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► **To cite this version:**

Giuseppe Iurato. *Συμβολου*: An attempt toward the early Origins: Part 2. Language and Psychoanalysis, 2013, 2 (2), pp.121 - 160. 10.7565/landp.2013.009 . hal-01425761

HAL Id: hal-01425761

<https://hal.science/hal-01425761>

Submitted on 3 Jan 2017

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Σύμβολου: An attempt toward the early origins, 2

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Abstract. In continuation of what has been said in the first part of this two-part paper, herein we present further considerations on symbolism, reconsider some related psychodynamic case reports with some possible variants about their interpretations, and will apply what is said to some further speculations on mathematical symbolism and thought.

In this second part, we continue with the numeration of the first part Σύμβολου, 1.

5. On symbolism: further considerations

5.1. On sign and symbol. Following Harré, Lamb and Mecacci (1983), in psychology, a *sign* is considered to have a symbolic nature when we are not interested in its referential meaning but, rather, in the content borne by it, whose communicative aim, being a psychological factor, could be unconscious. In the psychological context, the *symbol* should be considered in a different manner to the *sign*, and the *content* should be considered in a different way to the *referent*, the latter being correlated to the sign through the reference relationship, whereas the content is correlated to the symbol through the unconscious component of the former. All that is in agreement with the Jungian theory of symbolism according to which reference and use of signs of direct thought should be ascribed to the action of conscious thought, whereas symbols should be attributed to the joint and inseparable action of conscious and unconscious thought.¹ Moreover, according to these authors, there is a strict connection between the symbolic usage of signs and altered states of consciousness, the latter being seen as more desirable because they allow us to bypass the ordinary vigil (often unpleasant and anxiogenic organization of the Ego. These are often identified, in early adolescence (puberty), as initial psychotic events,² in alternation with the first normal phases of reasoning, abstraction and hypothesis-making abilities, together with the formation of first feelings of empathy and Ego's decentralization. And all this is in accordance with what has been said above about Ego's splitting. Following Galimberti (2006), Freud himself distinguished between sign and symbol, the former being understood as indicating a more or less direct presence of something, while the latter refers to something which, in turn, may refer to another something achieved only by means of an interpretation. As stated above, *displacement* and *condensation* are the main mechanisms through which the primary process acts. In the first of these,³ the part represents the whole or vice versa, or rather a given idea, object or image is instinctually replaced by another effectively associated with it, even if with modalities that are often not logical. On the other hand, in the second one,⁴ there is convergence and merging of the drive's cathexes related to different objects or aims. According to

¹ In this regard, see also the following subsection 3.

² According to Mastrangelo (1975, Chapter 9), the presence of psychoses in childhood is nowadays a matter of fact.

³ See Solomon & Patch (1971).

⁴ See Arieti (1969), especially Volume III as regard creativity.

Lalli (1993), metaphor and metonymy are the main mechanisms of symbolic activity; at the basis of metaphor, then, lie associations by similitude and analogy. Further, metaphor denotes a thing which is different from the named one, transferring the concept that this thing means out of its usual or normal meaning. Instead, metonymy, in naming a thing or a concept, makes a displacement on the basis of a conceptual relationship. In doing so, the effect is named for the cause, the possessor for the possessed thing, the producer for the product, and, above all, the abstract for the concrete.⁵ Finally, due to the replacement of a total object with a partial one, in fetishism there is the tendency to replace a part with the whole, albeit the inter-individual relationship is kept, and this principle of the method, as already said, might be, in some respects, compared with the inductive method. On the other hand, following Piscicelli (1994, Chapter 9), the displacement of a desire upon a generic image is one of the main semantic mechanisms of signification widely involved in symbolic formation. Through fetish formation, the transfer of the Ego upon the object fetish takes place in degenerative cases, or upon symbolic formations in normal cases (see also above Khan Masud's (1979) ideas on perversions).

5.2. Again on symbolism. Following Rogers (1978, Chapter 2), the consideration of language in relation to primary and secondary psychic processes requires a rethinking of the theory of symbolism. For instance, to rectify that sort of one-sidedness of symbolism (as in the 1916 Ernest Jones work on the theory of symbolism), Rycroft (1968b) argues against this unilateral view that sexual symbolism belongs solely to the primary process and occurs only by virtue of repression, in dreams. Rycroft (1968a, b) and Beres (1950) instead assume symbolism to be a general ability of mind which is based on perception and which may be used both by the primary process and by the secondary process. According to Rogers (1978), a literary symbol or a piece of symbolic behaviour can, and often will, reflect both primary and secondary processes functioning simultaneously, analogously to the action of a bi-logical process as formulated by I. Matte Blanco (see Iurato (2013)). Symbolism is a ubiquitous process present in all human activity. Following Petocz (2004, Chapter 1), amongst the diversity of meanings of symbol, Whitehead (1927) highlighted the mystical character that it had, commenting on “a certain unstable mixture of attraction and repulsion” in our attitude towards symbolism. He states that symbolism, from sense presentation to physical bodies, is the most natural and widespread of all symbolic modes. Langer (1942) states that symbolization is the essential act of thought: the symbol-making function is one of man's primary activities, like eating, looking, or moving about. It is the fundamental process of mind, and goes on all the time. The human brain function is constantly carrying out a process of symbolic transformation of experimental data that have come to it. The symbolization is the most natural outcome of how the human mind has transformed that primary need to express oneself.

5.3. A comparison with autism and a phylogenetic view. The relationships between creative thought and the spectrum of psychotic disorders have been known since Freud's work. For instance, many valuable studies have been pursued in this direction and, in this regard, the communication of Carapezza and Cuccio (2010) is a good essay on the chief studies (see references therein⁶) concerning some aspects of the creative abilities of individuals who are shown to have Autistic

⁵ This last displacement is of fundamental importance for symbolic function.

⁶ See, above all, the main researches made by Baron-Cohen, Ashwin, Tavassoli and Chakrabati (2009), Frith (1989) and Happé and Vital (2009).

Spectrum Disorders⁷ (ASDs). For instance, it turns out that many subjects with ASDs have a peculiar characteristic, called *weak central coherence*, which means that such subjects have a preference for details without being able to lay out them into a coherent and unitary frame.⁸ It seems that such a strong preference for and attention to details are also typical characteristics of creative thought, which, in turn, would derive both from a sensorial hypersensibility and from a certain tendency towards a *hypersystematization* thanks to which they are able to identify structural regularities and symmetries. On the other hand, these last considerations might have certain common points with what we have already said above if one considers the disavowal mechanism as strictly correlated with a sort of search for a penis where it is missing, seen therefore as a tendency towards an anatomic detail as well as the result of a lack of regularity which stems from a comparative examination of sexual gender differences. What is said above regarding non-adult subjects with *ASDs*, who also have an uncommonly high intellectual level,⁹ could be interpreted as the extreme outcome of a drastic and emotively poorly managed splitting of the Ego which, nevertheless, does not degenerate into paraphilia because of a hypersymbolization as compensation for fetishistic tendencies. From a phylogenetic viewpoint, symbolism embeds its roots in the mists of time. Indeed, symbols seem to be a psychic legacy dating back to the archaic origins of human beings. The history of religions, folklores and mythologies provides interesting sources connected to the first primitive initiation rites: in this regard, see Ferrero (1995), Marchesini (1901), Valeri (1979), Màdera (1977) and Eliade (1976). In particular, very close relationships exist between *totemism* and fetishism; in this regard see Eliade (1976), Abraham (1978) and Casonato (1992). Furthermore, fetishism also has deep historical roots in ethnic-social-anthropological and linguistic contexts, from which it has gradually earned its pre-eminent symbolic function during the course of history. However, the sources of fetishism confirm the essential intermediary nature of the fetish (hence, of the phallus) between humans and (divine) nature. Furthermore, according to the ethnoanthropological research, fetishism is not venerated because it is considered to be the place or the abode of the divinity but rather for the protection that one expects to have (hence to avoid an anxiety feeling). The symbol draws its origins from religious symbolism¹⁰ as a prolongation of the dialectic of the so-called *hierophanies* (or *theophanies*). A *hierophany* is something which manifests the sacred like myths, rites, cults and so on, through which heterogeneous plans and apparently irreducible realities are identified, assimilated and unified. Just from these historical bases come the origins of symbolism according to C.G. Jung, in which the concept of *psychoid* (which is a particular psychotic attributive dimension that should be meant from a well-defined phylo-ontogenetic sense¹¹) plays a fundamental role.¹² The fetish is then represented as one of the

⁷ This spectrum has a non-empty intersection with the spectrum of psychotic disorders (*PSDs* as Psychotic Spectrum Disorders): for instance, introversion and deficiency of social relationships are elements of $ASDs \cap PSDs (\neq \emptyset)$.

⁸ And this seems analogous to the fragmentary and disjointed corporal image which fetishists have.

⁹ Following Mastrangelo (1975, Chapter 9), this is one of the features of infantile schizophrenia, together with a phobic symptomatology and a loss of relations with the environment. From the psychodynamic viewpoint, the transitional (Winnicott) and persecutory (Klein) object phenomenologies are also invoked to explain certain damages to the object relationships involved in these disorders. Furthermore, until six years old, subjects with *ASDs* are unable to distinguish the meanings of personal pronouns in relation to others, because he or she has a severe impairment of the own identity perception in respect to the otherness. The only means thanks to which they establish relations are exclusively toys and not words. Hence, they do not develop an albeit minimal separation between I and not-I, that is to say, they do not recognize the otherness.

¹⁰ See Ferrero (1995) and Eliade (1976).

¹¹ For the notions of phylogeny and ontogeny and their possible relationships from a psychological viewpoint, see, for example, Gould (1977), Fossi (1983, 1984), Piscicelli (1994) and Petocz (2004).

first coarse forms of religion, according to Musatti (1977), hence an intermediary between the human being and the otherness. In this last sense, taking into account what was just said about fetishism, religion, mythology and initiation rites,¹³ it is not possible to leave aside the work of Thomas Mann and his *Moon-grammar* (see Sweet (1982, Chapter 6) and McDonald (1999)). This author, starting from the ancient Egyptian, Mesopotamian and Assyric-Babylonian mythologies to Revealed Sacredness, in his 1943 four-part novel *Joseph and His Brothers*, amongst other things argues on the possible origins of the common conscious language of ancient Near East people from initiation rites of a fetishistic nature, which have then been acquired by other religious doctrines. Mann distinguishes between a *Daylight-grammar* and a *Moon-grammar*, through which the spirits communicate with human beings, coherently with that intermediary role played by fetish mentioned above. The first has an exoteric character and is quite familiar to us in the form of Scriptures, traditions, events, worships, and so on. The second has instead an esoteric nature and regards small groups, prayer, silence, meditation, even dreams, and is called by E. Fromm “God’s forgotten language” (see Fromm (1951)). Some have argued that the first special gift of the Holy Spirit in the Bible was Joseph’s ability to interpret dreams, so that we have a very coarse precursor of the next Freudian dream interpretation. Finally, an interesting study on the influences of religious-mystical and psychotic experiences (like those of altered consciousness states) on the primary process of language, emotion and body boundary imagery, in the wake of what was just said above in relation to phylogenetic aspects of fetishism (and other aspects, like those related to transitional phenomena), has been made by Cariola-Žanetić (2012a).

6. On mathematical symbolism, creativity and other

6.1. *On mathematical symbolism.* 1. There have been several authors who have treated the relationships between exact and natural sciences and psychoanalysis: amongst them,¹⁴ C.G. Jung, C.A. Meier, W. Pauli, I. Matte Blanco, E. Von Domarus, S. Ferenczi, I. Hermann, J. Lacan, M. Klein and W.R. Bion. According to Canestri and Oliva (1991), who analysed the inhibitions in second degree school mathematics, it is possible to speak of a certain “mathematical anxiety” felt by those who use mathematical formulas, like $(a + b)^p = \sum_{i=0}^p a^i b^{p-i}$ for every $a, b \in \mathbb{Z}$ and $p \in \mathbb{N}$, which refers to a kind of trauma due to the emotive impact with something whose existence, that is the *meaning* of the formula, is misunderstood; and this, notwithstanding the fact that they showed a certain desire towards mathematics. To find such a meaning, the student is forced to compare herself or himself with an “exterior”, that is the mathematical reality, which has its specific meaningful organizations. For her or him, such a meaning hasn’t been symbolically included into the formulas but rather it has fully and defensively taken the place of the formula itself. Thus, we descry certain analogies with aspects of disavowal. In their important paper, Canestri and Oliva (1991) also analysed some youngsters suffering from disorders belonging to $ASDs \cap PSDs (\neq \emptyset)$ detecting a common feature, that is to say, their inability to make suitable links and connections, as well as to integrate the various senses (see above Section 5.3), the latter being a characteristic identified by D. Meltzer in his studies on autism. The authors, in analysing their case studies, observed as the usual processes followed in solving more or less correctly certain mathematical questions were characterized by sequentiality and continuity laws in turn inferred by perceptive

¹² See La Forgia (1991).

