

# We are IntechOpen, the world's leading publisher of Open Access books Built by scientists, for scientists

6,900

Open access books available

186,000

International authors and editors

200M

Downloads

Our authors are among the

154

Countries delivered to

TOP 1%

most cited scientists

12.2%

Contributors from top 500 universities



WEB OF SCIENCE™

Selection of our books indexed in the Book Citation Index  
in Web of Science™ Core Collection (BKCI)

Interested in publishing with us?  
Contact [book.department@intechopen.com](mailto:book.department@intechopen.com)

Numbers displayed above are based on latest data collected.  
For more information visit [www.intechopen.com](http://www.intechopen.com)



# Communicative Impairment After Traumatic Brain Injury: Evidence and Pathways to Recovery

Francesca M. Bosco<sup>1,2</sup> and Romina Angeleri<sup>1</sup>

<sup>1</sup>*Center for Cognitive Science and Department of Psychology, University of Turin*

<sup>2</sup>*Neuroscience Institute of Turin  
Italy*

## 1. Introduction

Traumatic brain injury (TBI) patients show a series of communicative difficulties, loading on all the dimensions that characterize satisfying communicative interactions. This chapter has three aims: first, it reviews the current literature on this topic in order to provide a complete picture of the communicative impairment in TBI patients; second, it examines the relationship between cognitive functions - i.e. executive functions and theory of mind - and pragmatic deficits resulting as a consequence of traumatic brain injury; third, it reviews the current literature on treatment planning in rehabilitation therapy and provides suggestions for the clinical practice.

## 2. Communicative deficit in TBI

The literature has shown that traumatic brain injury, (TBI), results in a range of communicative deficits that cannot be adequately explained in terms of linguistic impairment. Patients affected by TBI do not display classical aphasic symptoms: their syntactical and lexical abilities are often normal and their performance on standardized aphasia batteries is good (McDonald, 1993). However, communicative ability involves going beyond the comprehension and production of correct lexical and syntactical aspects: patients have substantial difficulty managing interactions in their everyday life, since for example they may have confused verbal behavior, inaccurate and confabulated speech (Hartley & Jensen, 1992). The discourse of TBI patients may be long-winded, poorly organized and tangential (Glosser, 1993), while some patients may have a lower than normal level of linguistic productivity, resulting in an inability to communicate their basic needs (Hartley & Levin, 1990).

From a pragmatic viewpoint, TBI patients encounter difficulties at various levels of comprehension: they cannot go beyond the literal meaning of utterances since they are not able to understand what is implied, as in the case of comprehension of sarcastic utterances (McDonald & Pearce, 1996), humor (Braun et al., 1989; Docking et al., 2000) or commercial messages which require inferential processes in order to be understood (Pearce et al., 1998). TBI patients are also impaired on the production side, to varying degrees of severity: for

example, they may have difficulty producing correct requests (McDonald & Van Sommers, 1993) or giving the interlocutor sufficiently detailed information (McDonald, 1993; for a complete review of pragmatic disorders in adults with language impairment see Cummings, 2007).

Dardier and coll. (2011) recently conducted a detailed analysis of pragmatic aspects of language use by TBI individuals, examining both comprehension - i.e., direct requests, indirect requests, and hints - and production ability - i.e., conversation during an interview situation-. The authors showed that the pragmatic skills of persons with TBI vary across tasks: patients demonstrated weakness (in topic maintenance) but also strengths (in turn-taking, comprehension of requests and hints). The authors also argued that the specific deficits observed in patients were not systematically linked to executive function performance, even if lesion unilaterality (right or left) seems help to preserve patients' pragmatic performance.

