SS4: Formal approaches in the age of mirror neurons: hints from computational psychoanalysis.

Rosapia Lauro Grotto
Department of Health Sciences
University of Florence
Florence, Italy
rosapia.laurogrotto@unifi.it

Abstract—The functional architectures approach, either implemented with hard or soft computation, or with mixed models, has been one of the most fruitful conceptual tools that allowed cognitive science to reach an integration of contributions from different disciplines, such as neurosciences, cognitive neuropsychology, I.T., linguistics and so on. In the last two decades, the discovery of mirroring systems in the animal and human brain is questioning this unitary approach, by introducing what is in fact becoming a new paradigm of research, embodied cognition. Here I will present some features of the psychoanalytic theories, especially in their more formal contributions, which could favor a better integration of disembodied and embodied cognition.

Keywords—embodied cognition; emotion; Matte Blanco; ultrametricity; computational complexity and metrics.

I. INTRODUCTION

The second part of the 20th century can be considered as the ‘golden age’ of cognitive psychology and cognitive neuroscience; cognitive psychology is based on the founding metaphor of the mind as an information processing device while in cognitive neuroscience the basic assumption is that the information theory approach is crucial in order to derive well founded structure to function inferences connected to information theory approach is crucial in order to derive well founded structure to function inferences connected to brain/neural activity. The mind/brain as an information device metaphor provided a common conceptual framework which allowed productive exchanges between many different disciplines such as psychology and neuropsychology, neurophysiology, artificial intelligence and I.T., theoretical physics, linguistic and neuro-linguistic, philosophy of mind and to some extent, social sciences.

Given the peculiar nature of this huge disciplinary convergence the conceptual and empirical tools that were developed in this domain are heterogeneous, including behavioral data, single/multiple cells recordings, human and animal lesions data, imaging evidences, simulations and analytical studies in the domain of both hard and soft computation, analytic modelling based on statistical mechanics theory and linguistic analysis tools. Given this very large base of evidence, the problem of deriving appropriate methods to obtain valuable scientific inference is one of the main issues in cognitive psychology and neuroscience [1]. The development of box-and-arrows diagrams and the cognitive architectures approach is an example of an efficient conceptual device in this respect. In [2], the authors, elaborating on Newell’s positions, derived 12 criteria that a human cognitive architecture should fit in order to be functional: flexible behavior, real-time performance, adaptive behavior, ability to resort to a vast knowledge base, ability to face a dynamic environment, ability to integrate in an efficient way different sources of knowledge in order to implement high level knowledge manipulation, such as required in order to support inference, induction, metaphor, and analogy, use of ‘natural’ language, learning from the environment, sensitivity to developmental constraints, capacity to exhibit consciousness and self-consciousness and brain realization. They then compared two of the most prominent competitors, ACT-R [3] and connectionist models [4] along these criteria. Here I am not interested in reporting the results of this comparison, as I will focus instead on some of the areas in which both types of models seem to be defective.

II. A FRUITFUL CONVERGENCE AND ITS LIMITS.

A first critical area in the cognitive architectures approach is knowledge integration. The issue of knowledge integration is a crucial one not only in the domain of high level cognitive processes, but even when considered at a more basic level neural domain, such as in the well known features binding problem [5]. Although many attempts to solve the binding problem have been made, especially by recurring to the temporal synchronization hypothesis or even to chaotic neural models (see for example [6]), these attempts remain largely at the level of toy models and therefore are still unsatisfactory. The situation is even less favorable when coming to higher level inferential reasoning: the attempts to model inferential processes [7], performing induction [8], and using metaphor and analogy [9], have been considered as based on ad hoc solutions of very limited scope, while J.A. Fodor argued against the idea that any computational approach, of any kind, would ever be able to support this type of inference, basically abduction, a typically human way of reasoning [10]. Self-awareness and the possibility to develop a sense of the Self has been addressed as a possible criterion to test cognitive architectures that seems to remain largely unfulfilled. The issue of awareness has been addressed substantially in the form of
the distinction between implicit and explicit processing. A recent approach rephrases the issue of self-awareness in the domain of social cognition. For example, a workshop entitled “From Cognitive Activity to Artificial Self Awareness” was held at the Centre for the Study of Complex Dynamics in Florence in June 2013 to help disseminate some of the findings from the RECOGNITION project, a multi-national research project as part of the FET Proactive Initiative on Awareness. The emphasis was on cognitive science, social psychology, socio-physics, and computer science, since the target of the project was the development of a cognitive inspired model to equip self-awareness at the level of the ICT systems. In this approach awareness has mainly to do with the possibility to instantiate locally constrained distributed computation, inspired by social heuristic reasoning, in a large network of social agents.

