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MENTALIZATION IN COMMUNICATIVE AND SOCIO-RELATIONAL INTERACTIONS: CONSIDERATIONS ABOUT A THEORY-OF-MIND MODELLING¹

Theory of Mind is an important and fundamental competence to manage relationship and communication in a socially functional way. Over the past twenty years researchers have been focusing on the development of this ability, on one hand considering childhood as the peculiar life-age for the acquisition of this competence and, on the other hand, assuming that adults should be able to use theory of mind in a “full-performing” manner. However, several studies found out that theory-of-mind functioning in real-life conditions is not independent from socio-relational, affective and linguistic abilities; moreover theory of mind in adults often does not work at an optimal level. This contribution presents a model for the theory-of-mind functioning: the aim is to offer a new possible framework to re-think the way adults use their ability of mentalization into the communicative and socio-relational interactions.

Keywords: Theory of Mind, communication, language, socio-relational interactions.

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1. Introduction

The label “Theory of Mind” (ToM from now) refers to the ability to meta-represent self and others’ mental states and to refer to them to foresee and understand one’s own and other people’s behaviour (Premack & Woodruff 1978). This ability represents a particular aspect of the wider domain of “social cognition” (Brothers 1990; Adolphs 2001): ToM provides the roots of our inter-subjectivity and plays a key role for our adaptation to social life, that is social interactions and communicative exchanges. In fact, with respect to communication, ToM is closely related to it for at least two main reasons. The first one is that language is the most important tool that has been used so far to test the presence of ToM (Wellman et al. 2001; see also Call & Tomasello 1999 for a non verbal ToM evaluation); the second one is that the most complex forms of human communication go along with the use of mentalistic abilities (Bretherton 1991; Antonietti et al. 2006; Wellman et al. 2001).

The aim of this paper is to provide a plausible explanatory contribution to the relational and the communicative functioning of the human being, where ToM seems to play a relevant role.

We would try to pursue such aim by adopting a new perspective: on one hand, it includes some specific reflections on the structural aspects of ToM itself, and, on the other hand, it has its core theoretical point in the question about ToM functioning. Therefore, the question we would try to provide an answer to is not “How and when does ToM develop?”, but rather “How and when is ToM used?”. Our assumption can be stated as follows.

ToM in its most basic form seems to emerge very early in child development (Wellman 2002) – although it is little likely to be innate; however, this competence, does not seem to consolidate strongly through development neither at a basic level. Rather, it remains a sort of “fragile competence,” as the wide variance in the ToM performances allows to hypothesise. This is supported by evidences in adults (Apperly et al. 2006; Apperly et al. 2008; Kinderman et al. 1998), who from a theoretical point of view should, instead, show a well consolidated recursive thinking of first and second level. In our opinion, a crucial point is the fact that this heterogeneity of mentalizing reflects the variability of the

relational and communicative competencies used in everyday contexts. Therefore, our hypothesis is that the variance in ToM performances which can be observed throughout the entire life-span and in conditions of typical development, may be due not so much to a lack of ToM, but instead to a variety of modes of ToM employment. Such different modes are used alternatively within our socio-relational interactions and would justify the reason why ToM does not always emerge at an optimal level, even if such level is expected from an experimental point of view. Our reflections will be outlined as follows:

- a brief critical overview of the most significant theoretical approaches that in recent years have tried to account for ToM development and its interactions with linguistic and communicative abilities; within this overview we would try to identify those aspects which, in our opinion, can be considered crucial for the proposal of an alternative model of ToM functioning;
- the description of a new model of ToM functioning in real-life interactions. Such a new model would not invalidate the proposals advanced by the literature so far, rather it would try to integrate some of those useful contents and to extend the potential explanations of ToM itself;
- a possible explanation of the main limits of ToM functioning through this new model, in order to highlight its explanatory value and to underline its possible theoretical and methodological implications.

2. The Risks behind the Classic Approaches

About a decade ago, Gopnik (1996) defined the three main theoretical approaches (Theory-Theory, Simulation Theory, Modular Theory) to ToM as “the only games in the city” to convey the idea that the realm of ToM research had been “colonized” by these three perspectives, that left very small room to other possible approaches. As we are going to show, all these classic approaches neglected the importance of the socio-relational aspects and of the communicative elements. In fact, they share a solipsistic matrix of the human being that on one side has highlighted the analytic steps of ToM development, on the other side it has paved the way to the socio-cultural turn.

The “Theory-Theory” approach (Gopnik 1993; Perner 1991; Wellman 1991) proposes an analogy between the world of childhood and the world of science: the child that is acquiring ToM is like a little scientist that is building a complex theoretical system about the functioning of the mind. The acquisition of mentalizing ability is considered in the terms of a strong conceptual change in such system, like a revolution from a previous level of reasoning to a qualitatively different one, thus evoking a Piagetian echo.

The “Simulation Theory” approach (Harris et al. 1989, 1991, 1993) stresses the importance of first-person knowledge: the child acquires the mentalistic competence through a process of mental simulation. Humans, in fact, are not supposed to build a complex theoretical system, as claimed by the “Theory-Theory” approach, but are supposed to use their own minds as a model of their partners’ mind, which can be understood in an automatic way through a simulation process.