It is not only the linguistic modality that may be impaired after traumatic brain damage, but also the extralinguistic modality, that is the ability to communicate through gestures (Bara et al., 2001), and the paralinguistic modality, that is the ability to mark one's own communicative acts appropriately using cues such as tone, prosody and rhythm. For example Rousseaux and coll. (2010) evaluated the verbal and non-verbal aspect of communication in TBI patients during a dyadic interaction and found that in the chronic phase patients showed marked difficulties in speech outflow and pragmatic language - i.e. responding to open questions, presenting new information and introducing new themes, organizing discourse and adapting to interlocutor language. As far as non-verbal communication is concerned, patients were impaired in understanding and producing gestures, in affective expressivity, in feedback management and pragmatics (i.e., prosody, orienting gaze, using regulatory mimogestuality and turn-taking).

Focusing on paralinguistic communication, some authors (e.g., Ylvisaker et al., 1987) have suggested that the inability to recognize emotions expressed by other people, both through their voice and through their facial expression, may even be the causal factor for the antisocial behavior and poor social relationships of TBI patients. After traumatic brain injury it is difficult to understand prosodic aspects of speech (Joanette & Brownell, 1990), especially in cases in which prosodic elements would help in disambiguating utterances (Marquardt et al., 2001). Furthermore, the social difficulties experienced after traumatic brain injury spread to the management of social interactions, with the inability to resume and carry on normal personal relationships.

Angeleri and coll. (2008) provided a comprehensive picture of communicative performance in TBI patients, encompassing both comprehension and production of a series of pragmatic tasks, such as for example direct and indirect speech acts, irony and deceit. They analyzed a great variety of expressive modalities, including linguistic, extralinguistic, and paralinguistic communication, conversational exchange management and the ability to evaluate the appropriateness of a communicative act with respect to a given social context. The authors showed that in the linguistic and extralinguistic modalities TBI patients performed worse than controls in both comprehension and production of each investigated phenomenon, i.e. direct and indirect, ironic and deceitful communication acts. However, while impaired in comparison with normal controls, some pragmatic tasks have been found to be better preserved than others. In particular, direct and indirect speech acts are better preserved than deceit, which is in turn better preserved than irony, the most difficult task to manage. Furthermore TBI patients showed a pronounced impairment in comprehending

and producing paralinguistic aspects, remaining attached to the expressed semantic content and neglecting the emotional meaning expressed through other modalities, such as, for example, prosody. However TBI patients are still competent in understanding communication acts adequate to the context (i.e., formal vs. informal) in which they are uttered, but they have difficulty in grasping subtler conversational violations of Grice's (1989) cooperation principle (i.e., the speaker is ambiguous or confused). Lastly, TBI patients achieve good conversational performance when the interaction is principally directed by another person through simple and superficial topics, although they have a pronounced tendency to persevere on the same topic during the dialogue. All their results considered, Angeleri and coll. (2008) concluded that the TBI patients they studied had a communicative deficit but preserved abilities in some areas. Furthermore, the authors point out that even when communication is damaged some pragmatic abilities are less damaged than others, such as for example direct and indirect speech acts with respect to deceit, and deceit with respect to the comprehension and production of irony.

Some authors have suggested that the communicative inappropriateness of TBI patients represents the most impressive obstacle to patients' social reintegration, due to impairments in social communication (Dahlberg et al., 2006; Turkstra et al., 2001). All these aspects are central to communication because of their role in setting and maintaining social relationships; it appears to be extremely important to assess this in patients affected by TBI since changes in social ability after brain injury represent one of the most destabilizing and invalidating sides of the condition (McDonald et al., 2004).

### 3. Cognitive functioning in communication

In recent years, there has been increasing interest in the cognitive aspects underlying pragmatic impairment (e.g., Perkins, 2000). In particular, some authors have suggested that cognitive abilities, such as executive functions and theory of mind, play a central role in the pragmatic performance of brain-damaged subjects (Happé et al., 1999; Martin & McDonald, 2003). TBI patients often suffer damage in the frontal lobe, the brain area involved in executive functioning - the construct used to describe goal-directed behavior - and some authors have explained the pragmatic deficit displayed by these individuals as being caused mainly by executive function impairment (McDonald & Pearce, 1998).