¹³ For these, see Piscicelli (1994).

¹⁴ See also Rosen (1954, p. 139) for further references.

rules. If one asks them the rationale behind these procedures, they are unable to give a correct answer: simply, for them, an algebraic equation is true or false depending on whether they consider a mathematical formula as a *concrete indivisible object* (we say, the missing female penis). Canestri and Oliva hence observe that this fact seems to refer to the H. Segal *symbolic equation* of psychotic thought that has been recalled in the first part of this paper. Canestri and Oliva repeatedly refer to cases in which the students feel inadequacy, shame and guilt senses in front of the question of establishing the truth or falsity of an algebraic equation. It is as if the notion of “equation with its resolution” was deposited or stored in some part of the mind (unconscious) and is re-evocable only by means of well-determined perceptive stimuli. In learning mathematics, it is necessary to refrain from the sensual gratification provided by sensorial perception. The mental operations of abstraction and formalization impose the abandonment of the known and concrete for the unknown and abstract, thus entailing a certain tolerance of the *lack of the object* (we again say, of the female penis). The authors refer to having the impression that many students do not endure such a sensorial deprivation, trying immediately to rebuild up the lost concrete object but not according to a right mental elaboration as above recalled. They immediately follow the known and well-established rules and institutionalized practices, without being able to autonomously and originally create new connections, possible analogies, comparisons and relationships, above all in the face of a new and complex problem. In conclusion, at the basis of these learning mathematics problems, Canestri and Oliva hypothesize a disorder of the symbolic function very similar to that involved in psychotic disorders: in coping with a mathematical task requiring a high symbolic performance, many students feel an unmanageable mental pain that triggers a specific defence mechanism (we say, the disavowal one) that avoids the pain with the construction of a new surrogating reality which is plausible at the perceptive level but misunderstands the true reality, that is to say, the existence of the meaning of mathematical formulas. What was said by these authors is clearly coherently placeable within the framework here outlined and based on the disavowal mechanism. Again, the authors affirm that the various possible solutions and strategies adopted by students to overcome this *mathematical pain* sometimes have a “psychotic” nature, other times a “neurotic” nature. According to them, this “mental pain”, felt in the face of an abstract reasoning, seems to be quite widespread. Canestri and Oliva try to explain these facts through different psychodynamic models, including the Freudian one based on *Mourning and Melancholia* (1917) related to the loss of a loved object and the consequent pain. Nevertheless, in reference to Freud’s work, they do not make any allusion to disavowal. Thereafter, they quote the fundamental work of Melanie Klein, who considered symbolism to be at the root of every creative process. She brings back symbolization disorders to persecutory anxieties regarding sexual fantasies related to primary scenes. Connected with the Kleinian thought is that of H. Segal, the main traits of which we have outlined in the first part. Then, W.R. Bion (1962, 1963, 1967) brings back learning obstacles to difficulties of the relationship between mother and child. In Bion (1967, Chapter 8, No. 102), the author states that the mathematical objects arise from certain *duplicity* relations: for instance, the number two of breasts, the two eyes, the two feet, etc., and this is coherent with the anthropomorphic origins of certain elementary mathematical notions. On the other hand, the above-mentioned Bion’s notion of duplicity relation is, in many respects, similar to that of Hermann¹⁵ (1989) and named *dual*

¹⁵ The original notion dates back to 1924. Imre Hermann (1899-1984) was one of the main Hungarian psychoanalysts, a pupil of S. Ferenczi and M. Klein, who carried out remarkable studies on the psychoanalytic foundations of rational thought. The thought of this author has still been little considered by the history of psychology.

procedure, about which we shall briefly speak in the next sections. According to Bion, the right mental predisposition for doing mathematics is the result of an overcoming of the state of frustration (for the object's loss) ruled by the sufferance and endurance which will lead to psychic modification and elaboration of secondary thought, whereas its intolerance will bring to a rapid behaviour of escape marked by the destructivity of reality data and impossibility of reflection. Bion (1962, Chapter XXIII; 1967, Chapter 9) makes interesting comparisons between the psychoanalytic interpretation and the insights that take place in science following what Poincaré said in this regard in his famous *Science and Method* (1914). Bion makes frequent use of epistemological and mathematical considerations in his work, for instance, in relation to a notable epistemological consideration of Poincaré about the origins of a new mathematical result. To be precise, according to Poincaré, a mathematical result must join together already known elements which were previously disjoined and apparently unrelated amongst them; this combination will be made in such a manner as to establish order where was there apparent disorder. So, we are suddenly aware of the right place that every single piece must be within their complex set. Like our senses, so our mind would be frail and astray if wasn't there harmony in such a set; as in myopia, similarly our mind would see only the near details which would be at once forgotten as soon as it turned towards the farthest if there weren't ordering capacity. The only facts which deserve attention are therefore those bringing order to this complex set, thus making it approachable. This is what Poincaré says and that it can hardly be contested. Furthermore, if one briefly looks at the foundations of Gestalt psychology, it is easy to descry, in the above Poincaré considerations, the bases of a paradigmatic shift as occurs in the Kuhnian scientific revolution theory. On the other hand, from what will be said in what follows, this Poincaré frame might also be brought back to the complex formation of bodily image, while Bion, instead, tries to put an analogy between this Poincaré synthesis and the Kleinian transition from a paranoid-schizoid position to a depressive one. Bion moreover states that the possible relations which will link together the elements of the above-mentioned complex set quoted by Poincaré are mainly carried out through unconscious processes which, in turn, operate by means of the so-called *alpha functions* whose main role is to organize the various sensorial and emotive elements of the perceptive field, providing relations and connections amongst them in such a manner as to structure this field (the Gestalt). Thanks to this alpha function, when normally operating, it will be possible to establish relationships between external and internal reality. The mother will be the first *primary object* whose mature alpha function will mould that of the child and that will allow the unpleasant feelings, including the absence of the primary object, to be overcome. When this alpha function fails, a thought disturbance takes place with the presence of an "object that misunderstands" which belongs to the wider class of the so-called *beta elements*. According to Bion, the primary object would be the breast which, when it is absent, will be considered as a separated and deanimated partial object. This Bionian *deanimation*, meant to be a defence mechanism in coping with the unpleasantness of the absence of the animated object (that is, the animated breast joined to the mother body), would give rise to abstract and formal thought. According to Canestri and Oliva (1991), this deanimation might be meant as an unaware splitting between the meaning (semantics) and the abstract formula (syntax) that represent it. Therefore, the *epistemophilic instinct*,¹⁶ which is, roughly speaking, curiosity about the object, will be suppressed

¹⁶ Following Bott Spillius, Milton, Garvey, Couve and Steiner (2011) and Galimberti (2006), the *epistemophilic instinct* is, for Freud, a part-instinct, which is a part of libido concerning voyeurism and exhibitionism, as a prolongation of sexual curiosity or meant as sublimation of oral drive. It becomes a central instinct in Kleinian thought where it is seen as exploratory and necessary but also inevitably aggressive, involving phantasies of getting inside the mother to find

and replaced by a simple mechanical manipulation of the forms and relations considered as things in themselves, used as such and split from their meaning. The normality is mainly ruled by a correct inter-relationship between semantics and syntax through pragmatics: for instance, in schizophrenia, the fundamental action of the latter fails to integrate the first two (see Falzone (2004, Chapter IV)) which remain unrelated. Following Bionian thought, Canestri and Oliva (1991) state that a bad outcome of this splitting as well as a defective functioning of the alpha function are at the root of many errors and much misunderstanding in mathematics. On the basis of this, we add what follows, namely that the Freudian epistemophilic drive performs a primary splitting between semantics and syntax in the following sense: when the primary object is perceptively absent, then, to avoid the consequent loss anxiety, the individual ontologically tries to re-evoke it. To do so, there are two possible ways, one consisting in immediately finding some material surrogate of it (with possible degenerations into paraphilia), and the other consisting in symbolically thinking about it. This last way will lead to the *ontic* identification¹⁷ (or definition) of that entity which will replace such an object with the formation of the related semantic and syntactic components of it. Further relationships between the syntactic and the semantic structures, ruled by pragmatics, will turn out to be of fundamental importance above all for the reality test. Canestri and Oliva (1991) pointed out that concrete and perceptive elements prevail in symbolic thought. They say that often there is an increase of physical exuberance and restlessness used as a primitive muscular defence toward mental stimuli lived as concrete objects. Mathematical corrections and attempts to establish connections or relationships are associated with unpleasant sensations of a persecutory type. Each student lives this as he or she had generically made “something evil” whose bad sensations hinder every improvement. Following Bion, the learning seems hindered by the presence of beta elements instead of alpha elements. We remember that, according to Bion, mathematical objects are the outcomes of the action of alpha function upon sensorial and perceptive impressions, while the action of beta function provides reality elements charged by persecutory and unpleasant features. In such a manner, the Bionian thought on mathematics is, in many respects, a forerunner of embodied mathematics. The concrete, imitative and greatly repetitive aspects of the wrong procedures adopted in solving mathematical questions often have the hallucinatory function of reproducing the lost object without taking into account its absence, that is, there is an incomplete elaboration of the object lack. According to Canestri and Oliva, these mathematical errors and misunderstandings are mainly due to a bad formation of the Gestalt as, for example, provided by the Meltzerian notion of “disassembly of senses” whose main result would be just this lack of Gestalt. These authors say too that this last state is not only typical of subjects having *ASDs* or *PSDs* but is the outcome of a mechanism susceptible to being active also in the absence of a specific pathology but when the performance of high abstraction tasks is required, and this corroborates what is expected by us in considering disavowal a general psychic mechanism according to Laplanche and Pontalis (1973). Again according to Canestri and Oliva, the great number of mathematical rules for signs, brackets, operations and so on needed for a correct development and resolution of a mathematical expression,

and often to take over or destroy the riches within – notably mother’s babies and father’s penis. The inevitable fear of retaliation may then inhibit curiosity and the capacity for learning. Within Kleinian work, such an epistemophilic instinct plays a fundamental role in symbol formation and in general learning, thanks to the sexual curiosity upon which they rely. See Bott Spillius et al. (2011, Part I, Chapter 10) for further interesting information on symbolism from S. Freud to M. Klein and H. Segal.

¹⁷ In the sense of Heidegger’s *ontological difference* between *ontological* truth and *ontic* truth. Every definition of each entity is always at the ontic level.

if not well organized according to a form semantically and syntactically correct, will act on the mind like a disorganized realm of undifferentiated, undistinguishable and meaningless stimuli. On the other hand, the epistemological structure of physics just relies on a particular and complex relational net between syntactic and semantic structures linked together through certain correspondence rules having an operational character (see Morgan and Morrison (1999, Chapter I)) which we would like to hypothesize is moulded on the basis of the above pattern of formation of the syntax and semantic primary structures.

6.2. *On mathematical symbolism.* 2. Later on, Canestri and Oliva (1991) re-present their considerations in the light of H. Segal's work on symbolism whose main lines were outlined in the first part of this paper. In discussing his thought, we have referred to a meaningful clinical case in which a schizophrenic patient identified a violin with his penis. This means that he found some element common both to the violin and the penis which has obscured all the others that made these two entities distinct, thus passing to an identification of the whole only on the basis of this primary common element. For instance, such a common element might be the geometric or material – hence perceptive – analogy of form between them, which prevails over all the other possible discriminating elements.¹⁸ Therefore, from a perceptive element of equality, the schizophrenic patient has passed to an identification of meaning of the two actions, namely playing a violin and masturbation, thus ignoring every minimal pragmatic contextuality. There is, in short, a substantial lack of abstract elaboration. This is the main feature that identifies, in a given social-cultural context, a psychotic disorder that, nevertheless, may be considered with a certain degree of acceptability in some social-cultural contexts and, above all, in children. In fact, the latter often identify the *name* with the (named) *thing*: for instance, for the child, the name “father” coincides only with her or his physical personal father, i.e. the child is unable to consider the name “father” as having something to do with the relational structure of human society, hence of interpersonal nature.¹⁹ In this regard, Canestri and Oliva refer to an analogous case which takes place in consideration of the formula $(a + b)^2$ which is directly equated with $a^2 + 2ab + b^2$ instead to give rise to the latter through detailed calculations starting from the former,²⁰ thereby ignoring the deep relational structure existing between these two entities. These modes of reasoning are coming back to slight forms of a psychotic mechanism that these authors would consider to be present in every human being but not in a psychopathological manner;²¹ and this is also in line with I. Matte Blanco's bi-logical process theory. Canestri and Oliva say that such types of mathematical errors are mainly due to wrong thought modalities which resemble psychotic ones. And this is a further confirmation of our main hypothesis of this paper, i.e. to put the disavowal mechanism at the primary basis of abstract thought as well as a general psychic mechanism. Furthermore, the basic work of Canestri and Oliva (1991), besides confirming many points raised in this paper, makes a comparison with other psychological perspectives, such as the cognitive one, highlighting many common points with the psychoanalytic standpoint. In particular, the cognitive perspective also

¹⁸ This is also coherent with what reported in (Iurato 2013) where has been discussed the basilar fact that a schizophrenic patient mainly use symmetric and generalized principles in her or his reasoning, this implying, in turn, an impossibility to conceive the notion of power set.

