric. We could say "*logos*" in ancient Greek [see the pioneering Psycho-rhetorical approach by Mosconi (1978)]. Both thinking and language are characterized by a constant, but only partially conscious effort to grasp the aim of the task and the intention of the speaker, identifying the appropriate layer of understanding for the context in which the task is expressed; in other words, interpreting. According to our view, this interpretative processing is the core of thinking, a way of functioning shared by both language and thought [Bagassi and Macchi (2006); Bagassi et al. (2009); Macchi (2000); Macchi and Bagassi (2006)].

I. THE INTERPRETATIVE FUNCTION OF THOUGHT

The search for meaning, in view of an objective, characterizes every activity of the human cognitive system at all levels: perception, language, reasoning. For instance, perceiving external reality is not just a question of registering stimuli; sensorial data have to be interpreted and organized, and relations created.

When analyzing sensory experience it is important to realize that our conscious sensations differ *qualitatively* from the physical properties of stimuli because the nervous system extracts only certain pieces of information from each stimulus while ignoring others. It then *interprets* this information within the constraints of the brain's intrinsic structure and previous experience. Thus … sounds, words, music, … color, tones… are mental creations constructed by the brain out of sensory experience. They do not exist as such outside the brain. [Gardner & Johnson (2013), p. 455].

Therefore routine activities such as recognizing a face or admiring a landscape, looking at a painting, activities that seem to be nothing more than input from our visual capacity are in fact are "analytical triumphs", made possible by our ability to grasp sensorial information holistically and attribute a meaning to it, so that in perceiving a scene, for example, we respond to a whole in which the relationship we establish between the individual parts is crucial, as the *Gestaltists* have demonstrated.

Our view, therefore, is that this *interpretative function* is a characteristic inherent to all reasoning processes and is an adaptive characteristic of

the human cognitive system in general. Rather than abstracting from contextual elements, this function exploits their potential informativeness. It guarantees cognitive economy when meanings and relations are familiar, permitting recognition in a "blink of an eye."

This same process becomes much more arduous when meanings and relations are unfamiliar, obliging us to face the novel. When this happens, we have to come to terms with the fact that the usual, default interpretation will not work, and this is a necessary condition for exploring other ways of interpreting the situation. A restless, conscious and unconscious search for other possible relations between the parts and the whole ensues until everything falls into place and nothing is left unexplained, in an interpretative heuristic-type process. The unitary cognitive activity shared by language and thought addressed by the interpretative function is grounded on common, universal interactive abilities.

This meta-representational ability always implies an analytic, multilayered reasoning that works on both conscious and unconscious layers by processing explicit and implicit contents, presuppositions and beliefs, but is always informed by relevance.

In our view, understanding, alias interpreting, precedes arguing. Take for example group problem solving, which, according to the authors, would evoke the best argumentative function. In fact, when people discuss a problem and exchange arguments, the solution itself does not automatically win; usually, it is not the best idea that prevails, but the one which has been most shared.

Take the case of the *Horse-Trading* Problem.

The Horse-Trading Problem

A man bought a horse for 70 pounds and sold it for 80, then he bought it back for 90, and sold it for 100. How much did he make?

The majority of people faced with this problem come up with one of two answers: 20 pounds or 10 pounds. The typical explanation for the first answer, which is the correct one, is "the dealer makes 10 pounds on the first transaction (70-80) and ten on the second (90-100)", while the explanation usually given for the second answer is "the dealer makes 10 pounds on the first transaction but loses this gain when he buys the horse back for 90. He then makes 10 pounds on the last transaction, when he sells the horse again for 100."

In our study the predominating answers were indeed '10 pounds' and '20 pounds', respectively 49% and 41% on the total of 90 participants, confirming the findings recorded in the literature. We noted that when talking about the dealer buying back the horse for 90 pounds, the participants who gave the wrong answer tended to say the dealer 'lost' 10 pounds. This simple statement becomes the forerunner to the error, or, in other words, the critical point in the erroneous process. The loss of 10 pounds became the counterbalance to the gain of 10 pounds that was used to express the result of the previous transaction. It is perfectly natural, almost inevitable, that the inferred data be used as elements of an algebraic addition (+10, -10), from which it appears that the horse dealer's gains and losses balanced out.