In the Open Peer Commentary session that follows [2], Yang and Bringsjord claimed that the fundamental issue to be addressed, even before being involved in any comparative procedure concerning the various cognitive architectures on the market, is the assumption that human cognition should be described in terms of computational processes [11]. They propose a conceptual comparison between this claim and Hilbert’s programme to derive a model of to derive a model of computation at or below the level of Turing machines (and their equivalents) to definitively settle all mathematical questions; as is known, Hilbert’s programme was abandoned when Kurt Gödel was able to demonstrate his famous two incompleteness theorems, opening thus the way to more sophisticated approaches. According to Yang and Bringsjord the emphasis on the computational hypothesis would rest on a genuine conceptual misunderstanding, that presupposes an exceedingly convenient sense of the term universality:

“According to this sense, a system is "universal" if and only if it can compute all Turing-computable functions. The construal is convenient because the vast majority of functions (in the relevant classes; e.g., functions from N to N) aren’t Turing-computable (Boolos & Jeffrey 1989). Anderson and Lebiere, the classical connectionists they evaluate, those they count as fans (e.g., Dennett), and so forth – all assume that human cognition can be nicely packaged beneath the Turing Limit. Yet, after decades of work, no system at or below the Turing Limit has the conversational power of a toddler” (p.628).

The second issue that seems conceptually out of sight within the computational approach is phenomenal consciousness [12;13] and its unavoidable claim in favor of the advantage of having an ‘inner life’, in the absence of which all we could aspire to evolve in the proximal future would be something like ‘zombanimals’, that is, something like a robot with the behavioral repertoire of a dog but with the inner life of a rock. A consequence of this type of failure would be the impossibility to derive n-order beliefs that are critical for reasoning in social contexts. An example of this type of reasoning is the one involved in the so-called ‘murder mystery’ inference, as the “the reader of a murder mystery often believes that the villain believes that the detective believes that the villain believes the villain will never be caught” (p. 628).

The recent volume [14] provides the relevant advantage to allow for a comparison between the domains in which the cognitive approach has been more successful and those that appear to be resistant to this type of insight, based on a large set of empirical evidence derived from cognitive neuropsychology, neurosciences, and imaging studies. Among the first we have semantics, short term retention, buffers and working memories, modeling of motor skills and action sequencing, visuo-spatial-motor analysis, syntactic operations at an abstract or behavioral level, some aspects of the modeling of supervisory processes, episodic memory, some forms of reasoning and problem solving. Overall, the pattern of results is not largely dissimilar with respect to what was discussed in [2].

As observed in [15] when a paradigm maintains for a long enough amount of time a dominant position in science, it is highly probable that new observations, made available by refined theoretical analysis and well developed empirical techniques, might highlight new phenomena that would potentially initiate the enquiry for a new paradigm. The criticisms about the founding metaphor, such as those proposed by Yang and Bringsjord are of this kind. However I would like now to discuss the growing influence that a purely neuro-physiological discovery is having on the field of cognitive psychology, by briefly referring to how ‘mirror neurons’ are actually deeply influencing the idea that a psychologist might have about what a cognitive phenomenon could be [16]; this becomes evident in the domain of social cognition, but the consequences are rather general. Just to anticipate the logic of the argument, a central claim by Gallese is the following:

“The point I want to stress is that social cognition is not only ‘social metacognition’, that is, explicitly thinking about the contents of someone else’s mind by means of symbols or other representations in propositional format. We can certainly ‘explain’ the behavior of others by using our complex and sophisticated mentalizing abilities. And we should add that the neural mechanism underpinning such complex mentalizing abilities are far from being fully understood. Most of the time, though, we do not need to do this. We have a much more direct access to the inner world of others. Direct understanding does not require explanation. This particular dimension of social cognition is embodied, in that it mediates between the multimodal experiential knowledge of our own lived body and the way we experience others” (p.659).

Before discussing the implications of this position, I will provide some more details about mirror neurons, first, in order to document the amplitude of the potential applications of the mirroring mechanisms.

III. COGNITION IN THE AGE OF MIRROR NEURONS

A. Mirror-neurons in the monkey’s brain.

The discovery of mirror neurons dates back to the 1990s, when Rizzolatti’s group of neurophysiologists, recording from area F5 of the ventral premotor cortex of macaque monkey found a specific group of neurons that were activated not only when the monkey executes goal-related hand or mouth actions,
like grasping an object, but also when observing other individuals (either another monkey or a human being) performing the same actions [17]. Neurons with this surprising property, involving a match of an action observation and an action execution, were also observed in the posterior parietal cortex, in an area that is reciprocally connected with F5; the group of researchers proposed an interpretation of the data by assuming that this ‘direct matching’ may underpin a non-mediated form of action understanding [18] based on embodied simulation, i.e. a specific mechanism by means of which the brain/body system models its interactions with the world [19].

According to this view the mechanism goes approximately like this: when a subject sees an action performed by another individual, neurons coding for that action discharge in the observer’s premotor cortex, thus automatically inducing a motor representation of the observed action, that matches the one which is spontaneously generated during active action and whose outcome is known to the acting individual [18]: “Thus, the mirror system transforms visual information into knowledge” (p.172). It was soon clearly demonstrated that mirror neurons are really sensitive to the intended action goal, as they respond equally well when the visual features of the act are altered or partially masked, and for some specific class of cells, called audio-visual neurons, even when a specific noise is associated with the intended action which is performer out of sight. The mechanism of mirroring was interpreted as the neural correlate of the dawning of a general conceptualization system in non-human primates [20].

A. The mirror systems in the human brain.

Given the novelty and relevance of these findings from neurophysiology, a hunt for mirroring systems in the human brain was soon started. Human data must obviously relay on more indirect evidence, such as those provided with Trans Magnetic Stimulation and functional Magnetic Resonance techniques, or neuropsychological evidence from apraxic patients (see [18] for a review). However evidence dating back to the 1950s was known, showing that desynchronization of a specific EEG rhythm recorded from the parietal cortex occurs not only when the experimental subject is performing a given act, but also when the subject is merely observing actions done by others.

Trans Magnetic Stimulation is a non-invasive technique that allows for an electric stimulation of some areas of the Central Nervous System, among which is the motor cortex. Modulation of the motor cortex activity via TMS produces motor-evoked potential in the muscles that can be easily detected, and refined empirical approaches are available to locate the underlying effects at the central or at a more peripheral level of the Nervous System. Therefore TMS studies were helpful in detecting a mirror system (a motor resonance system) in the human being and in showing that its properties are to some extent different from what found in the monkey’s brain. First, meaningless movements produce activation in the human mirror system while they do not elicit any response in the mirror neurons of the monkey’s brain. Second, the precise timing of cortical excitability, during action observation, suggests that human mirror-neuron systems also code for the physical movement sequences by which the action is achieved. According to Rizzolatti’s group these features of the human mirror-neuron system would be suitable to instantiate a motor resonance function that could constitute the neural basis for the humans’ capacity to imitate others’ action, and therefore, for learning by imitation [18].