¹⁹ In this sense, a connection with C. Lévi-Strauss's structural anthropology theory is possible, above all with his assumption according to which the Oedipus complex is the cornerstone of the passage from nature to culture, providing the notion of relational structure. This is in coherence with what said in this paper.

²⁰ In this regard, see also what is said in Iurato (2013).

²¹ Which requires a certain repeated and systematic presence in the time to be defined as such (see DSM-V options).

points out the action of certain defence mechanisms to avoid painful stimuli, including the so-called *cognitive avoidance* proposed by M.H. Erdelyi (1985). Retaking into account what is said above, the paper of Canestri and Oliva above all stresses a possible similar psychotic mechanism implying a lost object-induced splitting thanks to which it will be possible to give rise to semantic and syntactic structures of abstract thought. Their line of thought is very similar to the one followed in this paper and is based on disavowal mechanisms as well as being coherent with what will be said later about the relations with the bodily image formation. As further confirmation of this pursued line of thought, we report the main points delineated in the very interesting paper by V.H. Rosen (1954). First of all, he states that the concept of number normally arises in connection with certain stages of the maturation of the perception apparatus during the Oedipal period, and this, as well as what will be said, is of fundamental importance for the main arguments that we want to claim here. Indeed, the author goes on to say that in those with a special mathematical gift, it is probable that this maturational sequence takes place at an earlier period in Ego development so that along with the precocious concepts of number and quantity there remain certain archaic Ego defence mechanisms (amongst which we would want to include disavowal) which are later utilized in creative aspects of the (mathematical) process. A large part of the ordinary process of mathematical thought in these gifted individuals is preconscious and utilizes a capacity for decaathesis of the conscious perceptual system. The “illumination” experience is a creative act, as is inspiration in other fields, and utilizes the Ego’s capacity for controlled regression to unformalized infantile modes of perceiving space and number. It is a highly overdetermined psychic event which involves all three structural systems as well as the subject’s historical individuality. Rosen reports the clinical data of a case study relating to a mathematician with suspected latent psychosis. This is a patient who has been a very sensitive child since early infancy, showing an extreme intolerance of loud noise and brightness (photophobia). Rosen also reports a series of dreams of the patient. In the first one, he says:

«I am lying on a bed in a darkened room with a window at one end of it which is lit as if from the street. I am considering whether I should masturbate. Suddenly from behind the drape next to the window, I see a silhouette against the light, the figure of my father.»

The patient refers to having suffered *pavor nocturnus* around the age of four or five. On many occasions, when he was about five years of age, he was suddenly no longer allowed to stay in his mother’s bed and the night terrors disappeared shortly after this. Rosen interprets all this by bringing back it to scopophilic primal scene interests with special reference to his father’s erection (the silhouette); hence, the light from the street and the window to direct primal scene curiosity and its replacement by curiosity in the intellectual sphere. This latter is suggested in the reference to the delay in instinctual gratification: “I am considering whether I should masturbate.” The dream appears to refer therefore to the process of sublimation and the turning of the night light of the *pavor nocturnus* into intellectual light. Thereafter, the following two dreams were recounted:

«I am sitting on the floor and see a snapping turtle through a crack in the door of a room. It is my job to keep the turtle in the room, but it seemed to force its way out despite my vigilance»

and

«I see a small 'e' to the 'x' power times an equation. I realize that I should factor it out and that 'e' to the 'x' power is a psychoanalyst which must be taken into account in each factor».

These dreams occurred shortly after the episode of sudden illumination of a complex Riemannian geometry problem which employed the mind of the patient. For this purpose, he needed a mathematical book that he wasn't able to find easily where he stayed. A sample copy was available in his hometown so he asked his father to send it as soon as possible. But when he got it he suddenly had an insight into finding a short-cut method of reaching the same result by an original method without even removing the wrapping containing the book. The patient also says that as a child he had thought that all turtles were snapping turtles but was fascinated by them and liked to keep one in a pail. The turtle also reminded him of an individual who retires into his own shell and shuts out the world (like his father). He had noticed that turtles blink in the sun and had associated this with the darkness within their shells and to his own photophobia on exposure to bright light. Turtles can see the outside world while they themselves remain unseen. The crack in the door referred to early experiences of peeping at his sisters. The room recalled his own bedroom at home, and his mother's practice of watching him through a crack in the door when he first went to kindergarten, because of his terror at being left by her. This is what Rosen says about possible interpretations of these dreams. We instead would like to consider a possible alternative interpretative hypothesis according to which a turtle, with the pulling in and out of his head, might represent a female penis disappearing within the mother body²² like in the Freudian cotton reel game that we will consider later. Then, Rosen also makes a certain interpretation of the second dream, bringing back the e^x to an X-ray examination that the patient has undergone. We would like to propose other possible additional variants. Rosen states that this second dream is presented to indicate the relationship of the illumination experience to the primal scene problem. Later, Rosen says that two themes are referred to which are of importance for the development of the theoretical formulation which will follow: the first refers to the selective use of perception in the service of drive and defence in scopophilic fantasies, and the second to the narcissistic withdrawal from the real darkness and light surrounding the functional relationships of parental objects and their investment in the neutral symbols and relationships of mathematical invention. We add what follows. If one looks at the geometrical form of the graph of the real function e^x (which was surely known to the patient, given that he was a valid mathematician), it is not possible not to recognize an in-erection phallic symbol.²³ Then, the dream also compares this function with the psychoanalyst who, clearly by transference, corresponds to a father figure, so that this second dream should be more referred to the father's phallus rather than an X-ray examination. Afterwards, Rosen continues to interpret these and other dreams of this patient substantially revolving around the Œdipus complex questions concerning the patient of this interesting case report, to finish with a discussion on mathematical thought on the basis of the previous studies made in this regard. Amongst them, we report both a quotation by E. Kris (an exponent of Ego psychology), namely *«that hypercathexis*

²² In addition, one of the possible psychoanalytic meanings of the turtle is that of a mother with her values.

²³ Following this interpretation line, maybe it would be possible to extend these considerations related to the real exponential function e^x to the complex case in order to account for the celebrated *Lacan equation* $\sqrt{-1} (= i) = phallus$ as well as to give a psychodynamic explanation to the famous conceptual metaphor $e^{i\varphi} = \cos \varphi + i \sin \varphi$ which is at the basis of the framework of Lakoff and Núñez (2000). Elsewhere this possibility will be taken into account.

of preconscious mental activity with some quantity of energy withdrawn from the object world to the Ego – from the perceptive system to preconscious thinking – accounts for some of the extraordinary achievements of mentation», and a hypothesis, related to creative thought and also confirmed by clinical data, according to which there are suggestive borderline features as far as psychosis is concerned; a prominent sensory-motor hypersensitivity is also a predisposing feature. Rosen also noticed the concomitant presence of certain disorders in writing and reading in mathematically gifted subjects, which have their origins during the early latency period with the still unresolved Oedipal conflicts. Thereafter, in discussing the role played by the primary process in creative thought, Rosen reviews many interesting case studies and testimonies amongst which we recall only those relating to N. Lobachevsky's work on non-Euclidean geometry and A. Cayley's work on algebra. Indeed, the former was built on a negation of a sensory reality testing, namely that parallel lines can meet, while the latter is concerned with a particular algebra of matrices which was seen, for many years, as a kind of bizarre algebraic oddity. Such an algebra starts from a postulate, in "paranoiac" fashion, which appears to be an absurd negation of the self-evident, namely that the products of two entities (the matrices) are different depending upon the order in which the multiplication is performed. In both cases, we have a *negation* of a fact considered to be evident and, notwithstanding these appeared to be a direct negation of reality, they would have notable applications in physics. As is well known, Freud himself gave great importance to negation for consciousness development in his remarkable 1925 paper *Negation*, and, what has been just said above is placeable within our framework based on disavowal because, as Chemama and Vandermersch (1998) claim, this paper had really to do more with disavowal than negation. Finally, as regards the main case study of his paper, Rosen stresses the occurrence of primary scene fantasies, the consequent scopophilic and epistemophilic drives with related defence reactions (like *pavor nocturnus*, eye redness, etc.) and certain perplexities in gender roles, considering them to be at the root of the mathematical insight possessed by the patient. In addition and in relation to this, since Rosen also stresses the psychoanalytic meaning of the bringing of the book by his father in clarifying, inter alia, his doubts on gender roles, it is likely that this gender ambivalence worrying the patient might also be related to sex or genital differences which, as is well known, plays a fundamental role in the disavowal mechanism. So, we say, in searching a missing mother penis (the book, as surrogate of the missing primary object) in respect to the existent father's one, which maybe will arrive (the sent book), the patient carries out a symbolic elaboration upon this lack, whose insight will resolve his anguish once he has found (in concomitance with the received but unwrapped book) it. Finally, Rosen points out a possible origin of mathematical rules by means of reaction formation to the primal scenes which, amongst other things, are closely related to a castration complex because they furnish support to the consequent castration anxiety, this being, in turn, strictly involved in disavowal.

6.3. On mathematical symbolism. 3. The history of mathematics comprises numerous examples and case studies regarding concepts as well as notions having anthropomorphic sources. On the other hand, as remembered by Piaget (1968), anthropomorphism has its roots deep in the history of religions and mythologies, as also briefly recalled above. On Piaget thought, see also Rosen (1954) and Canestri and Oliva (1991). Many other studies on the history of mathematics, like those made in Ifrah (1985), confirm the primary role that the human body has played in the origins of the main elementary mathematical concepts, like those of number and order, up to the latest results and examples achieved and outlined by the cognitive science of mathematics as exposed by Lakoff and

Núñez (2000). For instance, Georges Ifrah speaks of the “bodily techniques of the number” as regards the archaic origins of human awareness of numeric and ordinal notions, so confirming the anthropological assumptions mentioned above. Furthermore, following Loria (1950), in the history of mathematics, the scholar shouldn’t only stop at that epoch in which the human being hadn’t yet consciously conceived of abstract numbers. In this period, the individual indicated numbers in a phonetic manner, like, for example, in denoting two sheep, three goats, four oxen and so on, or using proper names for certain objects to denote their parts or their components, like, for instance, in associating the *idea* (or the function) of one, two, three and five respectively to the word “I”,²⁴ to the wings, to the trefoil, and to the hand. Hence, according to Gino Loria, it would also be interesting to go further back, if one would really like to have some form of protohistoric knowledge on the early origins of numbers. According to Ifrah (1985), the numbers one and two were phylogenetically the first numerical intelligible notions conceived by human beings. These are also the first two numerical notions which are ontogenetically acquired by human beings, so that, in this case, the well-known 19th century scientists E. Haeckel and F.M. Müller’s fundamental biogenetic law according to which ontogenesis is, in a certain sense, a recapitulation of phylogenesis (at least, from a psychological viewpoint²⁵) seems valid. The number one, indeed, symbolizes the active man who is associated with creative work. It also denotes herself or himself within the related social group, her or his own loneliness in the face of life and death, and it also symbolizes both human bipedalism (or else, her or his standing position) and the erect phallus which distinguishes man from woman. On the other hand, the number two refers to the fundamental duality between male and female, the contraposition, the complementarity and any other oppositions. Finally, since the mists of time, the number three has been synonymous with plurality, with multitude, with cluster, hence an unthinkable and unpredictable limit, so that this means that, in the human soul or mind, the invention of numbers has marked a first stoppage beat at number two. In short, the number three has a very fundamental meaning from the psychoanalytic viewpoint. All this is also quite coherent with what Piaget said about the development of number sense in children. Indeed, more or less between six and 12 months old, a child acquires a certain global ability to recognize the space filled by things or persons which are familiar to her or him, so that she or he is able to roughly conceive of a totality (*subitization*²⁶) from some of its parts. Thereafter, approximately between 12 and 18 months of age, she or he is capable of distinguishing between one, two and many other objects as well as discerning and discriminating between two distinct groups of entities of no more than four elements. But, at this stage, her or his numerical attitudes are still so primitive as to be impossible for her or him to make a clear distinction between numbers and clusters whose elements represent the former. Afterwards, a remarkable fact takes place between two years and three years old, once the child has acquired the use of speech and has learned to name the first numbers. To be precise, it has been noted that often, for a certain time, the child has great difficulty in conceiving and saying just the number three, starting with correctly counting from one and two but then forgetting the number three, hence articulating one, two, four. In the light of what has been said above, this might be explained by reconnecting the strong emotive-affective involvement present at this age with the Œdipal phase of this period and related anxieties, if one

²⁴ As a personal pronoun.