The “Modular Theory” (Fodor 1987; Leslie 1987, 1988, 1994) considers mentalizing as the result of a hierarchical modular system, with an innate biological basis. This approach seems to be the one with the most formalised and detailed ToM models. According to Leslie (1994) it consists of three modules: ToBy (Theory of Body Mechanism), which develops between 3 and 4 months and is devoted to the construction of a theory about physical objects and mechanical agency; ToMM (Theory of Mind Mechanism), which develops between 8 months and 24 months and allows to understand human intentionality and mental states; SP (Selection Processor), from 4–5 years, acts as a selector of the inputs that will be used by ToMM. The core element of Leslie’s model is the decoupling mechanism, which constitutes the basis of the meta-representation ability. According to Leslie (1987, 1991) the first evidence of the meta-representation ability is pretence (which is among theory of mind precursors, as it will be explained later), as in this activity the child makes an operation of decoupling, i.e. of disconnecting the mental representation from its real referent. For example, the represented object – the fruit of the banana – is disconnected from its real referent – the real banana – and is connected to an imagined object – the phone handset. According to Baron-Cohen & Ring (1994) and Baron-Cohen (1995), instead, the hierarchical modular system that triggers mind-reading consists of four modules: ID (Inten-

tionality Detector) and EDD (Eye Direction Detector) are activated by 9 months of age and both underpin the understanding of intention; SAM (Shared Attention Mechanism), between 9 and 18 months, integrates ID and EDD, thus supporting triadic interaction (child – caregiver – object); ToMM, around 3–4 years, elaborates SAM inputs in order to build mental states representations. Besides the differences in the hypothesis of the structure of those hierarchical modular systems, both models join a strong assumption: humans are innately equipped with such modules, that are automatically triggered by the maturation of the brain, thus giving no role to socio-cultural and socio-relational factors.

Effectively, the role of such factors has been neglected by each of these three theoretical approaches. They are centred on the single individual as if he/she were pulled up by the social context, echoing a Piagetian conception of the primacy of maturational factors on social ones in development. Coherently with this Piagetian view, language has a minor role, because it is simply conceived as a tool that the individual uses to manifest ToM. Not by chance, in such field of research – especially in the Theory-Theory approach – the first attempts to discover some linguistic indicators of ToM have basically focused on the number of terms referred to mentalistic contents (emotions, desires, beliefs, thoughts) without considering the semantic and the pragmatic components of those terms (Bartsch & Wellman 1995).

Notwithstanding the relevance of these three theoretical approaches, in the nineties a new perspective started to arise, the so-called socio-cultural perspective (Antonietti et al. 2006; Astington & Pelletier 1996; Astington & Jenkins 1995; Liverta Sempio & Marchetti 1995).

3. The Socio-cultural Perspective and the Relations with Language and Communication

The socio-cultural perspective does not make assiomatic assumptions on the nature of ToM, but it claims the importance of social and cultural elements in its acquisition, following a Vygotskijan conception of development. In this socio-cultural perspective, various topics of research have been carried on: the role of sibling relationships in the acquisition of the mentalistic competence (Perner et al. 1994; Ruffman et al. 1998), the influence

of mother-child attachment relationship on mentalizing (Fonagy et al. 1997; Meins et al. 2002, 2003, 2006), the link between language and ToM development (Antonietti et al. 2006; Chandler et al. 1989; Siegal & Peterson 1994). Referring to this latter point, various works have proved the correlational as well as the predictive role of language on mentalizing (see for example Lohmann & Tomasello 2003). The so-called “correlational studies” showed that children master the semantic knowledge of mental state terms in the same period of the acquisition of proper mentalistic abilities (Moore & Furrow 1991). Moreover, the longitudinal studies confirmed the presence of a correlation between the linguistic competence measured at two years of age and the successful performance in ToM tasks at the critical threshold of four years of age (Astington & Jenkins 1999; de Villiers & de Villiers 2000; de Villiers & Pyers 2002; Farrar & Maag 2002; Tamis-LeMonda & Bornstein 1994). Furthermore, the so-called “training studies” demonstrated that children who fail ToM tasks, if submitted to a language training (distinguishing various aspect of the linguistic competence, such as semantic, syntactic and so on) then report better performances in ToM tasks (Hale & Tager-Flusberg 2005; Lohmann & Tomasello 2003; Lohmann et al. 2005).

If we focus on the early phases of development (from birth to two years of age), we notice several works on ToM precursors. Such early cognitive abilities that prepare the mentalistic competence are deeply rooted in the development of pre-verbal communication abilities. The understanding of agency (Mandler 1992, 1998, 2004) and of joint attention and pointing (Baron-Cohen & Ring 1994; Butterworth 1994) constitute the basis for the acquisition of pre-linguistic tools of communication with the human partner. Within simple social interactions the infant uses the declarative pointing (Camaioni et al. 2004) not only to catch the attention of the caregiver, but also to share his/her interest for any object of the world with the caregiver, thus allowing the development of inter-subjectivity in early communicative interactions. It may be worth considering the case of the Pervasive Developmental Disorders (PDD), especially of autism. These individuals are inadequate social partners, because they are not able to take part to communicative social interactions. In fact, there is a bunch of literature confirming that ToM is highly impaired in autism (Baron-Cohen et al. 1994; Frith 2000; Surian & Leslie 1999) since the early

stages of development; in fact autistic children show a lack of declarative pointing and a limited inter-subjectivity.

Considering the specificity of the mother-child interaction, Meins and colleagues (2003) found that the maternal mind-mindedness (that is the proclivity to consider the child as a human being with mental states) measured when the infant is 6 months old is a strong predictor of the child's ToM performance at 48 months of age. In particular they showed that appropriated mind-related comments were the only 6-month mind-mindedness measure that correlated with child ToM ability.

