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Studi

The Importance of Understanding Hierarchical Relations Between High Order Mental Functions in Clinical Practice

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Abstract The state-of-the-art in studies on mentalization suggests that capacity to understand other minds (mindreading), self introspection and consciousness, mental time travel in the past and the present, linguistic communication, are different components of a hierarchical organization of several functions reflecting the evolutionary development of the specie and integrates increasingly complex, mutually coordinated brain levels. The understanding of the precise hierarchical relations between them, that reflect the phylo- and ontogenetic evolutionary pathway for adaptation to the complex interpersonal and socio-cultural environment, has an essential application in psychopathology and psychotherapy, in particular for those clinical conditions where the normal integration of high order mental functions is hampered by developmental relational trauma.
KEYWORDS: Hughlings Jackson; Developmental Trauma; Attachment Trauma; Mentalization; Body-centered Psychotherapies.

Riassunto *L'importanza della comprensione delle relazioni gerarchiche tra le funzioni di ordine superiore nella pratica clinica* – Lo stato dell'arte nell'ambito degli studi sulla mentalizzazione suggerisce che la capacità di comprendere le menti altrui (*mindreading*), l'introspezione e la coscienza di sé, la capacità di spostarsi temporalmente nel passato e nel presente, la comunicazione linguistica, sono componenti diverse di una organizzazione gerarchica di molte funzioni che riflettono lo sviluppo evolutivo della specie e che integra livelli cerebrali reciprocamente coordinati e di complessità crescente. La comprensione delle precise relazioni gerarchiche tra essi, che riflettono il percorso evolutivo filo- e ontogenetico verso l'adattamento al complesso ambiente interpersonal e socio-culturale, possiede un importante risvolto applicativo nel campo della psicopatologia e della psicoterapia, in particolare per quelle condizioni cliniche dove l'integrazione normale delle funzioni mentali di ordine superiore viene ostacolata da un trauma relazionale di carattere evolutivo.
PAROLE CHIAVE: Hughlings Jackson; Trauma evolutivo; Trauma da attaccamento; Mentalizzazione; Psicoterapie centrate sul corpo.

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The magistrate burst out laughing
«Italian, I was somewhat weak in Italian...»
«Italian is not the issue: reasoning is»,
said the professor
Leonardo Sciascia, *A simple story*

ERICA COSENTINO AND FRANCESCO FERRETTI opposed a position they define as "linguistic idealism" which claims that the sense of self, reflexive thinking and, in general, meta-representational skills are a product of language, and hold the opposite point of view. There seem to be basically three arguments to oppose linguistic idealism.

The first is that representational and meta-representational skills seem functionally independent from language and seem to exist, albeit in a primitive form, even in subjects without full-fledged linguistic skills, such as some anthropomorphic monkeys. The second argument is that meta-representation and mindreading skills are constituents of language, not the other way round. The third argument, conforming to recent neuroscientific research findings, is related to language as the apparent product of a complex functional network, consisting of evolutionary older mental functions, such as the ability to orient in time between past episodic memories and representations of the future, as required by orienting in a forest, in addition to mindreading.

Mindreading and language: Which came first?

With reference to the first and second argument, Cosentino and Ferretti overturn linguistic idealism and claim that «meta-representation is one of the constituents of language development» not the other way around.[1] The Authors present several experimental findings, collected in studies on anthropomorphic monkeys' behavior, to support their claim:

> Language as we know it, developed as an adaptation within species already involved in inferential communication, and therefore already mastering mindreading skills to a significant level. In other words, from a relevance theory standpoint, the existence of mindreading in our ancestors is a precondition for the origin of language to arise.[2]

Cosentino and Ferretti also support the «primacy of thought over language [...] because language structure reflects the way of thinking» (therefore in agreement with Sciascia's words). Furthermore, going back to studying human beings, they claim that the ability to grasp the counterpart's intentions is a clear prerequisite to, not a product of, language understanding, also citing evidence for the difference between what we want to communicate and the actual communication.