²⁵ See previous footnote ¹¹. As is well known, this law is ruled out from a proper biological perspective; in this regard, see Carlson (1981). However, certain of its forms are assumed to be more or less valid in human sciences (see Lorenz (1977)), including psychology (see, for instance, Greenacre (1979, Chapter XIX, p. 370).

²⁶ See Lakoff and Núñez (2000, Chapter 1).

takes into account the genital psychoanalytical meaning of number three. In fact, according to Paneth (1953) and Musatti (1977), one of the main psychoanalytical meanings of number three is that of phallus²⁷ (erectus) which, together with the two gonads, means capacity for synthesis, perfection and creativity, whence the triadicity,²⁸ closely correlated to Œdipus triangulation which takes place in the phallic phase. According to Weiss (1995, pp. 42-43), the number three, in its Arabic denotation, comes from the Egyptian hieroglyph representing human phallus



from which, then, looking at the final part of the scrotum, sprung out, in the ancient Sinaitic speech, the symbol **Ω** which stands for the sound *shin*, that, in Hebraic speech, means *urinate*, as well as lies at the basis of the Arabic symbol 3. Furthermore, according to Dehaene (1997), the number “three” seems to be the most frequent number, coherently with the known fact that the word “phallus” (or one of its numerous synonyms) seems to be the most frequently pronounced term at every age. On the other hand, according to Weich (1989), although fetishism most often employs concrete objects for the related defensive purposes involved, there are other instances in which abstract words and speech can be concretely used in place of, or in addition to, the more familiar material fetish, discussing as well certain aspects of language’s development that are pertinent just in this regard. Hence, the language functions are also inherent to the psychosexual phases here involved. Finally, following studies made by S. Dehaene and quoted in Lakoff and Núñez (2000, Chapter 1), it has been ascertained that the main cerebral area involved in numerical questions is the lower parietal cortex (one of the most associative) where the association of many cerebral functions takes place, above all the sensory-motor ones (sight, hearing, touch, etc.), hence where the formation of corporal image will take place during own psychosexual development. There, the primary role that visual-spatial abilities play in mathematical thought is also confirmed (in this regard, see also Kreger Silverman (2002)), also in relation to gender differences (see Contreras, Rubio, Peña, Colom and Santacreu (2007)).

6.4. Two further report cases and a Freudian case study. Herein (and in the next subsection 4), we report some significant clinical cases drawn from psychoanalytic literature, which partially bear out what is suggested in this paper. Following Dieckmann (1993, Chapter 9, pp. 116-117), it is meaningful to report a clinical case treated by Dieckmann himself²⁹ concerning an eternal student in mathematics who suffers from a form of borderline syndrome. This individual refers to having

²⁷ This is the main meaning given by Freud to the number three in Chapter X of his work *Symbolism in the Dream* (Freud 1915-17).

²⁸ This plays an important role not only from the larger philosophical stance (see, for instance, the theological notions of *trinity* and its role in founding the non-contradiction principle of Aristotle logic as explained in Ventimiglia (2002)) but also from a mathematical standpoint. Indeed, many elementary formal entities are based on ternary properties, like, for example, a *function*, defined by a tern of the type $(A, B, f(x))$, where A and B are arbitrary theoretical sets and $f(x)$ is a (functional) law, or role, which connects the former in the following manner $f:A \rightarrow B$. See Christopherson and Johnstone Jr (1981). For triadic reality and its role in Ego’s development, see Akhtar (2009) as well as Rosen (1954).

²⁹ This clinical case is mentioned in the chapter entitled “The formation of symbols in the complexual nuclei”. In interpreting this case, Dieckmann himself, at first, made use of Freudian theory, then compared it with the Jungian one.

dreamed that Hitler wasn't dead and that he had retaken power in Germany. He says that the SS had identified him as a Jew due to the fact that he had dark hair and a crooked nose. Some days later, an SS official pulled out a revolver to shoot him in the back of the neck. The consequent strong anxiety woke him. Furthermore, when he described this dream to Dieckmann, he was still full of anxiety, insinuating that he (that is, Dieckmann) was that SS official of the dream, disguised as an analyst, who would have pulled out the revolver to kill him. Clearly, the patient had transferred to him (i.e. Dieckmann), by projective identification, his heavy male aggressiveness (which is a possible symptom of his latent homosexuality which, in turn, is strictly related to the Œdipus complex and to the castration anxiety – see Solomon and Patch (1971, Chapter 19)). In doing so, the patient hoped that the analyst would free him, with his death, from his strong feelings of anxiety. Dieckmann was quite bewildered by that, but immediately had the strong sensation of being the mother of the patient. With the upper part of his body, Dieckmann started to do some slow movements like dandle himself, uttering some calming sounds without speaking. Therefore, through this projective counteridentification by Dieckmann, the patient became the son of the mother (Dieckmann), and thanks to this process the patient was reassured, and at the end he was able to say: it was just a dream! Now, in this regard, it is clear that the dark hair refers to fetish objects and the crooked nose and the revolver clearly refer to a phallic symbol. Moreover, it is not by chance that the patient was attracted by mathematics. Finally, to further validate what we have covered in this paper, we simply quote two important Freudian works, namely *The Schreber Case* of 1911, and the 1910 *Leonardo da Vinci: A Memory of His Childhood*. In the former, Freud tries to explain the psychosis mechanism through the paradigmatic instance given by the paranoia, bringing this back to projections of repressed strong homosexual tendencies toward his own father, which were re-enacted by his personal doctor. In this essay, for the first time, Freud outlined the possible mechanisms underlying psychoses, including disavowal. But it is, above all, the second Freudian study that is of fundamental importance to our purposes. Indeed, there Freud made a careful analysis of the following childhood memory described by Leonardo da Vinci. Namely, Leonardo da Vinci wrote the celebrated 1505 codex entitled *Treatise on the Flight of Birds*, and during the description of the flight of vultures, he strangely quoted his childhood memory (see Freud (1989, Section 2, p. 143)) as follows:

«This detailed writing on kites seems to be my destiny, the one that is so deeply concerned with vultures – for I recall as one of my very earliest memories that while I was in my cradle, a vulture came down to me, and opened my mouth with its tail, and struck me many times with its tail against my lip.»

After various possible (some obvious) interpretations, Freud finished by agreeing with the following one (see Freud (1989, Sections 3 and 6, pp. 152-157 and pp. 184-188)). First, the curiosity for birds may easily be brought back to the childhood curiosity of Leonardo for childhood sexual explorations. Then, the vulture's tail is, of course, a male genital organ, while the vulture itself is a mythological symbol of maternity. The repeated tail knockings on his mouth mean a strong maternal care to Leonardo, so that he was fascinated and seduced by his mother in childhood. According to Freud, all this firmly engraved on Leonardo curiosity toward genital setting differences, above all in detecting the lack of a female penis, which is at the basis of the strong (sublimated) observational curiosity, also towards nature (mother). The precocious sexual excitation, etched in Leonardo by his mother, has been sublimated in symbolic elaboration which,

in turn, was the result of his great childhood curiosity arising from gender sexual differences, *in primis* by the lack of a female penis (the vulture's tail). Thus, the early sexual researches by Leonardo had a decisive role in his creative attitude. Finally, the possible homosexual tendencies of Leonardo may be explained by the lack of an admonishing paternal figure. On the other hand, this absence leads to not recognizing the order of law, this being also decisive in creatively achieving new results beyond the preconstituted order that determines the borders of the knowledge field of every discipline. All this clearly confirms what is said in this paper, since Leonardo was one of the greatest artists and scientists of all the times.

6.5. *A possible reinterpretation of another Freudian case study.* As a further case, we also consider, following Vegetti Finzi (1976, Part I, pp. 29-32), Freud's second chapter, entitled *The Child's Game of «Fort-Da»*, of the well-known 1920 paper *Beyond the Pleasure Principle*. In it, observing his one and a half-year-old grandson Ernst, Freud tries to interpret the cotton reel game by relating this to the absence of the mother and to fill up the emptiness left by the lost love's object. Whilst the child must undergo the turning away of the mother, with such a game he or she may retaliate against this, becoming an active part of such a relation. It is an essentially verbal game, the words *fort* [forth] and *da* [here] symbolically filling up such an object's absence, replacing and representing it in such a way as to develop the symbolic space, hence the culture. In the cotton reel game, it is possible to identify the three main dimensions of the own lived experience: the *real* one (the mother³⁰), the *imaginary* one (the reel) and the *symbolic* one (the word), overlooking the next Lacanian theory. According to Freud, the throwing out of the object, in such a manner as to disappear, might to be a (symbolic) way to satisfy a repressed drive, consisting in avenging the mother's abandonment, taking the meaning of defiance: namely, the child says, «Fine, begone as well, I do not need you, because I myself am to go away you!» The child himself, one year later, when he was angry with a toy, threw it out, roughly exclaiming: «Go to war!» At that time, indeed, it was told to him that his father was at war. Nevertheless, the child did not feel the father's absence at all, showing that he did not want to be disturbed from his own and exclusive possession of the mother. This is a general way of doing of the children when they desire to express similar aggressive and hostile impulses, hurling out objects instead of persons. As is well known, *d'après* Melanie Klein, play is the best way to analyse a child's unconscious, and Freud himself started to agree with this perspective with this 1920 work. However, given the age of the child herein considered, this discourse is properly inherent to the passage from the anal to the phallic phase until the Œdipus one, when genitality reaches its apex to guide the whole human personality.³¹ To this purpose, we would want to add that the above Freudian interpretation of the cotton reel game, especially that regarding the last part involving the father, is perhaps a little too rational (also in consideration of the child's age). Instead, we would want to propose a little modification to this last interpretative part, in accordance with what is done in this paper. To be precise, we wish instead to suggest that this cotton reel game could be related to the lack of a female penis instead of the lack of a mother, also on the basis of what Freud says about the second statement, made around the age of two and a half, by his grandson as regards his own father (who was at war). Maybe, the child's feeling of lack might refer just to this lack of a penis rather than that of a father, given also the simple fact that a reel has a phallic meaning: to be exact, the reel's wire (the phallus) that appears

³⁰ Or rather, the mother's phallus, according to our interpretation.

³¹ See Vegetti Finzi (1976, Introduction, Section 4), according to whom genitality represents the main *regulative leitmotiv* of psychoanalysis, due to its role in the formation and structuration of human personality.

and disappears into the reel (the mother) stands respectively for this penis's presence and absence (or retirement into the mother's body) which, as already said, has strong emotional charges in this period of life. The throwing of an object has the psychoanalytic meaning of a phallic erection;³² numerous phenomena of this type take place during the transition from the anal to the phallic phase, with an apex in the latter. Nevertheless, the psychoanalytic community has forever been concordant in assuming already existent precocious forms of castration anxiety in males and penis envy in females from two years old (see Greenacre (1971, Chapter XVII)) which, however, will change during psychosexual development. As stated above, around two years old, the first steps and words begin, together the incipient formation of own bodily image. Moreover, as we will recall in the next subsections, the first communicative and linguistic functions take place as means and tools to symbolically explain corporal movements or to expressively imitate other external phenomena observed by the child. At this stage, the infant's thought begins to form in concomitance with the first verbal and preverbal representations in turn based on and supported by corporal image formation. The child, at this age, is unable to carry out such complete thought, that is to say, that of the absence of the mother as a real person. Freud himself dealt with this argument in discussing *mourning elaboration* (afterwards included into the 1924 Kleinian depressive position) in his *Mourning and Melancholia* (1917). On the other hand, even if it were this, that is to say, if one took into account the above Freudian interpretation based on the mother absence, this mourning elaboration wouldn't be related to the loss of a real person (the mother, in this case) but rather to that of an internal object generally catexed by ambivalence (see Rycroft (1968a)), just like the mother phallus. Even in doing so, we would fall again into the realm of disavowal because this mechanism is just that invoked by Freud himself (for the first time) as a unique way to overcome this mourning and related anxiety through a psychic elaboration that contemplates disavowal as the first step toward this.³³ According to E. Kris, then, a certain castration anxiety is quite intrinsic to the same bodily human structure. Furthermore, according to Greenacre, the (anal) castration anxiety is operative since two years old, and, in the anal phase, it is due to a fear of losing too the penis (in males) in addition to the faeces. In this period, faeces and phallus are located in the same area, and roughly have the same form, but in the subsequent phallic phase, the penis will assume an ever more predominant role, while the faeces become something to get rid of. All this holds as regards Freud's grandson. Then, the fact that the child showed a certain intolerance towards his father has to be led back more than anything else to his entrance into the Œdipus phase with the end of the phallic phase. The cotton reel might then also have a fetishist meaning if considered as a transitional object in the Winnicott sense. Finally, the exclamation o-o-o (which, according to Freud, stands for "fort") could also stand³⁴ for a vocalization of *wohin* (or also *wo*), that is, "where is", or simply "where", the missing penis, whereas the other exclamation a-a-a, as above, might stand for a vocalization of "da", that is, "there is" or "is here" the penis. On the other hand, following Bulle and Rigutini (1902, 1907), in a German dictionary drawn up in the 1890s by a professional German philologist Oskar Bulle (1857-1917) with the support of his father-in-law, the Italian philologist Giuseppe Rigutini (1829-1903), the German term that properly stands for "go away" is *wegschicken* (as first term) or *fortscheiden* (as second term), or also *weggehen*, which is the adverb "forth" translated into *weg* as first term and into *fort* as second term. Then, the expression "hunt away" is translated as *wegjagen* in the first way, and into *aus dem Dienst jagen* in the second way.