B. Mirror systems and first person knowledge.

The use of functional Magnetic Resonance Imaging protocols, in which brain activation can be mapped on its anatomical substrate while the subject is involved in a given experimental task, have added new complex features in the picture. Empirical evidence indicates that actions made by other individuals could be recognized through different mechanisms [21], the crucial variable being the extent to which a given action belongs to the usual motor repertoire of the subject: actions belonging to the motor repertoire of the observer in fact can be mapped on his/her motor system, while actions that do not belong to this repertoire (like barking for a human observer, even when the barking one is a human subject) do not excite the motor system of the observer and appear to be recognized essentially on a visual basis without motor involvement [18]; “It is likely that these two different ways of recognizing actions have two different psychological counterparts. In the first case the motor “resonance” translates the visual experience into an internal “personal knowledge” (see Merleau-Ponty 1962), whereas this is lacking in the second case” (p.175).

According to the interpretation of this evidence proposed in [19], the crucial difference between the understanding mediated by embodied simulation and that mediated by the cognitive interpretation of a visual scene (as in the case of the observed barking dog) would be the quality of the experience coupled with the understanding. Only the embodied simulation mediated by the activation of the mirror neuron system enables the capacity of knowing ‘how it feels’ to perform a given action. Only this mechanism enables intentional attunement with the observed agent. This is the kind of interpretation that allowed the author to claim that the mirror system is the fundamental neurological substrate for social cognition, and that its disruption could have a prominent role in the origin of complex developmental deficits, such as those of the Autistic Spectrum [20].

C. Mirror systems and language.

In a subsequent series of experiments some tentative hypotheses about the connection between the human mirror systems and language were explored. Research moved in three principal directions. The first was to show, by behavioral experiments, that hand gestures and mouth gestures are strictly connected in human being and that this link extends to the orolaryngeal movements used for phonation; the second, more linked to the domain of neuro-anatomy, explored the continuity in evolution between the monkey brain areas in which mirror neurons were detected and the language areas in the human brain; the third developed an integrative approach where preliminary evidence was collected supporting the view that
the mirror neuron system represents the neurophysiologic basis from which language would have evolved [22]. This hypothesis is in line with those approaches that postulate that speech evolved mostly from gestural communication (see [23] for a systematic discussion of these positions). Its extra value rests on the fact that it postulates a neurophysiologic mechanism that would sustain a common (parity requirement), non-arbitrary, semantic link between subjects involved in a communication exchange.

A parallel line of research investigated the interplay between embodied simulation, action and syntax, producing highly speculative but fascinating hypotheses on the role of mirroring in the development of the most abstract characteristic of language, that is its syntactic structure. In their seminal paper, Hauser, Chomsky and Fitch proposed to differentiate a ‘language faculty in a narrow sense’ (LFN), restricted to aspects that are specific to language, and a ‘language faculty in a broad sense’, that would resort to more general cognitive functions, possibly shared with non-human animals.

As an example of this type of evidence, one can consider the experiment in [25] where the authors tested whether the frontal mirror region could have a role not only for the understanding of goal-directed actions, but also for recognizing predictable change in visual patterns. Results showed that in a serial prediction task there was an activation of premotor and parietal cortices, particularly within the right hemisphere, whether or not the subjects intended to prepare an action toward the stimulus. The frontal mirror-neuron system would therefore play, in humans, a role in the representation of sequential information, in the perceptual as well as in the action domain. This would be a faculty that would of course be relevant to the linguistic domain, although not being limited or specific to it.

In the most innovative part of their proposal [25] Hauser and coworkers postulated at the core of LFN the so-called ‘recursion’ mechanism; this would be the computational mechanism specific to humans at the basis of language grammar, which, nevertheless, might in principle have evolved for functions other than language [25]. A set of empirical indicators show that syntactic processes are influenced by non-linguistic constraints such as real world properties of the referential context, thus showing that the linguistic system cannot be assumed to be modular in Fodor’s sense [26].