An example of Cosentino and Ferretti's claim can be found in the telephone conversation between a woman in danger (A) and the emergency services operator (B) recently quoted by several US newspapers:

B: 911, where is your emergency?
A: 123 Main St.
B: Ok, what's going on there?
A: I'd like to order a pizza for delivery
B: Madam, you've reached 911
A: Yeah, I know. Can I have a large with half pepperoni, half mushroom and peppers?
B: Hmmm.... Im sorry; you know you've called 911, right?
A: Yeah, do you know how long it will be?
B: Ok, Madam, is everything ok over there? Do you have an emergency?
A: Yes, I do
B: ...And you can't talk about it because there's someone in the room with you?
A: Yes, that's correct. Do you know how long it will be?
B: I have an officer about a mile from your location. Are there any weapons in your house?
A: Nope
B: Can you stay on the phone with me?

A: Nope. See you soon, thanks

This is an example of the usefulness of social skills, both in terms of the motivation to help a fellow human being and specific social-cognitive skills. The operator's success in going beyond «the surface of the other person's behaviors to identify the mental states which originated them»,[3] in this case, the ability to understand the hidden meaning of the woman's telephone request and recognize her cry for help, is due to the ability to ascribe specific purposes to others, a skill many consider starts developing around one year of age and in any case before the development of linguistic skills. Obviously, the woman's safety and survival (which are the primary goals of evolutionary pressures determining the development of increasingly complex mental skills) were not due to understanding merely the linguistic text, but to understanding the *discrepancy* between the text and the context.

Furthermore, if understanding the real intention of others seems more adaptive than grasping the messages contained in the symbolic abstractions of verbal language, at least when someone is in danger, it is not surprising that mindreading skills may be a constituent of language, and they may also arise evolutionarily earlier.

The importance of defining hierarchical relationships between mental functions, as postulated by Cosentino and Ferretti with reference to mindreading and language logical-symbolic abstraction skills, has an essential application in psychopathology and psychotherapy. We shall come back to this issue in the second part of this article.

Language as a result of a mental functions network

The second issue highlighted by Cosentino and Ferretti is that mindreading skills are not «sufficient to exhaustively account for language pragmatic analysis».[4] On the contrary, they claim and document that language seems to arise from a complex neurocognitive network consisting of higher complex functions such as mindreading, and the ability to orient in episodic memory or project in the future, and that these skills are based on, and use, archaic functions related to evolutionary older levels such as space orientation:

> Accumulating data suggest that envisioning the future (prospection), remembering the past, conceiving the viewpoint of others (theory of mind) and possibly some forms of navigation reflect the workings of the same core brain network. These abilities emerge at a similar age and share a common functional anatomy that includes frontal and medial temporal systems that are traditionally associated with planning, episodic memory and default (passive) cognitive states. We speculate that these abilities, most often studied as distinct, rely on a common set of processes by which past experiences are used adaptively to imagine perspectives and events beyond those that emerge from the immediate environment.[5]

In these hypotheses on language, it is important to note the analogy with other mental functions which seem to bring skills developed for adaptation to evolutionarily older contexts (the physical environment) to a higher level (e.g., adaptation to social and interpersonal contexts).

For instance, considering that adaptations for spatial travelling seem to also be used for Mental Time Travelling, or to integrate syntactic-logic components in language, it was demonstrated that the neurobiological bases for alarm in instances of physical pain also contribute to alerts in instances of social pain.[6]

The hypotheses suggested by Cosentino and Ferretti for language, analogies for which are found in other complex mental functions, imply an important principle: higher mental functions are based on the integration of other evolutionarily older functions.

The example of empathy

An example of the need to include human higher complex mental functions and their neurobiological correlates in a hierarchic-evolutionary framework may originate from the neuroscience of empathy.