On the contrary, when we analyzed the responses of the participants who answered '20 pounds', we noted that the majority (29 out of 37) divided the sequence of events into two episodes, being the two transactions. In so doing, they reduced the problem to a simple task that could be solved by adding the two partial results, consequently avoiding the critical point that constitutes the problem and of which they were unaware.

It was interesting that fifty percent (n = 22) of the participants who gave the wrong answer confirmed their solution even after being told by the experimenter that "other people who were given this problem to solve gave 20 pounds as the answer", and explained the '10+10' procedure. Stimulated with the correct answer, the participants who gave the wrong answer should have thought through the problem again, as usually happens when a solution is revealed to people who haven't discovered it. However, none of these participants changed their answer, they confirmed their solution and rejected the alternative, explaining that it doesn't take into consideration the loss of 10 pounds between the first sale and the second purchase.

On the contrary, those who gave the 20 pounds reply as a consequence of the 10+10 equation, and who were told that other participants had replied 10, started to waver. "From a mathematical standpoint, it comes to 20 pounds. But it could be 10 pounds… I'm not sure, I don't know…". They were anchored to the mathematical result, but at the same time they were not able to explain where the others went wrong.

The remaining 50 percent of the participants who gave 10 pounds as an answer had a different reaction on being told that some participants[1] had answered 20 pounds; their explanation was that when the

trader bought the horse back, the 10 pounds he had gained in the first transaction reduced the actual cost of the horse to 80 pounds.

These results led us to introduce a fundamental distinction between those who actually reached the solution (the *solvers*) and those who simply gave the correct answer (the *correct-respondents*). The *solvers* loosened the constitutive incompatibility, or, in other words, overcame the impasse, by considering the three transactions and *re-interpreting* the loss as an investment, i.e., restructuring. Not only did they give the correct answer, they were also able to identify the impasse and explain where the flaw lay in the erroneous reasoning. They, and they alone, were in a position to persuade the participants who had given the incorrect answer to change their reasoning.

The *correct-respondents* had indeed given the correct answer but without encountering the impasse and so were not able to identify the incompatibility in the argumentation proposed by those who gave the incorrect answer. Moreover, they were unable to explain why and where the mistake was made, for the simple reason that they did not understand where or what the problem lay. Their reasons, which were adequate for the purpose of giving the correct answer, were of no assistance in actually solving the issue raised by the wrong answer. They just knew that the correct answer was 20 pounds. These results confirmed those from an earlier group study on the same problem [Mosconi, Bagassi, Serafini (1988)]. Only producing reasons that were able to loosen the problem knot, the communicator persuades the reticent audience. Otherwise, the communication of the answer "20" by the experimenter or the simple emergence of the answer "20" in the group problem solving is not persuasive at all.

Hence, we agree with the general claim that reasoning is itself a kind of intuitive inference, in the sense that many inferences are partly conscious, thus overcoming the dualistic view of intuition and reasoning as two quite different forms of inference.

Recently, certain weaknesses and criticisms of the dual theories have been discussed [Macchi, Over & Viale (2012)], resulting in a revaluation of implicit-intuitive thought, the "shadow zone" [Macchi & Bagassi (2012); Bagassi & Macchi (2016)] that in the past was considered responsible for automatisms and frequently for errors in reasoning. Now the dualistic view of thought and the logical-deductive paradigm are being questioned, and implicit-intuitive thought is acquiring a more central position in interaction with explicit thought.