As discussed in [18], different behavioral studies, indeed, appear to show that, at odds with Fodor’s presupposition, the syntactic system is penetrable, and therefore it is not informationally encapsulated. Evidence comes from syntactic ambiguities being evaluated with non-linguistic constraints like real-world properties of referential context. Empirical data provide evidence that we are continuously defining linguistically relevant referential domains by evaluating sentence information against the situation-specific affordances, which appear to be encoded out of the linguistic representation of a word or phrase. Listeners use predicate-based information, like action goals, to anticipate upcoming referents. Even purely syntactic decisions about ambiguous sentences can be affected by the number of referential candidates that can afford the action evoked by the verb in the unfolding sentence [27]. These results have been interpreted by suggesting that even a key component of the supposed LFN is intimately intertwined with action and its embodied simulation (for a different view, see [28]).

D. Mirror-neurons: what else?

The domain of research on mirror systems and embodied cognition has been growing exponentially since these founding results and conceptualizations were proposed to the scientific community in the last decade. One of the main advantages that are attributed to the discovery of mirror neurons is that they are supposed to provide a basis precisely for that class of phenomena that appeared to be out of reach within the standard cognitive architectures approach, namely first person knowledge, self consciousness and mentalization. In fact, it is evident that embodiment cannot be reduced to the classical requirement of dynamic behavior; this latter is the capability of a functional architecture to adjust to a changing environment, while embodiment has to do more with a way of ‘being’ in the environment. The crucial issue is the nature of the body as the primary locus of objective and subjective experience, and in trying to formulate this the natural reference is the conceptualization of phenomenology. The body, as stated first by Husserl (see [13]) is “something constituted in an oddly unfinished way” (p.106). “On the one hand it’s something physical, material, and has its own extension, including its real qualities, such as color, weight, heat and other similar material qualities. On the other hand I feel sensations ‘on’ it and ‘in’ it: I feel the pain bell when it rings, I feel the heat, I stretch myself towards the environment space, I place myself under a certain perspective” (p.106). This is a very powerful insight, but on the other hand mirror-neurons are brain cells, and despite the resonance of one type of description (the philosopher’s one) with the other (the neurophysiologist’s one) I would suggest that we do not gain a lot by simply mashing one description over the other, no matter which way around.

The point I would like to make here is that, despite other perspectives that have been put forward [29; 30], mirror neurons are considered to be the ‘grandmother cells’ of social cognition. A grandmother cell [31] is a neuron that, due to its specific physiology (its wiring, the way it has evolved, its specific repertoire of sensitivities and neural responses and so on) is able to exhibit a highly specific behavior, as for example, firing when grandmother is in sight. In the same line, to some extent we can see that mirror neurons do not have a ‘function’, they exhibit a behavior that is tightly determined by their physiology: they ‘behave’ as mirror neurons because they ‘are’ mirror neurons. Now this is good news if one is a neurophysiologist, but I would hardly see any advantage if one is interested in modelling at any level. And in fact, during the last decade research in cognitive neuropsychology and cognitive neuroscience has shown a trend towards the expansion of descriptive approaches, such as imaging studies: this appear to be rapidly becoming a core business in cognitive neuroscience and cognitive neuropsychology. In other respects the same trend can be detected in the constant spreading of the ‘neuro’ affix, that appears to be colonizing the whole range of scientific and humanistic disciplines, as from neurosciences
and neurolinguistics we moved to neuroeconomics [32],
neuromarketing [33], neuroaesthetics [34],
neuropsychoanalysis [35] and so on and so forth.

IV. WHAT SHALL WE GAIN WITHIN A FORMALIZED PSYCHOANALYTIC APPROACH

In the last part of this paper I would like to highlight some reasons to assume that a serious consideration of formalized psycho-analytic theories could provide a conceptual device to implement a more fruitful exchange between the actually divergent fields of disembodied and embodied cognition.