Other interesting evidences, which support the link between ToM and communication, come from the studies about ToM performance and conversational abilities. Siegal & Beattie (1991) were the first to show that miscommunication due to a partial shared conversational knowledge between child and experimenter (specifically very poor knowledge of conversational implicatures for the child) might be the reason of a low ToM performance more than a real absence of mentalistic ability. Siegal & Peterson (1994) claimed that the interpretation of 3-year-olds' performance as a conceptual deficit may be reinterpreted in terms of the pragmatic use of language. Siegal (1999) proposed that children may be less advanced in their conversational awareness than commonly assumed; if this element is recognised, children's competence can be assessed more accurately. According to Siegal (1999) the children's competence would be inadequately explained by a dichotomy between pre-operational and operational logic; on the contrary, it would be a "complex interplay between both conversational and conceptual processes" (1).

Studies with deaf subjects seem to support this idea: native signers would perform better than later ones in ToM tasks (see for example Meristo et al. 2007).

Finally, some authors explored the link between ToM and advanced communicative abilities and found several evidences for the idea that mentalization plays an important role when people want to communicate using complex way to convey the meaning. Doherty (2000) showed that 3- and 4-year-old children's understanding of homonym is associated to the understanding of false belief. Winner & Leekam (1991) investigated the 5- and 7-year-olds' ability to distinguish between irony and lies, considering the speaker's intention and the intended meaning. These two

competencies would seem to proceed side by side and both of them would appear positively associated with the second order recursive thinking (see also Sullivan et al. 1995). Happé (1993, 1995) found that autistic children's understanding of metaphor would be connected with the use of first order mentalization, whereas irony understanding would correlate with second order mentalization. Recently, Filippova & Astington (2008) highlighted that 5-, 7-, 9-year-old children's understanding of communicative intention of an ironist would follow the ability to reason about the ironist's beliefs: mentalization might predict irony understanding.

4. The Misleading Extension from Development to Deployment

The four approaches described before provide the relevant information on the acquisition of ToM and its peculiar links with language and communication, but they do not explicitly tell anything about the contents of its functioning. One point is the mechanism that leads to the construction of ToM: this mechanism has contents that can be a series of concepts organised step by step theoretically (i.e. theory-theory), a sequence of increasingly relevant simulations (i.e. simulation theory), the activation of a biological module (i.e. modular theory). The contents, that will become the objects of work of ToM itself in any situation, are a different issue.

As a matter of fact, none of these approaches has such a claim, i.e. none of these approaches effectively tells us that ToM will certainly work that way when socio-relational and communicative interactions are established. Anyway, an improper extension of the structural mechanisms to the functional criteria can be seen. Why does this happen? We would try to answer using two possible cues, which we have called "the model-driven influences" and the "task-driven influences."

4.1. Model-driven Influences

Many reasons are at stake. For instance, in the theory-theory and in the modular approaches the logical and analytical criterion by which the ToM competence is acquired automatically extends itself to the ways such competence should be applied to the contents (and hence a logical and mathematical treatment of information through ToM). Such risk can

be defined as “induced by the model,” or in other words: if the model extends itself on the basis of logical and mathematical criteria, the way the product deriving from that model will function should be the same, or should have the same nature (Birch & Bloom 2004; Bloom & German 2000). On the other hand, the simulation theory, though not condemning the theoretical or neuro-cognitive basis of ToM acquisition, lends itself to a possible improper extension, i.e. once the “acting as if” mechanism has been acquired, then it should be always applied according to a sort of repetition of the content (it may be plausible that I continue to thread a sequence of simulations, but it may be not so obvious that the nature of the simulations is always the same). Moreover, all the classical approaches quoted so far are characterised by a dichotomous nature, i.e. ToM is either present or absent, according to an “on/off” logic. This feature becomes even more evident when turning to the pathological domain, which not by chance has born inside a purely modular approach (see the pioneer work by Baron-Cohen et al. 1985), where ToM is not conceived as a continuous ability (with possible degrees of functioning between the extreme poles of the perfect functioning and of the deficit), but rather as a present/absent ability. A similar trend can be recognised also today in the most recent advances about the neural basis of ToM (see the Neuroscience of ToM, for example Saxe & Baron-Cohen 2006), flourished according to a typical neuropsychological approach focused on identification of the compromised neural area responsible for the deficit or for the lack of a certain psychological ability. However, real life is definitely more complicated than research settings and the use of mentalization would appear to overcome the simple dichotomy present/absent–on/off. Socio-relational and communicative interactions might be more pertinently described through a continuum of variation, in which ToM constantly interacts and regulates itself with the lasting social, cultural, linguistic and communicative skills of the people involved in the relational exchange.