³² See Greenacre (1979, Chapter XIV, p. 253).

³³ See also Galimberti (2006).

³⁴ Which, in any case, is easier to pronounce by a child than "fort".

Furthermore, the adverb “there” is also translated into *dort*, so that the exclamation o-o-o could also stand for the vocalization of *dort*, that is to say, the missing female penis “stays there”, where the reel has been thrown, in such a manner as to be hidden under the bed, while when he pulls back the reel out of the bed, he merrily says “is here” (*da*). In short, since the dictionary of Bulle and Rigutini is of the period in which Freud wrote that paper, it follows that the adverb *fort* wasn’t the first term to be frequently and commonly used to mean “go away” which, in German, had a more complex terminology. Hence, it is also likewise presumable that the exclamation o-o-o stood for *fort* or *wo* or else *wohin*, in reference to the possible localization of a missing object, the female penis in this case. What Freud himself says about the emotional tone with which the child expressed such exclamations leads us to be inclined towards this alternative interpretation of this game of appearing/disappearing. In fact, his grandson was much more joyful when the reel (female penis) reappeared rather than when it disappeared (missing penis), the former event being less distressing than the latter (anxiogenous). It would therefore be the castration anxiety at the basis of another possible interpretation of this game reported by Freud in his 1920 paper which, amongst others, also wanted to explain a possible origin of symbolic function, hence of culture. If one instead considers our interpretation, then this Freudian work would result in being another confirmation of what is herein suggested about the possible origins of symbolic function. All this, on the other hand, would turn out to be more coherent with the fact that the Lacanian theory of the psychoanalytic field (which, inter alia, is known to have its deep roots in the two cornerstones of human psychic development, namely penis envy for females and castration anxiety for males – see Dell’Io (1994)) – starts from the Ego’s splitting based on disavowal, as briefly recalled above. On the other hand, Lacan stressed the symbolic meaning and its possible relationships with language, the absence and presence phenomena described in this Freudian paper; the absence-presence pair provides the first opposition to introduce the symbolic order. Lacan himself, in one of his celebrated seminars, alludes to the possible relations between Winnicott’s transitional object and this reel.

6.6. *From fetishism to mathematics and physics.* Now, according to what has been said in section 3, between two and three years old the phallic phase takes place, in which, as we have seen, the castration complex prevails with related phenomena, in concomitance with the Œdipus complex. As we have seen, in this phase the disavowal mechanism (which starts, in its incipient form, in the preceding anal phase) acts with its consequences, so that the above-mentioned psychic phenomena related to counting and to the evanescence of number three might be correlated with it, or brought back to it, given the Freudian (phallic) psychoanalytic meaning of number three. So, we would want to focus attention just on these last remarks: that is to say, we wish to identify the formation of human symbolic function in concomitance with this Freudian psychosexual evolution phase (namely, the phallic one, but with a view too to the previous anal phase) by means of the disavowal mechanism intended as a fundamental psychic formation mechanism which acts in every human being, but which might have degenerative variants (for instance, toward psychotic disorders or paraphilias). In our view, this basic Freudian mechanism (initially considered as a simple Ego defence mechanism but later hypothesized to be also a normal psychic formation mechanism³⁵ by

³⁵ It will play, amongst others, a very basic role in the later pioneering works of Melanie Klein and Jacques Lacan. It will be necessary therefore to go on beyond this paper with another one which should take into account the Lacan perspective according to which, to access to symbolic order (hence, the linguistic one), a primary role is just played by disavowal, as already envisaged by Freud himself in his 1925 seminal paper *The Negation*, a work which nowadays is known to have to do with the disavowal mechanism rather than the negation one (see Chemama and Vandermersch (1998)).

Freud himself in his last 1938 work) has been quite neglected after Freud, except for some notable exceptions. Furthermore, from what has been said so far, it will be possible to put forward the hypothesis that symbolic thought (including the abstract one) is formed according to this mechanism during this psychic phase (the phallic one). In such a manner, it would also be possible to give some explanation as to what the famous physicist and mathematician Eugene Paul Wigner affirmed (Wigner, 1960) upon the close relationships between mathematics and physics, speaking of an “unreasonable effectiveness of mathematics in the natural sciences” about the efficacy of mathematics to symbolically explain the external phenomenic reality; indeed, according to what has been said in this paper, this could be explained simply by the fact that the human being starts to symbolically represent a really perceived object (the phallus, which is missing in the female) in a fetishistic manner, by means of a precise psychic mechanism (the Freudian disavowal) that takes place, as already stated, during a well-defined phase (the phallic one) of her or his psychic evolution. Indeed, as stated above, this fetish formation has a strict correlation with symbolic function, putting the human being into a close (symbolic) relationship with the external reality, at least in those cases in which it does not degenerate. On the other hand, following Carnap (1966), the very basic principle which lies at the foundation of every measurement process – hence, of the experimental scientific method (which, roughly speaking, combines mathematical analysis and experimentation³⁶) – is the *comparison* one: if there exists an arbitrary comparison method, then a (related) measurement principle is always possible through the subsequent assignment of quantitative rules whose results are numbers (measures). And, what deeper psychodynamic mechanism of comparison can there be if not the identification of gender sexual differences by the child, hence of the lack of a female penis? Furthermore, as we have seen above, there is a close connection between numbers and their Freudian psychoanalytic meaning contextualized within the psychosexual stadial development of the human being which should also explain the natural human tendency to assign numbers to natural phenomena. On the other hand, following D’Amore (2009, Chapter VII), whenever we try to evoke a mathematical object, like a line, we must necessarily represent it through a *semiotic register*, that is to say, geometrically with a sketch, or algebraically with an equation ($ax + by + c = 0$), or denoting it with the index finger (clearly, a phallic symbol), or evoking it with written or spoken words. All these representations are not the line (as a mathematical object) but its evocations, its semiotic pictures, its images. The mathematical line, in its own simplest realistic meaning, does not exist. Algebra is the highest expression of a deattached process while geometry deals with spatial relationships in their most attenuated form but still in a guise which is capable of visual representation (see Rosen (1954)).

6.7. *On conceptual metaphors.* What has been said in this paper about the primary role played by bodily image formation may be also laid out into the general cognitive context of *embodied knowledge* which, as said above, seems to find experimental confirmation by neuroscience studies on mirror neurons. Within this context the important work of George Lakoff and Rafael E. Núñez on embodied mathematics is therefore laid out. Their celebrated work (Lakoff & Núñez, 2000) is based above all on the general linguistic notion of *conceptual metaphor* according to which, roughly speaking, abstract human ideas make use of cognitive mechanisms to bring back to sensory-motor experiences; that is to say, the abstract is understood through the concrete. This viewpoint has already been philosophically proposed (see Cuccio (2012)), while a more scientific

³⁶ See Segrè (1964, Chapter 1).

perspective to this idea will be given by the Greenacre researches. As the authors themselves recall, most of our thoughts and conceptual systems are sources from the *cognitive unconscious*, which is a construct wider than the psychoanalytic one; indeed, it comprises not only the repressed content but, in general, every sort of non-conscious thought, just to use a simple negation. According to Lakoff and Núñez, perhaps the main and most surprising result achieved by cognitive science is that most of our thoughts are unconscious. And mathematics does not make an exception. All our own ideas start from our corporal experiences, including the mathematical ones. Nevertheless, these authors point out that a deep explanation of the *implicit* origins of these ideas is missing. For them, conceptual metaphors are mostly part of the cognitive unconscious. They say that these mainly originate from our childhood experience, invoking a sort of *fusion* of embodied experiences as sources of them. Such a process is analogous with the formation of corporal image during childhood as we will see later, above all with the notable work of Phyllis Greenacre who conducted fundamental studies on the possible relationships between creativity and perversions. In such a fusion, contemporaneous (or synchronic) active involvement takes place, with emotive attendance, of different parts of the body. But mathematical creativity has nothing to do with elementary arithmetic, but rather with abstraction, which is mainly symbolic in its deep nature. In this regard, the psychoanalytic perspective might accomplish this, as we have tried to do with this paper. Indeed, the disavowal mechanism is basically centred on a corporal insight whose outcomes will then be unconsciously elaborated with repercussions on the Ego structure, hence on cognitive tasks. Therefore, what is here proposed might answer this demand for clarification of these *implicit* questions that Lakoff and Núñez (whose viewpoint is that of the cognitive science of mathematics) claim. They state that there is an unavoidable unconscious conceptual system underlying the whole mathematical framework. In this regard, the psychoanalytic paradigm may lend a valid model to explain the primary sources of conceptual metaphors. Lakoff and Núñez again make proposal about why mathematical knowledge has not been extended to the unconscious realm.³⁷ This is not completely true: indeed, the important work of Ignacio Matte Blanco tried to successfully move in this direction, as we have briefly outlined in Iurato (2013). It seems that there is a certain reluctance to use the psychoanalytic pattern where it is needed. We instead assume a certain *democratic* epistemological viewpoint in the general context of psychological sciences. Indeed, extending an epistemological principle due to the physicist Richard P. Feynman,³⁸ it is possible to consider each of the various psychological trends as a model describing a part or aspect of the complex psychic reality. Only all together will they give a more unitary and complete view of this entity which is shown to have a multiple and varied nature.³⁹ So, the psychoanalytic paradigm might shed light upon those unconscious aspects that are not very clear to the cognitive sciences, without demanding full authority. From the point of view outlined in this paper, we have tried to descry a possible origin of symbolic function by action of the disavowal mechanism. This might turn out to be useful

³⁷ Even if they do not quote Freud at all or, in general, psychoanalysis, in their work.

³⁸ According to Feynman (1965, Chapter 2) (see also Baženov (1977)), in physics there exist many models which can equivalently describe the same physical entity but from different viewpoints. He takes into consideration the *Babylonian perspective* on physics according to which there exist various different theories, including many to reciprocal relationship, but there does not exist a unique axiomatic system within which they are laid out. So, Feynman speaks of a *principle of multiplicity and variety of equivalent descriptions*, briefly known as *Feynman's epistemological principle*, which might be extended, in some respects, to the case of the variety of psychological theories.

³⁹ A similar perspective is provided by Carotenuto (1982, Chapter 1) in the case of the many psychoanalytic paradigms, but that may be easily extended to the general setting of the various psychological trends as confirmed by Caramelli (1984, 1985). Nevertheless, K. Bühler had already hoped for a unitary view of psychic processes that overcame the divergences of the various psychological schools.

to explain many not properly cognitive aspects of mathematical thought, for instance, to (epistemological) integrate the Lakoff and Núñez perspective on the cognitive science of mathematics. On the other hand, following Hopkins (2000, Section 3), there are close relationships between psychoanalysis and the source-target domain structure of a conceptual metaphor as understood by Lakoff and co-workers, again underlying the central role played by corporal image. Following Hopkins (2000):

«Where the source domain is A and the target B, so that in mapping the domains we think of B in terms of A, we can speak of B as metaphor of A. Thus we seem to make use of a metaphor of a relationship as a journey. In this we use concepts of objects, properties, and relations from the domain of travel or journeys in order to conceptualize objects, properties, and relations in the domain of co-operative personal relationships, such as love. In doing this we systematically take persons in such relations to correspond to travellers, their particular relationship to the vehicle in which they are travelling, and their goals in the relationship to their destinations in travelling. Thus we may speak of such a relationship as going along well, slowing down, going nowhere, getting stuck, at a crossroads, at a dead end, and so on.»

The reference to the triadic structure⁴⁰ by such a metaphor notion as well as to its essential meaning to replace or represent an *absent* object (the female penis in the source domain) with another symbol (in the target domain) is clear. Nevertheless, Hopkins does not make the allusion to the disavowal mechanism and related phenomena either explicit or implicit, even if many interesting points discussed by him might be laid out in this explanatory framework considered in this paper.