A. The relational matrix of affects as a bridging concept.

According to Freud himself [36] “psycho-analysis is the name (1) of a procedure for the investigation of mental processes which are almost inaccessible in any other way, (2) of a method (based upon that investigation) for the treatment of neurotic disorders and (3) a collection of psychological information obtained along these lines, which is gradually being accumulated into a new scientific discipline” (p.235).

With respect to the first aspect, a very simple description of what psychoanalysis is about is ‘representations endowed with affects’. The term representation is used here in a way that is in many respects very similar to the one that is adopted in cognitive science. Following the idea put forward by the economist Kaldor back in the 1960s, that one should feel free to start speculations from mindful as well as simplified views of empirical evidences, I will suggest to start my reflections by considering some ‘stylized facts’ about affects. Affects, like emotions, are deeply rooted in bodily experience, but at odds with emotions, they imply a certain degree of stability in time; furthermore, while emotions can be elicited by any experience (e.g. a sudden noise that might frighten me), affects emerge within a relational matrix, that is, they are rooted in an interpersonal experience as well as in a bodily experience [37].

The expression ‘representations endowed with affects’ seems to suggest that affect can be somehow ‘added’ to a mental representation; this is reminiscent of a naive idea of ‘hot cognition’, in which emotion is added as a kind of perturbation term to a first order cognitive phenomenon. The whole corpus of psycho-analytic theory is based on a radically different assumption, stating that affect is the primary experience [38], and mental representations emerge as a consequence of the need to elaborate and moderate the blaze of affective experience. According to the current theorization, this process is primarily bound to occur in an interpersonal space [38; 39], and the process of thinking might be seen as the results of the constant attempt to elaborate affective experiences arising within the interpersonal matrix in representational terms [40]. This is the basic devices of psychoanalytic practice are actually conceptualized in terms of ‘coupling’ devices, that are implemented either in a dyadic setting or in a group setting [41].

B. A principled approach to describe ‘representations endowed with affects’.

A second point of divergence between cognitive science and psychoanalysis is that the latter, but not the former, provides a principle way to describe the phenomenology of our mental life (the space in which the representations endowed with affects do live and evolve) in terms of an underlying unified model of psychic functioning. This model dates back to the original intuitions of The Interpretation of the Dreams that the presence of affects in mental representations can be detected by observing a peculiar sets of transformation mechanisms acting on representations themselves [42]. It is interesting for us to note that in fact Freud never abandoned the idea that the original and basic expression of affects (the so-called Primary Process) is in actions and not in representation, as stated in the famous maxima expressed in Totem and Taboo that ‘at the beginning there was the action’ [43] and that affects are to some extent forced into the representational domain (the Secondary Process, that is assumed to be constrained by the standard logical rules) due to the limits the reality inevitably imposes on their direct expression in behavior [44, 45].

Subsequent formulations of the theory allowed us to reach a more precise account of the conceptual nature of ‘representations endowed with affects’. In particular Matte Blanco’s theory of mind as a Bi-Logic system [46, 47] provides the first attempt to formalize the theory in terms of the entanglement of two different ways of functioning, corresponding to the Freudian Primary and Secondary Processes, that can be described in their pure form as characterized by the presence of an ordinary logic system, called the Asymmetric Mode, operating within the Secondary Process, and of a different logic system, called the Symmetric Mode for the Primary Process. Bi-Logic has been since then considered a powerful conceptual tool to explain the nature of the experience of being in touch with something/someone at a deep emotional level [48].

In the last decade, Matte Blanco’s theory [46, 47] has been reformulated in topological terms, by showing that the Bi-Logic system can be described in terms of mental representations that are embedded in metric or in an ultrametric spaces [49; 50; 51]. The idea that what affects are about is the shaping of the topology in which mental representation are embedded, provides the advantage of suggesting a possible way to move towards a unified view of affective experience and representational activity in human mental life: this could be a step in the direction of reducing the disembodied vs embodied cognition distance, although obtained at the price of resorting to an abstract and formal level of description spaces.