4.2. Task-driven Influences

Other risks are hidden inside the kind of task so widely used to test ToM, i.e. the false belief task (Wimmer & Perner 1983). It requires to predict and/or explain the behaviour of the protagonist of a story referring to

his/her false belief about the state of reality and not about one's own knowledge of the state of reality. Such risk is not new indeed, since it always crosses the researches in psychology and in particular those methodological questions faced by the experimental research in psychology. Bruner (1995) and Feldman (1995) already warned researchers against the risk of reducing ToM to the success or failure in the false belief task. In this sense Bruner wrote that "mind is inside the head, but it is also with others" (1996: 86). If the discovery of the presence or of the absence of a certain competence becomes always and only related to the submission of a certain single task, it will be likely to arrive quite easily (and probably also wrongly) to believe that the lack of a good performance means the lack of the competence. At the same time, the risk is also to forget that the presence of a certain competence does not itself mean that such competence will be automatically activated at the highest possible level and in a lonely way. Facing a false belief task, the skills that are activated may not be always and exclusively those related to ToM. This leads also to another point, i.e. the risks connected to operationalization, inasmuch as the realization of a new task with its coding criteria requires a sort of policy of economy, so that one correct answer is found as the good solution that can be reached through a specific interpretation of the stimuli (the story). Therefore, if the researcher thinks that ToM could and should work only through the re-interpretation of those criteria that have guided to devise the task, then he/she will not only automatically judge as wrong those answers that people provide as different from the correct expected answer, but he/she will also conclude that ToM is not working properly, because if it worked properly it would necessarily lead to the solution assumed (Birch & Bloom 2004; Bloom & German 2000). Again, the problem of the evaluation of ToM functioning in research settings appears to be quite far from the use of ToM in real-life situations – intersubjective ones – that are richer of composite interactions and fluctuations between different competencies (for example linguistic and communicative abilities).

5. The Socio-cultural Approach

This approach seems to dilute the impact of a highly qualitative perspective on ToM, since it introduces the idea that the development of the

mentalistic competence is strictly connected with the development of other psychological competences. However, this mitigation turns into a sort of “shifting of the problem” rather than into a real solution. This appears quite clearly if one remembers that the quantitative *décalage* of ToM stems from the stating (at least theoretically) of an optimal level of ToM functioning. Once again, despite dealing with the importance of the individual differences, then the outcome is the same (perhaps because of a methodological deficit), i.e. the idea that the presence of a competence – under a functional point of view – totally runs out in a dichotomy of alternatives, so that given equal conditions (linguistic and meta-linguistic development, affective types of functioning and so on) theory of mind is there or is not there. Once again, why does this happen? Probably for the same reasons stated before: despite the relevant interest and effort of researchers in identifying new methods of investigation (such as the faux pas, the strange stories, the eye test, see for example Stone et al. 2003; Baron-Cohen et al. 1997; Happé 1994), then the deepest structure of these tasks still suffers heavily from the same logic of the false belief task. In fact, they all end up with a dichotomic categorization of the performance and do not contemplate the possibility that the same level of ToM performance could be expressed through a variety of alternatives. As previously said, Siegal & Beattie (1991) have tried to go deep inside the question of the distance between competence and function (though without exhausting it) by addressing the issue of the formulation of the crucial false belief question “Where will X look for the object?” into the more explicit form of “Where will X look first for the object?”. The authors did not simply state that if a certain conversational and linguistic competence has not developed, then there is no ToM, but they stressed the fact that, given the very same immature conversational and linguistic competence, ToM can come to light in different ways (albeit also in this case these different ways overlapped again with the right or wrong performance to the false belief). It is not a chance that this consideration emerges from the re-evaluation of the ToM performance in a intersubjective perspective that considers the interaction between metalization and language. More precisely they addressed the influence of the conversational implicatures even in a simple research paradigm as the false belief task.

A litmus test of what has been stating so far may come from the evaluation of the semantic meaning of the terms that are mostly used to label the “unconventional” ToM occurrence. These terms have all a negative sense, until the point of stating ToM absence: the curse of knowledge, bias, error, the problem of selection.

6. Changing the Point of View

Although the researchers have been studying ToM for more than twenty years, the first attempts of modelization are quite recent (see for example Friedman & Leslie 2004; German & Hehman 2006; Leslie et al. 2005). Some of these models have received empirical confirmations. Leslie and colleagues (2004) proposed that the desire-belief reasoning is partially based on a neuro-cognitive mechanism which uses the information from people’s social behaviour to generate representations which could have contributed to that behavioural outcome. Then, another mechanism would select the most plausible mental representation. Wertz & German (2007) tested this hypothesis and found that, into this theoretical framework, the selection mechanism is driven by a sort of sense of “pertinence about the action:” the mental states about the objects present in the context are used to reason about the interpretation of the situation only if they are in some way involved in the action; otherwise they are discarded.

These recent models can be considered the first attempt to shape the functioning of ToM into a framework which should be able to better interpret the role of ToM for the economy of the human mind. The attention is not exclusively focused on the mentalistic ability, thinking that it may develop and/or operate independently from all the other cognitive functions. On the contrary, the goal is to understand how ToM works “in vivo” – in synergy with the other psychological abilities of the human being. At the basis of this idea there is probably a crucial change of perspective, which opens to the study of the mentalistic abilities in a more concrete and co-contextualized way. This means that ToM does not only works in a – social, affective, communicative, cultural – context but, it is also part – a component – of the context. As already discussed before, the socio-cultural perspective has probably moved the first step in this direction considering ToM as an ability which develops with many other

aspects of the human mind. Nonetheless, it was not able to disarticulate completely a logic which could be defined as “satellite:” ToM, once appeared and consolidated, would always work independently from the other functions which could introduce, support, obstacle it. From a perspective that could be defined as molar, the more recent models propose an idea of ToM as a tool among many other cognitive tools of the human mind. In this sense Keysar and colleagues (2000) addressed the problem of the reduction of the ambiguity of linguistic expressions by using perspective taking and showed that people use mutual knowledge as well as some egocentric heuristics to make successful communication. ToM has surely some specificities and peculiarities, and probably it works into a mental economy that is not ToM-centric; rather, it puts ToM into a complex and articulated structure in which many other mechanisms of causation, regulation, mediation interact with ToM in a multi-directional way (Keysar et al. 2003).