6.8. *On transitional objects and fetishism. I.* In Greenacre (1971, Chapter XIV), the author argues about an important study conducted by her on the nature of inspiration in relation to the phallic phase. At the end of this phase, the child should be able to distinguish herself or himself from the external world. The faeces assume the role of objects which are no longer so strictly correlated to own body but belong to the external world and have the double quality of being good or nasty. In this sense, we are much nearer to the Winnicott notion of *transitional object* as well as to the notions of *good* and *bad* object of Melanie Klein. Thanks to her or his conquered standing position as well as to the sensory-motor refinement, the child is able to distinguish between substance and appearance (or form). The obscurity arouses contrasting sentiments, fascinating or scaring. The faeces have the meaning both of birth (from the anus) and death. According to Greenacre, in this period, that is around four years old, it seems that there is a correspondence between the first forms of consciousness, good or bad hygienic behaviour and the awareness that dreams are just that and not real events that occurred during the night. The control and usage of physiological needs in this period are closely connected with the internalization and comparison of external inputs with imagination and conscious thought. These control functions are mainly located in the genital area which is highly sensitive to external stimuli. Thereafter, castration anxiety (anal castration) starts to appear, even if it is qualitatively different from the one present in the Œdipal phase (phallic castration). The related modalities of explication are different for males and females. In Greenacre (1971, Chapters XVIII and XIX), the author discusses fetish and transitional object from a comparative stance. There exist many common points between fetish and transitional object, the latter practically ubiquitous and not necessarily entailing a degeneration. The latter is usually abandoned after infancy but may be extended to accomplish fetishist functions. The transitional

⁴⁰ Which also seems to recall the triadic *structural model* (with its communication functions) provided by K. Bühler which will exert a great influence on the final work of R. Jakobson that in turn will play a basic role in Lacan's work.

object, as meant by Winnicott, is usually the first object recognized as belonging to the not-Me (or not-I; see above point *a*) of section 4) but not in a full manner. It is created around one year old from the symbiotic mother-child pair, when verbal capacities are uncertain. Greenacre alludes to a basic role played by the choice and formation of this transitional object in creativity. The fetish is above all a bisexual symbol that allows sexual differences to be refused and affirmed. The fetish is almost never spontaneously abandoned because it is the only one thanks to which a sexual satisfaction is possible. Following Greenacre (1971, Chapter XVIII), by comparing the Winnicott notion of transitional object with that of fetish, it is possible to identify some main common aspects. First, there is a kind of symbolic magic in both. In particular, the symbolic nature of a transitional object is quite primitive, through which the infant starts to cast bridges with the external world even if it initially has a multiform, nebulous, evanescent and changeable nature (like the symbol, as recalled in section 1) but inspires a sense of confidence and assurance to the possible frustrations and anxieties due to a still weak sense of reality. It is the first object created by the child with the help of the mother, which will assume a meaning assigned to it by the child herself or himself. Through its institution, he or she will be able to establish further object relations. It is ubiquitous, although the period of its usage is variable. Nevertheless, the initial emotional charge cathected into the transitional object gradually vanishes (often towards games), whereas that of fetish is persistent and continuous also in adult age, without doubts about its nature and existence. In the latter, which should represent the mother phallus, material elements and magic essences (mainly due to enchantments and self-hypnotic procedures) are intimately mixed, in a persistent manner. Second, the relationships with aggressiveness are quite different in both cases. The transitional object rather has supportive, intimate and fond relationships with the mother (from which it arises, as the fetish), not marked by an aggressiveness so intense as to become hostile as in fetishism, which has a coagulated anger sprung out of the fear of castration, mainly due to primal scene traumas. The transitional object undergoes a gradual separation from the mother with a certain amount of aggressiveness, but incomparable with the one that fetish has. It is the cross point between the non-hostile aggressiveness of growth and the object of love. The transitional object usually arises when a good enough *mother* is present, otherwise hostile aggressiveness or frustrations will be the predominant features. The fetish has its source from the mother's body, from her genital zone to be precise, hence is characterized by an aggressiveness turned toward an own narcissistic satisfaction and not as a means of love like the transitional object. It takes place in its material and noticeable form through a latency phase to adolescence. Sadoomasochistic fantasies and practices are common features of fetishists. The transitional object has a fundamental role in building up the own individuality and sense of reality, and may diversify if necessary to the various next purposes. Instead, the fetish is a surrogate of the genital zone of the corporal image. It has a narrow action area and is never used for other purposes if not for a sexual one.

6.9. On transitional objects and fetishism. II. We now discuss the role played by fetish and transitional object in imaginative function, following the careful analysis made by Greenacre (1971, Chapter XIX). Taking into account what was said in the previous section, the overlapping between transitional object and fetish phenomenologies are non-void, in which their common aspects fall. From this, just when the transitional object gradually starts to vanish, the fetish formation begins almost like a continuation of the former, at least in degeneration cases. According to M. Sperling, Winnicott's transitional object is considered as a kind of *infantile fetish*, further pointing out the comparison between these entities. At this point, in relation to the non-empty area given by

common aspects between fetish (infantile fetish) and transitional object, we might rightly call *transitional-fetishist objects* the entities falling in this area. Now, we debate on the close relationships existing between transitional-fetishist objects and symbolism, imagination and creativity, also taking into account the fact that during the period of formation of these objects, that is to say from two to four years old, the first language properties start to form. According to Greenacre, the capacity to develop illusion and imagination is the main useful (but also potentially dangerous) feature of a transitional object. In general, the formation of illusion is a general and natural phenomenon that exists throughout life, which may be defined as the consequences of a wrong interpretation of one or more stimuli. When we have a sensorial stimulation, the consequent perception of related data is normally performed. Nevertheless, this sensorial experience is apperceived by the observer according to the emotional state of that moment. The various changes that take place are possible only thanks to rapidity of free associations. In adult age, the illusions are often created in those situations in which there is some obstacle to the usual and normal clearness of sensorial consciousness or apperception, also due to inhibiting or hindering external conditions. Then, the collective situations increase such perturbations and deviations which favour the illusion, above all when a common ideology exists that makes the possible choices biased. In this case, the doubtful or dissenting individual may have a general *Weltanschauung* that is much more exact or valid than the collective one. In these general terms, it is clear that the child is more inclined to create illusions. The only available means of acquisition for children are those provided by sensorial experiences which are mainly promoted, developed and managed by the mother from pregnancy, where a considerable role is played by the introjection-projection mechanisms of primary identification which are already very active during the prenatal phase (see Sasso (2007)). The ability to distinguish between Me and not-Me, the animate and the inanimate, the mobile and the immobile, and so on, is quite uncertain in the child. The ability to determine and to distinguish between the form and contour of external objects develops with the increasing awareness of the own body acquired thanks to sensations due to endogenous experiences as well as to explorations of the own body. In this precocious period the transitional object appears as a means of comparison between already acquired knowledge and further experimentations, hence as a first object for establishing subsequent non-aggressive and sympathetic object relations in the wake of the previous relationships with the mother and her body of which the transitional object will be the natural continuation beyond the restricted bodily confines towards the wider external world. Gradually, the transitional object will be replaced by a toy or various other objects, parallel to the development of imaginative skills, in non-degenerative cases, while in cases in which aggressiveness tendencies prevail it gradually becomes an infantile fetish which will further evolve towards an adult fetish in degenerative cases. Therefore, the emotional components of aggressiveness involved in this period will play a crucial role in choosing one way or the other. The possible shift from a transitional object to an infantile fetish is shown by a clinical case reported in Roiphe and Galenson (1975) where a separation experience was able to lead to a serious pre-Edipal castration reaction, by which the transitional object was no longer capable of serving its ordinary function and was replaced by a fetishistic object (infantile fetish).

6.10. *Fetishism and bodily image. I.* Thanks to its great plasticity,⁴¹ the transitional object will allow further multidimensional connections to be instituted through associations with many other external objects which may be represented by means of a spontaneous playful activity. This activity, which was initially free, spontaneous and casual, gradually becomes constrictive and more organized under the internal pressure of maturational tendencies to give a sense of reality and security in the wake of the good mother aspects, if there are any. The transitional object is the first creative object made by the child, an indispensable help for her or his psychic growth. With her or his own imagination and creativity, the child gives a form to this object, instituting with it various possible relations with other objects of her or his imagination or of the external world. The transitional object is moulded on her or his previous (if any) relationships with the good mother of whom it will constitute her symbolic representative. Instead, it will degenerate into an infantile fetish when the bad mother has instituted a perturbative relation with her child, giving rise to a damaged corporal image which he or she tries to remediate by means of narcissistic satisfactions in the latency phase or puberty, during which the adult fetish starts to form in concomitance with strong castration fears. Starting from these notable Winnicott ideas, in particular considering the transitional object as the first object created by the child, Greenacre was naturally led to consider the obvious links existing between the transitional object formation and creative as well as imaginative abilities. According to the official biographies of the most important scientists in history, there are numerous cases (see, for example, Isaac Newton) in which childish play has played an important role in developing their creative and imaginative abilities. According to Greenacre, illusion is a fundamental human capacity which can be improved by means of the correction of wrong perceptions with the own lived experience that gradually every human being acquires through her or his comparison with the external world. To this end, the transitional object plays a fundamental role in the conformation of the perception with reality, trying to avoid the delirium (or hallucinations) which may arise in the case of inadequacy of the related involved emotional control. In some respects, the relationship between (correct or real) illusion and delirium might be roughly compared to the relationship between transitional object and fetish. However, this situation is rather more complex in early infancy in which a primary role is played by the set of perceptive experiences undergone by the child during her or his development, which take place from the first one-year-old abilities to distinguish the Self from the Other. Nevertheless, in childhood, the child has a sensitivity that is so high that he may perform discriminations between objects that the adult may consider to be equal, this being due to a different higher perception of *Gestalt* by a child than by an adult. In childhood, the perception field of a child is so susceptible and highly reactive thanks to the concomitant development of her or his bodily kinaesthetic formation and sensorial-somatic experience enrichment,⁴² whose outcomes will contribute to the parallel carrying out of the phenomenology of introjective-projective relationships with the external world. The repetitive comparison between the outcomes of the former processes with the external objects will form the central core of the own stabilized knowledge through which it will be possible to recognize the various objects already examined. All that will only be possible for the child if the mother is present as support to this protective activity and explorative knowledge. A prominent role will also be played by all the various emotive reactions with which she will assist such a primary child development. Although

⁴¹ In what follows, we refer to Greenacre (1971, Chapters XVIII and XIX), which are respectively the contents of the basic Greenacre papers (1969, 1970).

⁴² The gastrointestinal system and the genital zones are the main (but not unique) bodily areas involved in such a childish sensorial consciousness of the first two years of life.

the maternal figure might be replaced by other so-called *carers* (even if not in a perfectly equivalent manner), the basic introjective-projective mechanism system between the Self and the Other will never be abandoned throughout life.⁴³ It will play a basic role in emphatic and emotional growth. Thereafter, the various sensory-motor outputs coming from all the sensitive organs will be organized⁴⁴ to give rise to symbolic vocal forms of language, which are one of the main creative features of human beings. Greenacre then supposes that the extreme complexity of perceptivity due to the multiple combinatorial characteristics of the set of the first two-year-old elementary sensory-motor stimuli lie at the source of as many multiple illusions which have the main function to stabilize the evaluation of the object of the various object relationships. At the same time, this infinite possibility of different combinations of the perceptive elements, in turn, allows shades, shadows and ambiguities which are the source of symbolic function, which is a considerable component of originality. The creative person is able to play with analogies and resemblances which, suitably (unconsciously) managed, may lead to a new, useful and harmonious combination which might give rise to her or his original contribution. According to Greenacre, illusion plays a very fundamental role in creativity because it may furnish the stimulus for a further primitive invention. Creativity is a prominent ability in those individuals who show they have a very great and unusual sensitivity for every sensorial-kinaesthetic stimulation that, together with the correspondent introjective-projective reactivity, leads to a clearer consciousness of *Gestalt*. Just these last introjective-projective reactions, above all in the periods in which the capacity of autonomous movements increases, may contribute to the illusory animation of inanimate objects as well as to the deanimation of parts of the own corporal image. According to Greenacre, this stage of perception of the external world in terms of the own body may be considered as a precursor of the next ability to transform games and other objects in a projective extension of parts of the own body. In this, the author invokes the analogy with the prolonged use of the transitional object by the child which nevertheless may degenerate into infantile fetish in cases of insufficient good mother behaviours, thereby transforming the potentially creative illusions into possible deliria. In any case, the transitional object, whatever function it has, is a tangible symbol of a relation which is undergoing a change (whence its name) toward different possible alternatives. Amongst the normal ones (and not degenerating into fetishism), there is the one in which this object will be abandoned as an obsolescent and without any more sense thing; or the one in which it will be creatively converted into a material toy or into a coherent and realizable fantasy, thus developing the higher forms of creative imagination. These last changes may take place only when the own Ego's development has reached a point of self-awareness, that is to say, the child is conscious about having and controlling a form of thought which belongs to her or him. This favourable change is allowed only when the aggressive drives are managed by herself or himself on the basis of what is

⁴³ The maternal cares (only of a good mother) are of fundamental importance in developing and in bringing about the somatic experience field. In this regard, it is enough to recall that Freud, in the 1910 *Leonardo da Vinci: A Memory of His Childhood*, was able to recognize a great somatic relation between Leonardo da Vinci and his mother: indeed, Freud told of many childish experiences of Leonardo in which his mother numerous times covered him with many kisses, so increasing and enriching his somatic perception with these very close maternal touches (see Freud (1989)). As we know, then, the deep somatic and sensitive exchanges are of primary importance for the child (see Greenacre (1971, Chapter XX)). They originate from the initial mother-child symbiotic relation, to which the child will respond with a suitable *reflecting reaction* (see Greenacre (1971)) after having almost subliminally (Stern's transubstantiation) absorbed the mother stimuli. In this regard, see the basic studies of Daniel N. Stern (1985), in which the primary role played by the mother in the first two years of the child's life is further highlighted. Stern speaks of a *transubstantiation* which takes place between child and mother during this initial symbiotic phase (see also Piscicelli (1994)).