Following a parallel line of research, already from the end of the 1990s Khrennikov proposed and developed a formal approach of the conscious/unconscious dynamic in which the thinking process is implemented in a system of interplaying systems: the human unconscious is considered as a dynamical system whose parameters are regulated by the conscious processes; at the core of the model there is the formalization of the space of ideas in terms of a $p$-adic numbers space [52; 53; 54]. The core of system is the $p$-adic numbers structure that captures the intrinsically hierarchical nature of human thinking,
thus providing the basis for mental holicity [55]. In fact according to Khrennikov the flow of consciousness of the human mind cannot be embedded into a real number line, even a curved real line is not ‘curved’ enough to fit the mind’s trajectory of thoughts. On the contrary in his model each coordinate of the mental space has a treelike structure, in which each branch of the tree keeps the same hierarchical organization. The $p$-adic numbers space is an ultrametric space: the topological constraints are therefore exploited in order to model a huge range of psychological as well as psychopathological phenomena [55]. Finally Downes has recently proposed a fascinating and unifying view of the psychoanalytic theory of unconscious processes (including aspects of the formulations developed by Freud, Klein, Matte Blanco and Jung) and Lévi-Strauss’ structural anthropology, based on an analysis of the contrasting relations between diametric and concentric spaces [56].

C. Formal approaches in psychoanalysis and clinical practice.

Formal models of psychoanalytic theory tend to produce a mixture of skeptical reactions in the psychoanalytic field, in part due to the use of mathematical and physical models that are not trivial to treat. Here I would like to stress a more relevant reason to consider with care some implications of the formalization of psychoanalytic methods. In fact contemporary psychoanalytic theories have an empirical basis that is almost entirely confined to observations performed in the clinical setting, which is, as already stated, a relational and interpersonal device [40]. This has been a crucial factor in keeping in balance psychoanalytic theory and practice. According to the positions expressed by the Argentine analyst José Bleger, a peculiarity of the psychoanalytic epistemology would be the tendency to usually resort to both naturalistic and phenomenological description of the same phenomena [57]: to illustrate the point Bleger takes into account two psychoanalytic conceptualizations, his conceptualization of syncretic sociality and Melanie Klein’s fundamental clinical conceptualization of projective identification [58]. Syncretic sociality has been defined as the basis of symbiotic relationships among individuals as a condition of ‘being in relation without interaction’ which is basically always mute and becomes observable only when it is perturbed. An example of this condition is the institutional bond, which shapes and stabilizes a relevant part of our personality despite the fact that we generally are not aware of its existence (consider the troubling turbulence connected with conditions such as divorce or retirement); another example is the experience of being alone in the presence of someone else, as shown by the child who is quietly playing alone in the presence of the mother, and immediately interrupts his activity and follows her if she leaves the room. Projective identification refers to a situation in which one of the two in the analytic couple, often the analyst, feels the urge to enact a given feeling or affect, for example hostility, and in the meantime he feels as if hostility was not actually his own feeling. According to Bleger what is naturalistically described by syncretic sociality is the same phenomenon that is phenomenologically experienced as projective identification. I have gone through this example quite in detail because I think that it casts light on a relevant theoretical gain obtained with psycho-analytic practice, that is, to allow for a constant and subtle interplay between phenomenal and naturalistic descriptions of the same phenomena [59]. In order to preserve this important feature, analysts tend to more or less explicitly settle down to a given level of abstraction in their theoretical formulations. It is well possible that this is one reason why there is still a certain degree of doubt in the field towards formalization. In one of his considerations about the fundamental value of adopting a scientific method in psychoanalysis, Bion states that a crucial reason for having a scientific method for a psycho-analyst would be to have a method to become aware of the fact that he or she is making a mistake [60]. What I would like to claim as my final point here is that it seems to me to be a very good reason for a theoretician (either a psycho-analyst or a cognitive scientist, [61]) to have a formal model, too.

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REFERENCES