7. The Model: Macro- and Micro-ToM Levels

The model we propose is focused on the modes of ToM functioning in socio-relational and communicative contexts. ToM becomes visible through two levels of functioning: a macroanalytic one (which we will call “macro-ToM”) and a microanalytic one (which we will call “micro-ToM”). These two levels are structurally set into a more complex intersubjective model, and therefore it is in the light of the way of functioning of this model that the ToM manifestations and outcomes should be assumed and interpreted. Otherwise, the risk is to reduce the human psychological functioning to ToM competence, thus losing a richness and complexity of abilities and distorting the effective interpretation of the human cognitive skills and performances.

7.1. *The Macro-ToM Level*

The macro-ToM level refers to the proclivity to put the individuals and the objects of a certain socio-relational and communicative context – which an individual belongs to, or which he/she comes into contact with – as the direct objects of a proposition, which has a mentalistic nature.

The conceptualization of this dimension has the goal to replace the ToM ability into the economy of the mental functioning. Therefore, it contrasts with the pervasive idea that 1) the absence of the interpretation of any situation and 2) the absence of any mentalistic explanation of the situation are the proofs of the deficit of the mentalistic competence.

Both points arise further concerns. First of all, it may not be given for granted that an individual must proceed on an interpretation of a certain situation/behaviour/statement and so on. He/she can do it, but he/she can also ignore the state of things and proceed along his/her own specific cognitive path. Secondly, it is not obvious that for any interpretation the individual makes a proposition with a mentalistic feature and he/she puts as object of that proposition the situation he/she would like to interpret. This reflection is closely tied to the idea that ToM has an adaptive value (Liverta Sempio, Marchetti & Lecciso 2005), in the sense that it becomes functional even if it "does-not-work." This idea is somewhat in line with Astington's statement (2003) that ToM is "sometimes necessary, never sufficient." The key point is that the fact of identifying a specific value into a certain competence, does not mean that such a value (which has a wider goal for the social and communicative welfare of the individual), automatically becomes the unique and exclusive employment of that competence. If ToM has an adaptive value, this does not mean that a good adaptation (for example a successful communicative exchange) to a certain situation should necessarily rely on a mentalistic interpretation. The adaptive value itself should not be considered as on/off, but rather with various gradients of activation depending on the nature of the expectations and goals of the actors, on the quality of the relationship and on the level of the communicative exchange. For example: the quality of a communicative exchange at the post-office will be strictly coherent with the goal of sending a priority mail (therefore primarily informative and scarcely mentalistic); unless the employee's behaviour does not fit the post-office frame (hostile, incompetent, etc.). In this case the use of mentalization could become useful to make the communicative exchange smooth and to pursue the goal. In other words, if the goal is set inside a relationship, the more the relationship is significant the more ToM will have chance to be used. However, if the goal is set outside a relationship, then the chances of using ToM will

decrease. Another example may help to clarify. Consider the following scenarios:

- 1) *I have to go out for dinner with someone* – it is like saying that, among my goals, I have to build a relationship with that person to guarantee the success of the evening.
- 2) *I have to go out for dinner, but unfortunately I meet someone* – the management of the relationship is no longer functional to the success of the evening.

In the first case, a poverty of ToM will cause the other person to consider the evening a failure (it has been like going to dinner alone because of the poorness of the relational and communicative exchange). In the second case, instead, a poverty of ToM will not necessarily result in an failure of the evening. The plausibility of all the possible N alternatives (ToM and non-ToM) and the fact that a certain type of behaviour does not automatically bring about the property of being adaptive simply by virtue of the fact that one of the features of ToM is precisely that of being adaptive. The activation of ToM at a macro-analytic level can be seen as the function of anticipations, goals and need of a socio-affective and communicative relationship:

Macro-ToM = fx (Anticipations, Goals, [social, affective, communicative, formal, etc.] needs of the Relationship)

So, the central issue is not the development of radically new concepts, but rather a re-evaluation or a new weight of the available evidences, in order to contrast back the risk already mentioned before, i.e. an over-extension of the meanings attributed to those elements. Consider the following propositions:

- A) ToM is adaptive
- B) People's behavior tends to be adaptive
- C) People's behavior tends to be ToM

This could briefly summarize what roughly drives our reasoning on ToM. However, large areas of shadows can be found in-between a passage and the other:

1. ToM is not always and necessarily adaptive;

- 2) The contexts of B and C propositions do not exactly overlap;
- 3) So, it can be further specified and concluded that:
 - a) Not all ToM behaviours (in real life) are necessarily adaptive;
 - b) “non-ToM” behaviours are not necessarily dysfunctional or not adaptive.

An example can help to understand the meaning of macro-ToM:

It is lunchtime: Mark and Anna, husband and wife, are walking in a mall when they meet Frank. Frank is Mark sister’s former boyfriend, now close to get married with his new partner. Mark and Anna hanged around with Frank for about three years until he broke up with Mark sister. The last time they met was about two years ago. Mark, Anna and Frank have a brief conversation and Frank announces that he will get married within a few days; then they say goodbye to each other and they go their own ways. Given this situation, consider the following scenario about Mark and Anna and about their communicative exchange on Frank.