Sometimes we inappropriately generalize when we claim that mirror neurons and, in general, certain mental functions mirroring skills typically associated with the social brain constitute the neurobiological foundations of empathy. Actually we can plausibly claim that, in order to reach the mental function we call empathy, we need to integrate functions originating from several evolutionarily different neurocognitive levels.[7]

The first level is that of mirror neurons, i.e., the ability of some nerve sublayers to perceive purposes and mental states by activating in our body some sensorimotor and emotional schemes similar to those we see activated in other people. This perception-action coupling is supported by the activation of the so-called mirror neurons, and allows for some sort of somatic apperception of the other person's experience, showing in manifestations such as facial expression mirroring,[8] perception of other people's pain[9] or emotional resonance (demonstrated in emotions such as revulsion or regret).[10]

This is a necessary though not sufficient primary constituent of empathy, expressed by Trevarthen's concept of intersubjective sympathy.[11] These mechanisms probably play an essential role in "emotional contagion",[12] i.e., the automatic activation of other people's emotional states in us, creating shared representations between us and them.[13]

However, in order to experience an authentic empathic experience, we need to be able to differentiate ourselves from others; therefore, the affect sharing typical of empathy is modulated and controlled by the perception «of whose feelings belong to whom».[14] As a further confirmation of the existence of this second "social" level and of its modulating ability, Tania Singer and colleagues found in 2006 that the intensity of the affect resonance with other people's pain changes with the quality of the social relationship with them.[15] According to their experiments, the empathy affective component increases in direct correlation with the level of cooperation experienced by subjects, therefore, the pain of those who were more collaborative is more acutely felt than that of agonistic opponents.

Therefore, if a social representation of the self and the other allows for adaptive modulation of emotional contagion, this is not configured yet as empathy, defined as the ability to comprehend and appropriately respond to someone else's affective experience and to his consequent needs.[16] In order to obtain such a sophisticated response, we must assume the involvement of complex mental functions such as reflexive thinking, mind-reading, *Mental Time Travel* in the episodic memory of our personal experience (how did I feel when I experienced this?), the prefiguration of a solution and, maybe, language, i.e., the inseparable functions, in an ethological-evolutionary framework, from the relationship between the subject and the symbolic-cultural world shared by virtue of the subject's affiliation, to emotional contagion, shared representations and differentiation between the self and others.[17]

Consistent with this hypothesis, functional neuroimaging studies indicate that the activation intensity of the brain areas governing the production of linguistic activity and abstract thinking in the observing subject is in direct proportion to the shared linguistic, social and cultural elements perceived in the observed subject, therefore, the intensity of emotional contagion is the neurophysiological correlate of the intensity of the feelings of social-cultural affiliation of the subject. On the other hand, the conscious representation of the emotional state implies its modulation by the prefrontal cortex areas and directs behaviors to prosocial purposes.

Furthermore, as demonstrated by Liberman and colleagues in their neuroimaging studies,[18] one of the main factors inhibiting

automatic activation, necessary to reduce emotional contagion and fostering empathic skills is affect labeling, i.e., the verbal identification of emotions.

As postulated by Decety and Jackson, empathy

> involves parallel and distributed processing in a number of dissociable computational mechanisms. Shared neural representations, self-awareness, mental flexibility, and emotion regulation constitute the basic macrocomponents of empathy, which are underpinned by specific neural systems.[19]

Hierarchical integration of mental functions: Neojacksonism

Considering what Cosentino and Ferretti postulated concerning the relationship between mentalization, language and spatial exploration, together with the aforementioned results from social neuroscience studies on pain and empathy, some common elements seemingly outlining some general principles of mental functioning, emerge.

The first, almost taken for granted by many scholars,[20] is that the evolutionary pathway outlined by Darwin seems directed to adapt to an increasingly complex social environment with the complexity of the central nervous system (CNS) as its morphological correlate, in other words the more deve-loped a species, the more complex its CNS. This implies the existence of several brain organization levels performing different functions, expressing different motivations and organizing through increasingly complex cognitive characteristics: from homeostasis to thirst to the more refined social and cultural motivations.[21]

From this perspective, the more a species has developed, the more complex its relationship with the social environment will be: from the relationship with caregivers, common to all mammals, to the construction of social rank dynamics, to the formation of peer alliances and forms of cooperation, all the way to the creation of a relationship with the social group, its rules and the cultural products of extended societies, which seem to require language.[22] Only at the end of this evolutionary and developmental pathway, can one relate with him/herself and his/her own mind.[23] Increasingly complex mental functions developed to adapt the person to an increasingly complex social environment, constituting a counterpoint relationship between social brain and social environment.