⁴⁴ According to almost universal structures and roles.

made by her or his good or bad mother in developing the proper corporal image; otherwise, the fetishistic drifts are unavoidable, as surrogates to these latter deficiencies. As stated above on perversions, Khan Masud agrees with what is said in this subsection and the next.

6.11. Fetishism and bodily image. II. In Greenacre (1971, Chapter XX), an interesting discussion on a 1969 work by E. Galenson about possible sources of symbolic thought and its influences on sublimation processes is conducted (see also Gay (1992)). Galenson discusses on the verbal, non-verbal processes and their relationships as well as their possible role in creative thought. She stresses verbalized and non-verbalized games and their role in creativity. In this regard, a careful analysis of language function was needed. Play comprises movement, imitation and action and generally it is a spontaneous expression of pleasure and spontaneity. According to K. Groos, play will anticipate the subsequent kinds of adult activity. Play has been a fundamental analysis and research tool upon which the work of Melanie Klein, in psychoanalysis, and of Maria Montessori,⁴⁵ in pedagogy, has been successfully built up. The various toys and objects involved in play basically have the meaning and the function of prolongation of body parts. They are the result of a kind of cathexis of a surplus of bodily energy whose excess needs to be released during bodily growth, while also taking into account environmental opportunities. The modalities of these energetic investments are multiples, and the plasticity with which they will be satisfied are at the sources of secondary thought processes. It seems that thought is the ability to retain and to use interior images sprung out from sensory-motor and somatic experiences which are acquired with modalities very similar to those of play, although experimented in different conditions and opportunities. This retention, then, is closely related to the sense of time, which is a valuable support to the forms of representation given to these images. During this period, between the end of the first year and the beginning of the second, communication abilities and language functions begin to develop coherently and parallel to the main formation processes of corporal image, as stated above. The first linguistic phenomena are mainly imitative, like exclamations and preverbal vocalizations to symbolically denote corporal movements. The fact is that language also starts during the period of sphincter development and it is clinically known as well that child language may be greatly influenced by the control of sphincters. Therefore, according to Greenacre, there is a great plasticity in the bodily organization which is the basis for the image of Self, characterized by synchronic or parallel developments of various and different parts of the body which therefore will turn out to influence each other by means of simple energetic displacements. In short, Greenacre thinks that there exists a sort of *somatic background* for symbolism. Furthermore, starting from the above-mentioned discussion on sphincter development, Greenacre points out that the phallic phase plays a fundamental role in the further establishment of object relationships. Finally, Greenacre comes back again to creativity compared with secondary process thought and play. Greenacre points out that certain creative predispositions are innate.⁴⁶ Out of these, there is a great running of sensory-motor apparatus which will contribute to a better formation both of the perception field and of the set of possible responses to external stimuli. All this will then be developed and assisted by the symbiotic child-mother relation. The mother at first will constitute the *primary object* of the child's interests,

⁴⁵ This is well known as the appreciated *Montessori method* is, amongst other things, based on a full development of all the sensor-perceptive abilities of a child as well as on the coherent and harmonic integration of their outcomes. On the other hand, a further confirmation of the primary importance of play in the symbolic formation in concomitance with the primary and fundamental relation mother-child is due to M. Milner (1955).

⁴⁶ And, following Sasso (2007), we would want to bring them back to the introjective-projective process system formation of the prenatal phase.

around whom subsequently other peripheral objects might represent or summarize her body or parts of it, which she will promote in dependence on the degree to which she is a good mother. Greenacre calls these *collective alternatives* or *substitutes*, and these are variously invested by libidinal energy as well as non-hostile aggressive manifestations. Besides being crucial points in the perceptive consciousness field, these substitutes will form the seeds of the subsequent affective relations with the external world of which the mother body is an unavoidable intermediary. These objects will be the first steps through which relationships are interwoven with the external world, toward an increasing own autonomy and independence from the mother. They are also the necessary precursors of play as well as of other creative interests. In conclusion, in the predisposed child, the appearance of multiple symbolic functions is based on the institution of these collective alternatives which are mainly the result of external preverbal or partially verbal impressions entrusted to replace the primary intimate contacts with the mother.

6.12. *On algebraic symbolism and other.* This paper has sprung out of a discussion, exclusively performed within the cognitive psychology context, enjoined with Professor Antonella D'Amico, a valid cognitive psychologist from the Department of Psychology of the University of Palermo, about some gender differences in certain mathematical attitudes observed in children and adolescents.⁴⁷ To be precise, Lipari and D'Amico (2009) observed major abstraction ability in boys compared to girls, above all as regards algebraic attitudes in which, as is well known, the symbolic function plays a very crucial role.⁴⁸ Clearly, from their point of view (that is to say, the cognitive science one), these authors have not given any possible psychoanalytic motivation to this detected fact. These outcomes of Lipari and D'Amico (2009), besides to be in agreement with past neuroanthropological studies by Falk (1998), are also confirmed, again within the cognitive viewpoint, by Real Ortega and Ursini (2010), who detected, however, a certain general difficulty in symbolizing and interpreting algebraic variables, even if males are favoured compared to females. Their following conclusions will be easily laid out into a framework based on the disavowal mechanism. To be precise, their conclusions reported the following

«All the students had more difficulties with the variable as a general number and with related variables than with the variable as a specific unknown. In particular, they had difficulties with the symbolization and interpretation of these two uses of variable. We found gender differences between male and female students in 31 of 33 questions. Males obtained higher scores than females, but these differences were significant only for 12 items. The percentage of unanswered problems was higher for females than males. Significant differences favouring boys were found in the interpretation of a variable as a general number and as a specific unknown, when interpretation, manipulation and symbolization of a variable as a general number were required. Considering the interpretation of a variable in a functional relationship, focusing on the variation of variables and on the range of variation, girls had more difficulties than boys in flexibly moving between different uses of variables. This finding allows us to establish that gender differences exist when students work with two or three uses of variables in the solution procedure. The differences were related to the interpretation of a variable in these three different uses and aspects. Clearly, the gender differences were more significant in those exercises in which students need to shift between different uses of

⁴⁷ For a general review on gender differences in creativity, see the recent essay article by Hill and Rogers (2012).

⁴⁸ This, however, does not imply any notable difference in logical reasoning, which seems to be equal in both sexes.

variables as facets of the same mathematical object and when they are required to integrate these different uses. Male and female students tended to interpret the variable incorrectly. Frequently, they interpreted the variable as an unknown when the interpretation of the variable as a general number was required. For tautological expressions, female students interpreted the variable as unknown. The incorrect interpretation of the variable in a specific mathematical context may lead to errors such as the concatenation of algebraic terms. Students, in general, had difficulties in accepting a negative number or fraction as a valid solution to an algebraic equation. [...] Our findings have shown that these are gender differences when working with variables. More research is needed in this direction, nationally and internationally.»

All the above-mentioned authors, then, adduce mainly some social-cultural motivations for trying to explain these differences. In contrast, with this paper, we would like to suggest a first possible psychodynamic explanation for this fact. Indeed, it is clear that the disavowal mechanism has certain substantial different implications in respect of gender differences, due to their intrinsic nature as has been defined and considered above all by Freud but also by post-Freudian authors. Boys have a greater propensity to a symbolic and abstract function than girls because of the different approach with which they emotively experience this female lack of a penis. Hereupon, the action of this general psychic mechanism as well as its outcomes will take place with different modalities. On the other hand, it is now known that many mathematical attitudes get their primary sources mainly from visual-spatial abilities⁴⁹ as well as from bodily sensations (*embodiment*⁵⁰).

⁴⁹ Which phylogenetically may be explained by the major male curiosity in looking at and finding the female genital organs which were occulted to his vision by the conquered standing position of the genus Homo – see Piscicelli (1994). Then, as further confirmation of what is said in this paper, according to Hadamard (1996), it seems that mathematical thought has its deep roots mainly in visual-spatial properties and abilities, while its creativity force substantially comes from the unconscious. According to this eminent author, then, linguistic and verbal properties play a minor role in the mathematical creativity field, while he assigns a predominant role to visual and imaginative abilities. On the other hand, the history of mathematics comprises celebrated cases of important mathematical discoveries or inventions coming from insights in turn stimulated or motivated by real situations or images: for instance, H. Lebesgue, in working out his famous theory on integration, had an important insight during the building of a brick wall (see Hoare and Lord (2002)). Likewise, J. Leray, in brooding upon a mathematical question on turbulence, had a sudden insight by observing the eddies of the Seine (see Ruelle (1991, Chapter 9)). Therefore, an imaginative or visual or geometrical mind is a basic requirement also in mathematical intuition. Following Rosen (1954), Hadamard himself refers to his own subjective observations. In repeating the proof of the classic proposition that the sequel of prime numbers is unlimited, he says that “a group of vague unstructured spots of different cluster qualities stand out at each decisive stage of the proof before the stage (itself) comes clearly to mind”. Also, concerning the problem of considering a sum of infinite numbers of terms intending to evaluate its order of magnitude, he states that “when I think of that question, I see not the formula itself, but the space it would take if written; a kind of ribbon which is thicker or darker at the place corresponding to the possible important terms ... or as I should see it, being strongly far-sighted, if I had no glasses on”. Could it be perhaps that this ribbon stands for, or is in place of, the missing female penis? Hadamard also confides that he makes many errors in writing. Hadamard himself then quotes H.J. Poincaré’s *œuvre* as confirmation of what has been said, which, amongst other things, is mainly centred on visual representations. In any case, all the Poincaré philosophical thought is a confirmation of what here has been discussed about symbolization and creativity. Also, psychological anthropology confirms a certain influence of visual perception on culture (see Bourguignon (1979) and references therein). Finally, the latest neuroscience researches (see Mancina (2007)) say that the first memory, from neonatal to about the first three-four years old, is the implicit one, roughly localized in the subcortical areas, which is not of a repressive nature. Indeed, the repressive contents are due to the action of explicit memory, which takes place when the cortical areas are well developed, since its neural circuits are mostly localized there. The implicit memory has, then, essentially somatic-emotive origins and accomplishes to the presymbolic and preverbal attitudes. It will play a very fundamental role in the next psychic evolution of the individual. At last, take into account the cerebral localization both of the visual stimuli and of the sensory-motor ones, as well as the possible deficits of symbolic function in children with visual impairments (cf. (Lewis et al. 2000)).

However, the primary aim of this paper has been above all to try to explain a possible origin of human symbolic function from a psychodynamic stance, by means of the last Freudian thought of Freud (1938), starting from a case study drawn from mathematics. Nevertheless, this simple line of research deserves further attention, for instance by orienting the attention towards a general study of symbolic function, which has started with this paper to move toward other knowledge fields, including the linguistic one, where such a function also plays a fundamental role besides the mathematical one, as briefly recalled in the above section 4. Furthermore, it would be of a certain interest to deeply study the metonymic and metaphoric properties of the fetish which were briefly recalled in section 4, as well as to compare what is proposed here with the emergence of human linguistic functions which take place during the passage from the anal to the phallic phase. Indeed, on the basis also of the many sources consulted, we are strongly inclined to think that the characteristic relationships between the semantic and syntactic features of the fetish are, in a certain sense, homologous to those related to physics and its formal language, that is to say, between its semantic and syntactic aspects. In other words, the formation of bodily image, as described above, is of fundamental importance in establishing the possible and right relationships (syntax) between its component elements together with their meaning (semantics) in dependence on the reality test (pragmatics). As is widely described above, during this corporal image formation the agency Ideal Ego and the agency system Ego's Ideal-Super-Ego are mainly involved together with their psychodynamic mechanisms.

7. Further considerations on creativity and all that

7.1. *On creativity. I.* According to Carotenuto (1991, Part II, Chapter III), creativity is mainly an Ego's function. Such a creative Ego's function does not exclusively have a concrete character, that is to say, it does not consist uniquely in the production of concrete objects, but instead it may act in various other ways. The aims and objectives of libidinal drives are also shifted toward non-personal objects which Phyllis Greenacre generically called *collective alternatives* (see above section 6). Fossi (1983, Part III, Sections E)), starting from the previous work of Greenacre⁵¹ (1953, 1957, 1971), states that at the basis of creative thought lies the experience of childhood dismay felt by a creative individual, during her or his own infancy, with a very special emotional intensity.⁵² Such an experience would be related to the vision of a penis and with the features of the Œdipus phase, so that we have another confirmation of what is suggested in this paper. According to Greenacre, the psychosexual development of a creative person is quite different from that of any other normal person, so that the contact points between creative talent and neurotic or psychotic behaviour may

⁵⁰ In this regard, we have the above-mentioned *embodied* mathematics (see Lakoff and Núñez (2000)) conception, which receives further validation by the recent experimental work by the neuroscientist A.R. Damasio, according to whom somatic experiences play a fundamental role in the formation of human thought and its developments. On the other hand, all that is coherent with the slow maturation of the nervous reticular system which inextricably links together the peripheral and the central nervous systems (see Oliverio (1982)).