Activation of macro-ToM:

- Anna *activates* the macro-ToM level
- Mark *does not activate* the macro-ToM level

Anna activates her mentalistic skills at the macro level, so that she opens the possibility that the sudden and brief relationship with Frank becomes the object of a proposition with a mentalistic background. In other words, it is as if Anna said: “I think that (*proposition with a mentalistic background*) – Frank (*object of this proposition*)...” On the contrary, Mark bypasses this possibility, i.e. he does not interpret the communicative exchange that has just occurred with Frank (i.e. he does not make a proposition like the one of Anna). In this sense, Anna’s attempt to find a confirmation of a possible explanation about the quality of the communicative exchange they have just experienced, would find no Mark’s answer about that. These individual differences in macro-ToM level activation could concretize as follows:

Anna: “*I think that Frank was a bit embarrassed and we were as well, since we perceived his discomfort.*”

Mark: *"But ... I do not know, to be honest I did not care about that; I had in mind that it was late and we still had to sit down to eat something."*

Using such a situation as a test of ToM, in line with the most recent evidences in the literature that aim to assess complex levels of mentalizing in the most ecologically possible way, a good ToM competence would be attributed to Anna, a low or poor ToM competence to Mark. However, if we reinterpret the outcome on the basis of the function described before (Macro-ToM = fx [Expectancy, Goal, Relationship]), Mark's behaviour would appear sufficiently adaptive as follows:

Expectation = that everything works easily in order to find a place to have lunch
Goal = to have lunch

Relationship (and communicative exchange) = incidental (in the sense that the meeting with Frank was not well in-between the expectation and the goal).

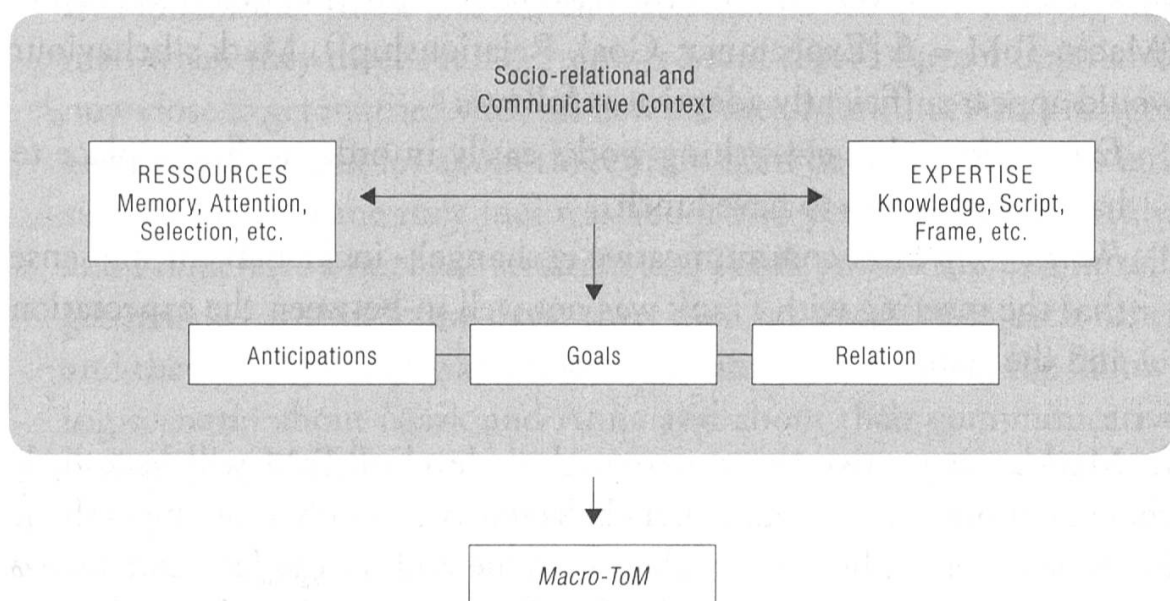
In Mark's perspective the macro-analytic level of ToM will have little chances of being activated. Anna's behavior is certainly more mentalistic in absolute terms, but on its adaptive value and on the fact that such a mentalistic manifestation may be a litmus test of Anna's and Mark's competences some serious doubts can arise.

Anna and Mark's example may be a good task to explore complex and ecologic ToM functioning, in accordance with the most relevant position on this topic (Kinderman et al. 1998; Keysar et al. 2003; Apperly et al. 2008). However, a classical interpretation of the results would lead to a rough simplification of the phenomenon (as already said, good performance = presence of ToM Vs. bad performance = absence of ToM). Our new perspective reminds how a low ToM performance may be probably due to a competition for cognitive resources, but not necessarily and definitely to a lack of mentalizing. Rather, any ToM performance should be read as the result of a socio-adaptive functioning, where ToM acts if required by the evaluation of the general goals of the situation.

Summarizing, we assume that a person is engaged in the selection of information about the context and the relationships, in order to determine whether this information and/or relationships should become the object of a mentalistic proposition, by weighting the effect of a series of

mediators. On one hand, they are psychological skills (socio-relational, communicative, affective ones) and on the other hand they are internal and external constraints interacting with each other. On an upper level there is the macro-ToM device, intended to weigh the acceptability of the mentalistic proposition on the situation in object.