The second feature, which seems to arise from the previous observations, is that a function developed by a species to adapt to a specific environment can be marshaled, at an evolutionary more modern level, for other purposes. This is the case of the functions developed for orientation in the physical environment, marshaled at different levels for time orientation in episodic memory and language syntax, or the marshaling of the neural structures governing the processing of physical pain to signal danger in affective and social connections (this may help us to understand why linguistic metaphors describing these breakages often refer to bodily injuries: “when you treat me badly, you hurt me”, “you are breaking my heart”).

This second feature implies that, in order to ensure proper functioning of the evolutionarily modern mental ability, all morpho-functional levels must be highly integrated and follow their developmental hierarchical balance. Furthermore, this explains why lower mental functions are neurologically localized, stable and have low flexibility,

> wherein higher levels are characterized by elaborated networks with progressively greater flexibility and functional sophistication. Rather than replacing lower mechanisms, however, higher systems critically depend on these lower substrates for informational inputs and for achieving motor outputs in a hierarchical-like fashion.[24]

Effectively over the last decade many re-

searchers have demonstrated the role of widely distributed cortical networks in underpinning higher-order integrative mental functions. These networks are conceived as dynamic states of the cerebral cortex, characterized by a high degree of functional connectivity between widely distributed neurons and they are considered to play a crucial role in high level cognitive functions: working memory, top-down executive functions, attentive tasks and consciousness.

Such a model of mind functioning leads to some theoretical implications important for psychopathology and clinical work: the importance and vulnerability of integrative skills relying on higher mental functions. As we shall discuss in the next paragraph, these implications are even more important in terms of orienting clinicians to such pathologies where we assume the core pathogenic mechanism operates in a dis-integrative way, as is the case of developmental trauma.[25]

Clinically, a pioneering *evolutionary-hierarchical* theory of brain structure and organization was formulated at the end of the XIX century by the famous British neurologist Hughlings Jackson, who stated over a century ago: «We have multitudes of facts, but we require, as they accumulate, organizations of them into higher knowledge; we require generalizations and working hypotheses». Jackson's work has had a significant influence on the most recent concepts of normal and pathological mental functioning[26] as well as on the psychopathological theories at the beginning of the 20th century proposed by Pierre Janet and Sigmund Freud, and also on more modern psychoanalytic theorizations by Henri Ey, Allan Schore and Russel Meares.

The essential core of Jackson's work is that the mind, rooted in the body's natural world, consists of a hierarchical organization of several functions reflecting the evolutionary development of the species and integrates increasingly complex, mutually coordinated levels. Each level modulates and is coordinated with the lower levels, building their representations and, «at the highest levels, the mind represents itself integrating the activity of its lower level components».[27] The modernity of Jackson's concept of the mind is also confirmed by its evolutionary and relational nature. The French psychoanalyst Henri Ey highlighted that

> Jackson was able to imagine and present a hierarchized structured model of the central nervous system which is not so much the model of the spine architecture, but rather a model of the autonomy of relational life ontogenesis.[28]

This *naturalistic and relational* position partly anticipates the theories of modern psychology and psychiatry and is clearly reflected in Attachment Theory, and its contribution to the understanding of the inter-subjective nature of mental dis-integration based on the concept of *disorganized attachment* and developmental trauma also described by Attili in this special issue.

According to Jackson only at the end of the evolutionary path does the mind represent its self. Through its self-representation, the mind produces consciousness, expressed at its "*highest levels*" (in Jackson's words), through works and functions such as William James's *Self* and Janet's *personal synthesis*, i.e., the ability to interpret in a unified and consistent way, the parts of one's own body and the memories of the self.[29] As stated before and consistent with the relational/inter-subjective nature of this perspective, it is only at the end of this evolutionary and developmental pathway, that one can relate with him/herself and his/her own mind[30] and contrive to grasp his introspective self-description as rationalized in terms of autobiography.[31]

This seems to be consistent with Marraffa's claim that mentalizing other minds has a functional and evolutionary priority over introspection. Marraffa suggests that introspection and self identity consciousness is the arrival of this evolutionary pathway and emerges through