⁵¹ Already widely mentioned above. *En passant*, following Harley and Weil (1990) and Scull and Schulkin (2009), we recall that Phyllis Greenacre (1894-1989) was a notable American psychiatrist (with A. Meyer as advisor) and a psychoanalyst (with F. Wittels and E. Jacobson as supervisors), in friendship with E. Kris and H. Hartmann, who made important clinical and theoretical contributions to and insights into human development, to psychoanalytic training and therapy, and to creativity and fetishism. In particular, in the early 1950s Greenacre began to write on fetishism, observing that fetishists had an especially mutable bodily image. The notable fact that descriptions of bodily changes were central to the works both of the writer, mathematician and logician Lewis Carroll and of the writer Jonathan Swift led to the psychoanalytic-biographical study (Greenacre, 1955) in which she made a psychodynamic study of the creative thought of these authors on the basis of her ideas on creativity and fetishism.

⁵² See also Rycroft (1968a).

exist, that is to say, such an incomplete psychic development cannot exclude predispositions to dissociation phenomena. In creative individuals, certain tendencies toward a precocious mysticism or religious experiences have also been detected, sometimes with identifications with divine figures, and this can again be explained by means of the disavowal mechanism because of the mystic meaning that the fetish may have. The gifted child sublimates strong erotic and aggressive instincts into a “loving affair with the world” of which he or she has an exalted vision, so that the creative thing is meant to be like a loving gift. Creativity expresses an endeavour to harmonize the external world (to which the individual responds in a hypersensitive manner – see also the above section 5) with the internal one, to gratify the own narcissistic needs and to overcome loneliness. According to Greenacre, the creative process does not use neutralized energy and it does not represent a function of the Ego agency (as stated above) free from conflicts. Instead, the creative mind often undergoes reactive formations which may promote symbolization phenomena. The adult creative individual is subjected to a continuous conflict, to an incomplete repression, to an unusual re-entry to childhood fantasies, to great availability of non-neutralized libidinal and aggressive energetic quantity. The latter continuously oscillates between primary and secondary processes, although the creative activity is mainly the result of the primary process whose instinctual energy is displaced as a cathexis object and aim through elaboration by secondary process. Greenacre distinguishes between two possible main creative inspirations, the oral one and the Œdipus one, the latter being related to the resolution modalities of the Œdipus complex. Thus, also due to these last conclusions as well as to the different available sets of collective alternates and to the greater or lesser degree of conscious or preconscious attachment to the original object of libidinal drive, we have enough elements for a possible explanation of the detected minor degree of creativity in women compared to men. In Greenacre (1971, Chapter XIV), the author argues on some important studies made by her on the nature of inspiration in relation to the phallic phase, which we have already discussed in the previous section 6. In particular, she points out the importance played by some significant screen memories and particular events that occurred during the transition from the phallic to the Œdipus phase. In short, she reports some clinical cases treated by her and related to gifted persons with a great imaginative component, all joined by some recurrent common themes mainly linked to primary scenes, recounted as screen memories, above all related to penis envy for females and to a general reverential awe for penis, prodromal to later castration feelings. All the examined subjects showed a great imagination, a sensual sensitivity to light, colours and nature, hence a deep interest in and curiosity for the external world in which they look for the reflection of their sentiments. According to Greenacre, the inspiration experiences of childhood (named *phallic experiences*) are the prototype of any other inspiration. In any case, human thought ever recalls the somatic or corporal experience which has created it, whose physical sensations will be imaginatively projected in symbolic forms according to modalities which are predisposed during the phallic and Œdipus phases. Furthermore, Phyllis Greenacre detected a particular predisposition, above all amongst scientists, to a sort of mystic relationship toward a God, mostly not related to that of religion, representing that mysterious impulse that gives the creative force who they have. Greenacre would want to bring back such a God to the father of the familiar romance (of the Œdipus phase) as lived by the individual. All that, from the point of view of the present paper, could also be linked to the symbolic role played by fetish in mythology and religion, as briefly recalled in section 5. In this regard, it is noteworthy to recall the 1928 work *Dostoevsky and Parricide* in which Freud proposed interpreting the hysterolepsepsy of the writer as being due to the strong anguish of his father’s

threats. According to Greenacre (1971, Chapter XVII), certain perverse characterial profiles are present above all in creative personalities, often hidden behind forms of isolation.

7.2. *On creativity: II.* Creative thought, with the symbolic function as a result of the disavowal mechanism, has strong instinctive needs that the external reality is not able to satisfy, differently from the fetishist who instead finds, in a partial material object (fetish), a rough satisfaction with them. So, the creative person turns her or his attention towards the fantasy world where he or she finds a surrogate to the satisfaction of her or his own desires. Likewise to neurotics and psychotics, the creative mind is cut out from the reality, but is different from it because he or she may come back to the reality since this is not precluded from him or her. This is explainable through the disavowal mechanism because this is mainly based on the chief fact that a real fact (the awareness of gender sexual difference, namely the detected lack of a female penis) is, however, always perceived but disavowed, displacing such real but painful perception to the symbolic realm in normal cases, whereas, in degenerate cases, it is displaced to a material fetish object. Again, following Carotenuto (1991, Part II, Chapter XXIII), the well-known writer Joseph Conrad seemed to have strong fetishist problems according to a psychoanalytic biography written by Meyer (1967). According to Eissler (1962; 1967), who made some interesting psychoanalytical remarks on Leonardo da Vinci and his work in Meyer (1967), psychopathology is an indispensable element for certain types of higher mental conquests; in this regard, see also Andreasen (2008) and Janka (2004). Finally, as stated above, the remarkable work of Greenacre (1955) is on two creative persons, the writer Jonathan Swift (1667-1745) and the mathematician and writer Lewis Carroll (1832-1898). At the basis of their creative thought, Greenacre identifies a disorder of bodily image, hence forms of fetishism. The whole Part II of the fundamental treatise by Carotenuto (1991) is fully devoted to the creative dimension of human thought, and most of what is reported there is easily explainable through the simple psychodynamic model considered here and mainly based on the disavowal mechanism. All this might turn out to be of a certain usefulness to confirm what we suggest. In particular, we have widely made reference to the remarkable work of Phyllis Greenacre. She began to be interested in perversions and creativity from the 1950s. Her main idea is that fetishism is chiefly the outcome of an imperfect development of the corporal image. She deepened fetishism in relation to Winnicott's transitional object theory, whereupon, Greenacre was naturally led towards creativity: as she herself said, this interest in creativity was due to the influence of Ernst Kris and to her previous work on fetishism. In that period, Greenacre was engaged in studying the celebrated Lewis Carroll work *Alice's Adventures in Wonderland*, under the strong and stimulating advice of Kris. To be precise, in studying fetishism and similar disorders, she noticed the recurrent presence of sentiments of change of corporal image together with tendencies to identify and personalize different parts of the body. At the same time, Greenacre was also studying the above work of Carroll as well as Jonathan Swift's *Gulliver's Travels*, finding confirmation of what she had noticed, namely that in fairy tales and popular stories there were descriptions similar to the features of fetishism of above, so that she began to study the biographies of these authors, which led her to the basic work (Greenacre, 1955). In this way, fetishism and creativity met during the fruitful and notable work of Phyllis Greenacre, a route also followed successfully by Chasseguet-Smirgel (1985, Chapter 8).

8. Conclusions

Finally, we summarize what points of this paper, from our point of view, deserve major attention. On the basis of the fetishism pattern as explained by the last 1938 Freudian thought, and taking into account the disavowal mechanism considered to be, *d'après* Anna Freud and Laplanche and Pontalis (1973), a general psychic mechanism involved in a basic Ego's splitting which gives rise to two main subagencies (Ideal Ego and Ego's Ideal according to H. Numberg and D. Lagache), it is possible to reach the basis of the first very basic symbolic functions by means of the separation of opposites operated by the dialectic interaction between the above Ego's subagencies.⁵³ To be precise, it is the dualistic interaction between the Ideal Ego subagency, mainly related to primary narcissism, and the subagency system Ego's Ideal – Super-Ego, mainly related to secondary narcissism, that gives rise to that complex, interrelated and variegated realm of non-conventional and conventional symbols. At the same time, starting from the Freudian assumption of the polymorphous nature of a child (which might justify a kind of ubiquitous nature of childish fetishism in infancy), this Ego's splitting gives rise as well both to symbolic and imaginative elaborations (as in normal cases, marking the passage from nature to culture, including the language) or to degenerations (as in pathological cases of paraphilia). These two alternatives are not completely disjunctive of each other, but always in dialectic interaction between them, with a prevalence of one on the other. It is also possible to understand symbolic or imaginative elaborations in a wider sense, including too neuroses and psychoses, but whose relations with reality are quite different from those related to the remaining normal forms of symbolic elaborations like those involved in natural sciences. As recalled by Laplanche and Pontalis (1973), and as widely mentioned above, the two different psychic attitudes resulting from the Ego's splitting, contrary and independent of each other, are at the foundation of the person's psychoanalytic theory itself. Furthermore, having to do with an intrasystemic Ego's splitting rather than with an agency splitting (for instance between Ego and Id), Freud wished to stress a new psychic mechanism different from repression and negation. Indeed, the main feature of this division process is just that it does not reach the formation of a (synthetic) compromise between these opposite attitudes, but rather it keeps or maintains both simultaneously without establishing between them any dialectic relationships. In doing so, that is to say, in contemporaneously maintaining, at the same level, opposite or contrasting tendencies or attitudes, it will be possible to have that *syncretic* character,⁵⁴ unifying and globalizing, that will allow a symbolic function, in accordance with its original etymological meaning. As stated in section 3.3, during the passage from the anal phase to the phallic one, *ambivalence* gradually reaches its higher value in the sense that, in it, the opposite tendencies lie at the same level, that is, they hold next to one another, this being a characterizing element for symbolic formation. In any case, the symbolic function would be closely related to the outcomes of the disavowal mechanism and then ruled by the various qualitative and quantitative

⁵³ These two Ego's subagencies related to the Ego's idealization are also closely connected with the formation of primary and secondary narcissism, the first being related to Ideal Ego, the second to the system Ego's Ideal – Super-Ego. Therefore, the dialectic relation between all these Ego's subagencies is connected with narcissism. On the other hand, in relation to what has been pursued in this paper, the narcissistic character of mathematicians is well known, since K. Weierstrass and Novalis's semi-philosophical considerations on mathematics (see Dyck (1960) and Jahnke (1991)) according to which «*a real mathematician is an enthusiast per se; without enthusiasm, there is no mathematics*», as was well testified by Fine and Fine (1977).

⁵⁴ See Iurato (2012) and also Iurato (2013).

dialectic relationships between these two Ego's sub-agencies,⁵⁵ established bit by bit during psychosexual development. In particular, in doing so, it would be possible to provide some psychodynamic motivation to mathematical symbolism in relation to natural science in the cognitive model of G. Lakoff and R.E. Núñez, based on the notion of conceptual metaphor. Furthermore, from what has been said in the paper, it is possible to put forward the hypothesis according to which there may be a gender difference in the formation of bodily image during the first four years of age, which, in turn, reflect different abilities in visual-spatial skills that, as said, are of fundamental importance for mathematical attitudes, above all the algebraic-geometrical ones. On the other hand, for every creative artist, no one moment of her or his life is more happy and rewarding than the one leading to a discovery or invention thanks to which the artist may finally appease her or his original castration anguish by means of this symbolic satisfaction, thereby refinding the female penis lack. Finally, as we have said at the beginning of the first part of this paper, the above-mentioned Ego's splitting is also at the basis of the bodily image formation with related phenomena (like transitional object phenomena, etc.) on which, in turn, the first syntactic and semantic formations of human thought rely, prodromal patterns upon which further relations between mathematics and physics will be moulded.

Acknowledgements. I wish first to thank Professor Antonella D'Amico of the Department of Psychology of the University of Palermo for the very interesting discussions I had with her about cognitive psychology aspects of mathematical thought. I'm also grateful to Professor Mauro La Forgia of the Department of Psychology of the First University of Rome, as well as to Dr. Valentina Cuccio of the Neuroscience Department of the University of Parma, for kindly furnishing me with some of their interesting works. Finally, many thanks to an anonymous referee whose invaluable remarks and hints have certainly been important in improving and correcting many aspects of this paper.

⁵⁵ Most human psychic functioning will be ruled by the basically dualistic interplay between the system Ego's Ideal-Super-Ego subagencies and the Ideal Ego subagency with their relations with Id.

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