Figure 1: Functioning Exemplification of Macro-ToM Level



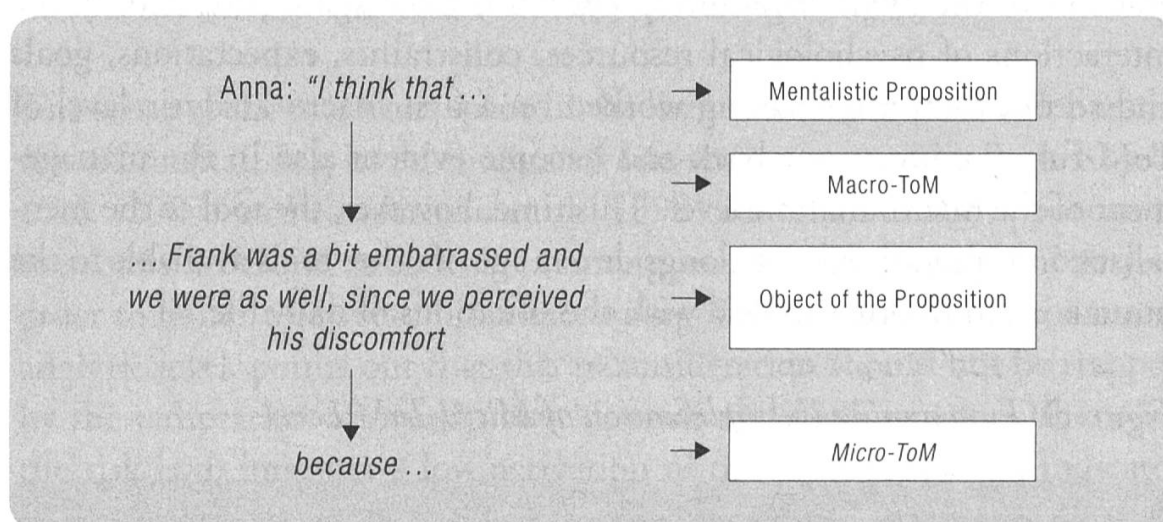
It seems therefore evident that the macro-analytic level is a necessary requisite (but obviously not sufficient, in the sense that it does not provide any guarantees on the level of complexity) for the transition to a micro-analytic level of ToM suitable for a further and deeper interpretation and management of the socio-relational and communicative exchange. In this sense, and in line with the example, Anna has access to the micro-analytical level, whereas Mark does not, remaining stopped in a condition of poor or absent macro-ToM, thus flowing into a state that could be defined of relational and communicative inhibition.

7.2. The Micro-ToM Level

The micro-ToM level can be defined as the propensity to provide a more or less mentalistic interpretation to all those elements that had been put as complements of a mentalistic proposition at the macroanalytic level. In other words, the micro-analytic level is expressed through the measure of

the mentalistic contents that will be combined with the reflection on the object of the initial mentalistic proposition. Therefore, the micro-ToM requires an activation of the macro-ToM. The situation that has already been put as object of a kind of mentalistic reasoning will be further specified with mentalistic contents. The previous example of Mark and Anna can be useful again. Only Anna moves to the micro-analytical level: since she places the situation as the object of a mentalistic proposition, she approaches an interpretation that enriches the relational and communicative exchange.

Figure 2: Exemplification of the Transition from the Macro-ToM Level to the Micro-ToM Level



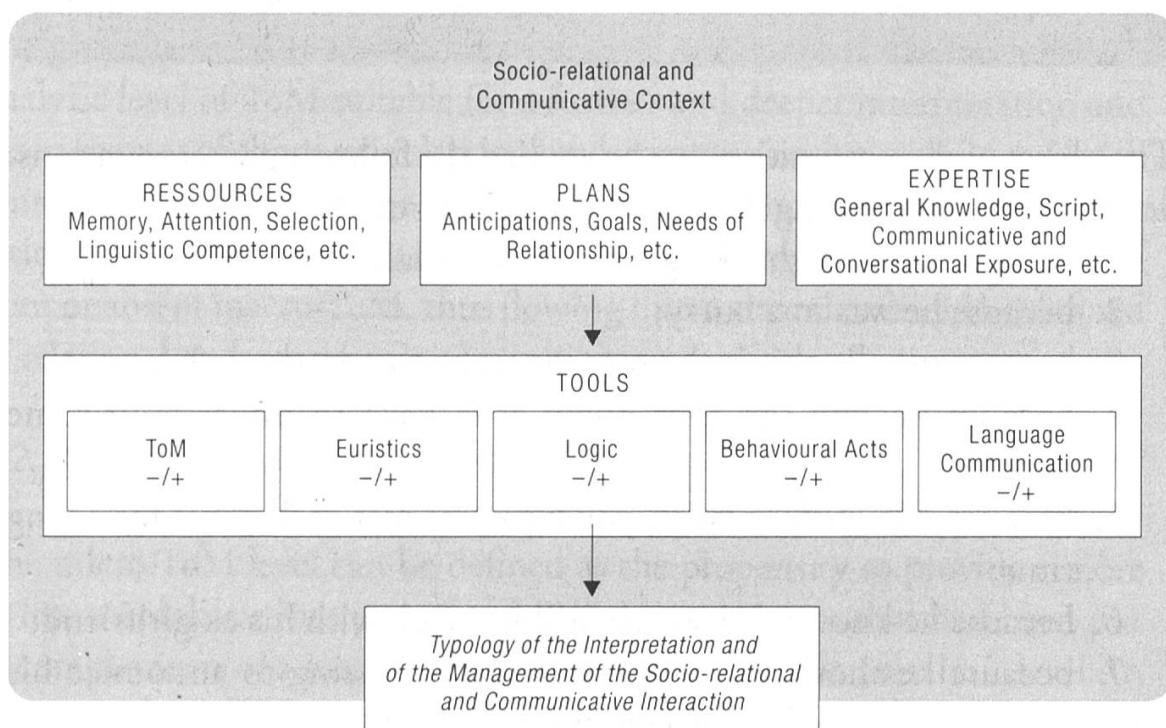
The object of the proposition can be applied the following interpretations, according to a increasing degree of mentalization:

1. because it was such a long time since we last met;
2. because he was in a hurry;
3. because usually this is the way the story goes in these situations;
4. because no one can ever know, it is hard to understand some people;
5. because it is obvious when you have not met each other for a long time;
6. because he knows that we are still in touch with his ex-girlfriend;
7. because he thought it was a little embarrassing to announce his marriage given all our background;

8. because he thought that we had already known about his marriage and so given our background it was difficult to tell us, but at the same time it was desirable to tell us;
9. because he thought that we were thinking that he was thinking that he should have already told it before and that we already knew that fact from his ex-girlfriend...

From this list – which is of course not exhaustive – it is possible to understand that once the macro-ToM level – i.e. the mentalistic interpretation of an event – has been activated, the complexity of that interpretation can vary greatly from an almost behavioural level (1) to a very complex mentalistic recursive level (9), passing through intermediate gradients. The gradient of the mentalistic interpretation is once again provided by the interactions of psychological resources, constraints, expectations, goals and so on, that, after having worked on a first macro-analytic level of ToM functioning, come back and become evident also in the management of the micro-analytic level. This time, however, the tool of the mentalistic interpretation is set alongside a range of other tools available to the human mind in order to deal with the situations of daily life.

Figure 3: Functioning Exemplification of Micro-ToM Level



The tools interact with the psychological resources and constraints and lead, depending on their level of activation, to a certain type of output. The level of mentalistic reasoning of the output will be proportional to the level of activation of the ToM tool into the overall psychological architecture. The level of mentalistic interpretation could be seen as the combination of two functions: the first one determines the activation of tools through the interaction of the psychological resources available to the individual; the second one acts directly on the differently activated tools:

Psychological activation tool = $fx(\text{Resources, Plans, Expertise})$

ToM output level = $fx(\text{psychological tools})$

General output = more or less adaptive acting and management of the socio-relational and communicative exchange

The sense of the tool finds space in the literature that tries to redefine the role of mentalizing in an integrated life-span perspective. Both Keysar et al. (2003) and Kinderman et al. (1998) claim about the opportunity to reconsider ToM as a device (among many other cognitive ones) in order to better understand its functioning. Our model, also at the micro analytic level, points out that this reconsideration should not be trapped by the temptation to overlap development and deployment. Otherwise, the risk is to interpret a low activation of the ToM-tool as an indicator of a general poorness of ToM. A possible “antidote” maybe the effort to approach ToM highlighting its socio-relational and adaptive component (Liverta Sempio 2002; Marchetti 2002). Indeed, Rutherford (2004) considered the possible link between ToM and social role and showed that a low status condition induces people to a more intense use of ToM, rather than a high status condition. People with a low status condition would be in the need of making sense of their relational contexts, attributing mentalistic meanings to the implicit elements of the social and communicative exchange. In other words, ToM functioning could be conceived in terms of goal-oriented activation. This view would stress the relevance of an integrated approach to ToM; it would also unhinge a research logic too much oriented on the presence/absence of the cognitive ability. Hopefully, the result would be a new perspective on the various cognitive abilities – ToM included – that underpin a good performance.

8. Conclusions

The model divides in two parts the way ToM works into socio-relational and communicative interactions: a macronalytic level and a microanalytic one. The goal of this model is to separate the evaluation of the mentalistic ability from the mere evaluation of a performance through the submission of tasks that, if on one side reveal the specific mechanisms of recursive reasoning, on the other side can not be used as unique indicators of the possession of that ability. In particular, ToM investigation in adulthood seems to be quite challenging: the most probable risk is that any failure in mentalizing tasks would be considered as a real impairment of ToM, rather than a “simple” methodological issue (see for example, Rutherford, Baron-Cohen & Wheelwright 2002). In this sense, the model identifies these two moments of operation (Macro and Micro) temporally and causally linked and deeply rooted in the socio-relational and communicative peculiarities of the human interactions. The model tries to set ToM into a complex and articulated psychological framework where the absence or the low level of performance can be interpreted as the result of a particular interaction between the many elements available for the socio-relational and cognitive functioning, rather than as a deficit in charge to ToM competence. In other words, the model tries to offer a new interpretation for those elements that so far in the traditional research on ToM have been considered as mistakes. Such mistakes, as already stated by Wertz & German (2007), are too many, especially if they are associated with other biases in reasoning, such as, for example, the hindsight bias (Fischhoff 1975) and the outcome bias (Baron & Hershey 1988). Therefore, it seems not so reasonable to settle them as mere exceptions that confirm the rule. Rather it is the rule itself that should be reviewed, by resizing the definition of the possession of a competence in dichotomous terms (on/off) and by extending its interpretative power also to the value of low performances in the tasks. As already assumed by Wertz & German (2007) the first step would be to get out from the logic of the mistake (probably also semantically). The proposed model is just an attempt in that direction; it offers some conceptual elements to approach these alternative modes of output – outside a logic of an optimal performance vs. a suboptimal one – as rich exploratory and cognitive potentialities of the human acting in the domain of intersubjectivity.

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