> the act of turning on oneself the capacity to mindread other people; and that this occurs through that socio-communicative interaction with caregivers (and successively other social partners) investigated by attachment theory.[32]

Psychopathology of dis-integration

A neo-Jacksonian mental operating model of the type found in Cosentino and Ferretti's and Marraffa's theses is currently the theoretical reference framework to understand the psychopathological and clinical aspects of relational/attachment trauma disorders, i.e., the effects of repeated traumatic relational experiences, as is typically the case in developmental trauma. To this end Russel Meares recently stated that:

> the effect of complex trauma is the *disintegration*, disintegration of the highest levels of the mind, which means of the self... the primary task of psychotherapy for patients with trauma-related disorders is to deal with a fragmented and *disintegrated sense of self* [...] the self can be conceived according to the definitions of Jackson as reflective, or "higher-order", consciousness [...] Based on Jackson's theories, the hypothesis proposes an etiology of disturbances as the failed maturation of cortical networks leading to a disruption in coordination, or integration, of sites of brain activity.[33]

Actually a growing amount of clinical and neuroscientific evidence demonstrates that childhood adversities such as abuse and neglect are the main risk factor for mental health problems[34] and negatively affect integrative mental functions either by hampering the development of the hardwired brain networks on which they are based or by hindering their dynamic operation.[35]

This dis-integrative psychopathological mechanism stems directly from the concept of *désagrégation* (disaggregation) introduced by Pierre Janet at the turn of the past century to indicate a disorder of the integrative capacity leading to mental fragmentation over several levels: from a deficit in the field of consciousness to an impairment of the very unity of the subject's personality[36]. Contrary to the defensive hypothesis postulated by Freud, according to Janet, dissociation implied a disconnection of the normally overlapping and integrated functional levels of mental functions due to a *structural collapse* induced by the violent emotions caused by relational traumatic experiences.[37] Over the last twenty years, Janet's theories, after being buried by Freudian psychoanalysis,[38] have recovered their status, especially in the psychoanalytic world, as the most important bases for understanding psychological trauma and dissociation.

According to the theories originating from Jackson, these failures in optimal development could lead to mental disintegration that consists in the loss of integration between hierarchical levels. The consequences of this dis-integration have two main manifestations: on the one hand, the absence of integrative function leading to typical dissociative symptoms such as depersonalization, or more subtle experiences of loss in the sense of self-unity (e.g., the painful incoherence of borderline patients), on the other, the uncontrolled surfacing of the previously integrated lower functions such as involuntary surfacing of a traumatic memory or sudden loss of affect control.[39] Indeed many contemporary researchers and clinicians have demonstrated the effects of disintegrative processes on other high integrative mental functions, typically altered in developmental trauma patients, such as affect regulation, metacognitive monitoring, mentalization and the capacity for coherent autobiographic narratives.[40]

Traumatic memories provide us with an example of dis-integrative psychopathology. Since they were experienced and recorded when the overwhelming emotional experience of the trauma altered integration capa-

city, this prevents them from being remembered in their multimodal integrity and often results in their being remembered in an unintegrated way.

It is difficult to place them in the past, and the *Mental Time Travel* skills are lost; sometimes they cannot even be verbalized, but are remembered as physical and emotional memory states, deprived of the inner sensation of something being recalled. The price of being able to automatically activate defensive responses to traumas is the loss of the ability to witness the experience as a whole, therefore, our worst human experiences hamper or prevent our mind from its task of preparing us to make sense and ascribe a meaning to what happened.[41] Moreover, negative interactions with caregivers hamper the development of metacognitive functions (either the mindreading of other minds or introspection) leading to more severe difficulties in regulating emotions in social exchanges and building a coherent sense of self and personal meaning.[42]

The influence of dis-integrative psychopathology on psychotherapy

The theoretical model of traumatic disintegrative psychopathology, based on the neo-Jacksonian concepts of the mind, has important repercussions on the treatment theory level.