Our position on this crucial issue is even more extreme, conceiving the relationship between intuition and reasoning as a form of *unconscious analytic thought*. Sometimes in everyday life we come up against an impasse; analytical thought fails us, and we just cannot see our way out of the dead end into which we have inadvertently strayed. We know we are in difficulty, but we have no idea what to do next. We have no strategy, and this time failure does not come to our aid with any information that could help us forge forward. In other words, we have come up against a deep impasse. These are situations that change our life radically if we do find a solution: the situation, which a moment before seemed to lead nowhere, suddenly takes on a different meaning and is transformed into something completely new. The literature discusses studies in which these situations are reproduced as experimental paradigms of insight problem solving. These problems are an emblematic case of human creativity in which intelligence is at its acme. Their study provides a privileged route to understanding the processes underlying creative thought, scientific discovery and innovation, and all situations in which the mind has to face something in a new way. Hence, we speculate that the creative act of restructuring implies high-level implicit thought, a sort of *unconscious analytic thought,* informed by relevance, where *analytic thought* is not to be understood in the sense of a gradual, step-by-step simplification of the difficulties in the given problem, but as the act of grasping the crucial characteristics of its structure, with an act of re-interpretation.

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NOTES

[1] Even reasoning on the basis of three transactions in sequence, a very limited number of the participants (8 out of 37) gave the correct answer. In this case, in their mind, the loss of the 10 pounds gained in the previous transaction translated into the reduction of the actual cost of the horse to 80 pounds. When they look at the final transaction (the sale of the horse for 100 pounds), they calculate correctly that the dealer has made 20 pounds.

REFERENCES

BAGASSI, M. & MACCHI, L (2006), "Pragmatic Approach to Decision Making Under Uncertainty: The Case of the Disjunction Effect"; *Thinking & Reasoning*, 12, 3, pp.329-350.
— (2016), "The Interpretative Function and the Emergence of *Unconscious Analytic Thought*"; in Macchi, L., Bagassi, M. & Viale, R. (eds.), *Cognitive Unconscious and Human Rationality*; Cambridge, MA: MIT Press, cap. 3, pp. 43-76.
BAGASSI, M., D'ADDARIO, M., MACCHI, L. & SALA, V. (2009), "Children's Acceptance of Underinformative Sentences: The Case of 'Some' As a Determiner; *Thinking & Reasoning*, 15, 2, pp. 211-235.
GARDNER E. P. & JOHNSON K. O. (2013), "Sensory Coding"; in: E. R. Kandel, J. Schwartz, Th. Jessell, St. Siegelbaum, A.J. Hudspeth (eds.), *Principles of Neural Science*, p. 455. New York: Mc-Graw Hill
MACCHI, L. (2000), "Pragmatic Aspects of the Base-rate Fallacy". OBHDP, 82, 2, pp. 217-236.
MACCHI, L. & BAGASSI, M. (2012), "Intuitive and Analytical Processes in Insight Problem Solving: A Psycho-Rhetorical Approach to the Study of Reasoning"; *Mind & Society*, 11, 1, pp. 53-67.
— (2014), "The Interpretative Heuristic in Insight Problem Solving"; *Mind & Society*, 13, 1, pp. 97-108.
— (2015), "When Analytic Thought is Challenged by a Misunderstanding"; *Thinking & Reasoning*, 21, 1, pp. 147-164.
MACCHI, L., OVER, D. & VIALE, R. (eds.) (2012), "Special Issue on: Dual Process Theories of Human Thought: The Debate"; *Mind & Society*, 11, p. 1.
MOSCONI, G. (1990), *Discorso e pensiero*; Bologna, Il Mulino.
— (2016), "Closing "Thoughts"; in Macchi, L., Bagassi, M. & Viale, R. (eds.). *Cognitive Unconscious and Human Rationality*. Cambridge, MA: MIT Press, cap.17, pp. 347-363. (Original in Italian *Discorso e pensiero*. Bologna: Il Mulino, 1990, cap.15).
MOSCONI, G. & D'URSO, V. (1975), *The Selection Task from the Standpoint of the Theory of Double Code*; International Conference on "Selection Task", Trento.
MOSCONI, G., BAGASSI, M., & SERAFINI, M. G. (1988), "Solutori e benrispondenti. II. Il problema della compravendita del cavallo: Discussione e ricerca di gruppo"; *Giornale Italiano di Psicologia*, XV(4), pp. 671-694.