The most common psychotherapies, both psychodynamic and cognitive, assume the functioning of integrative mental capacity to treat emotional disorders: this is why their process is called top-down, since it seems to marshal the most sophisticated mental functions to influence lower emotional levels of the mind from the top. Just think for example about the level of integrative capacity needed to benefit from a psychoanalytical interpretation, or the *Mental Time Travel* skills necessary to explore the autobiographical memories during ABC in a cognitive-behavioral therapy session, or simply during an affect labelling task. However, as mentioned earlier, trauma-related disorders involve a (trait-dependent and state-dependent) reduction of this higher integrative capacity. This is one reason why classical top-down therapeutic approaches are considered insufficient for dis-integrative psychopathology.

Albasi reminds us that, from a clinical standpoint, classical psychoanalysis is aimed at making the implicit relational experience explicit (verbalized), especially through transference interpretation. Dissociative processes in traumatic attachment make this operation impossible for the subject.[43] With respect to this, Bessel van der Kolk said that, basically, «words cannot integrate the sensations and disorganized motor patterns constituting the trauma core imprint» and the therapy must integrate the sensations and actions left uncompleted, for people to acquire a sense of familiarity and effectiveness in their organism.[44]

This is why the therapy for dis-integrative psychopathology developed using a combination of top-down and bottom-up therapies, i.e., techniques and therapeutic methods acting on the hierarchically lower and evolutionarily older mental functions, which are generally left intact, in order to reintegrate the newest and more sophisticated ones. For instance, body-oriented therapies work on sensorimotor patterns (for instance, spatial orientation in the therapy office) to reorganize *Mental Time Travel* between the trauma-disintegrated autobiographic memories or use body sensations to restore a sufficient level of integration of the experience of the self and the outside world in the client. In this perspective, the therapeutic relationship as a concrete corrective emotional experience is preferred to the verbalization of transference interpretations.[45]

Furthermore, logical dialogue may be associated with *analogical dialogue*, highlighting non-verbal intuitive communication, such as preverbal exchanges between mother and child in the first months and years of life where the core of communication is the affective and intentional tuning that usually

leads to the development of mentalizing capacities,[46] such as those that enabled the 911 operator to understand the danger of the woman who called to order a pizza, but that is compromised in the severe forms of emotional neglect belonging to developmental trauma.

Conclusion

Dis-integrative psychopathology therapy proceeds in the original direction of the evolutionary and developmental pathway. This is the only way to progressively recover the client's integrated and coherent sense of self, mindreading and introspection, *Mental Time Travel* for episodic memory, and to symbolize in words the typically speechless traumatic experience and ascribe new meanings to it.

This, in my opinion, shows the application value of Cosentino and Ferretti's and Marraffa's concepts in clinical practice and the importance of studying and understanding hierarchical relationships between mental functions.

Notes

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[4] E. COSENTINO, F. FERRETTI, *Mentalization: From Theoretical Models to Psychopathology*, Rome 2013, December 12th – Conference Booklet.

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[6] See N.I. EISENBERGER, M.D. LIEBERMAN, *Why Rejection Hurts: A Common Neural Alarm System for Physical and Social Pain*, in: «Trends in Cognitive Sciences», vol. VIII, n. 7, 2004, pp. 294-300.

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[11] *Ibidem.*

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[14] See J. DECETY, P. JACKSON, *The Functional Architecture of Human Empathy*, in: «Behavioral and Cognitive Neuroscience Reviews», vol. III, n. 2, 2004, pp. 71-100.

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[16] See J. DECETY, P. JACKSON, *The Functional Architecture of Human Empathy*, cit.

[17] See M. CECCARELLI, M. PUGLIATTI, E. AVALLONE, G. BRESCIA, M. CIMMINO, M. VALENTE, B. FARINA, *L'organizzazione gerarchica dei processi empatici*, cit.

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[31] See M. MARRAFFA, *Mindreading and Introspection*, in: «Rivista Internazionale di Filosofia e Psicologia», vol. VI, n. 2, pp. 249-260.

[32] *Ivi*, p. 258.

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[38] *Ibidem*.

[39] See R. MEARES, *A Dissociation Model of Borderline Personality Disorder*, cit.

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[44] See M. SYKES WYLIE, *The Limits of Talk*, in: «Psychotherapy Networker», available at the URL <http://www.traumacenter.org>

[45] See G. LIOTTI, B. FARINA, *Sviluppi traumatici*, cit.

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