Theory of Mind (ToM) is the ability to ascribe mental states to oneself and to other people and to use such knowledge to interpret one's own as well as other people's behavior. Some authors highlight the role of ToM in human communication (Happé & Loth, 2002; Tirassa et al., 2006) and argue that a developed and intact capacity to mindread is necessary to comprehend a partner's communicative intention (Frith, 1992).

The relation between Theory of Mind and communicative ability is particularly apparent in individuals on the autism spectrum whose communicative and social difficulties have been noticed in several studies (e.g., Frith, 1989; Tager-Flusberg, 2006). Several authors (e.g., Baron-Cohen et al., 1985) have proposed that difficulty in social adjustment and communicative impairments typically demonstrated by autistic children were caused by a specific ToM deficit.

Only a few studies have specifically investigated ToM impairment in TBI patients (Channon & Crawford, 2010). In a focused study Bibby and McDonald (2005) tested patients with TBI on mentalistic (ToM) tasks and non-mentalistic (inferential) tasks. Their results revealed that subjects with TBI performed more poorly than controls on all tasks (mentalistic and non-

mentalistic). However a more detailed analysis revealed that inference-making ability and working memory significantly predict the subject's performance on second-order stories and non-verbal ToM tasks but these factors were not significant predictors of subjects' performance on first-order ToM tasks. The authors concluded that further studies are necessary to determine whether a specific ToM deficit can be observed in relation to other tasks that demand a comparable non-mentalizing process. The authors also suggested that a number of factors, in addition to ToM deficit, may influence TBI patients' social performance, including inferential ability, language comprehension, understanding of humor and working memory. The authors concluded that rehabilitative programs should also consider these factors, in addition to ToM. However, to the best of our knowledge, no specific rehabilitative processes focusing on ToM, or on ToM plus such factors, have been created and used in TBI patients' rehabilitative treatment.

#### 4. Cognitive rehabilitation

Generally speaking, cognitive rehabilitation refers to a wide range of methods aimed at remediating or compensating for decreased cognitive abilities. However, in recent decades, it has been emphasized that treatment should focus on the *individual* rather than on cognitive functioning per se; this means that the influence of specific contextual variables on rehabilitation plans, the emotional and social aspects associated with brain injury, and their interactions with cognitive function should be clarified for each patient, in order to precisely assess the patient's particular needs. The goal of treatment is thus a functional change able to bring about meaningful changes in the patient's everyday life, including improved autonomy and satisfactory social relationships.

As researchers have shown (e.g., Chen et al., 2010, Kolb & Gibb, 1999), the brain is a plastic organ capable of considerable reorganization that can be considered the basis for functional recovery; the way in which dendritic growth, structured stimulation, and recovery of lost function are related has been well demonstrated, and this is the starting point for the utility of cognitive treatment.

Rehabilitation programs for individuals with brain injury commonly focus on attention, memory, and executive function. We will now briefly review those cognitive functions that have the greatest impact on communicative abilities, i.e. executive function and theory of mind ability.

For individuals with acquired brain injury, damage to the frontal lobe and its connections throughout the central nervous system could drive impairment in executive functioning, i.e., a cluster of deficits including planning, problem solving, initiating, and regulating behavior (Kramer & Quitania, 2007; Stuss, 2007).

A clinical model of executive functions has been proposed by Mateer (1999). This model conceives the following different domains of executive functions with wide clinical impact: 1. *Initiation and drive (starting behavior)*, 2. *Response inhibition (stopping behavior)*, 3. *Task persistence (maintaining behavior)*, 4. *Organization (organizing actions and thoughts)*, 5. *Generative thinking (creativity, fluency, cognitive flexibility)*, and 6. *Awareness (monitoring and modifying one's own behavior)*. These categories capture the wide range of cognitive and behavioral impairments that may occur when executive functions are damaged; it is important to note that these six categories, as part of the same brain network, are linked, related, and interdependent. Once the cognitive impairment has been carefully assessed, a variety of clinical approaches may be used to address executive function rehabilitation. The choice of



clinical approach is dependent upon specific variables that clinicians must consider when planning patient management. For instance, it is important to consider the time after onset, the severity of the executive dysfunction, the co-occurrence of other cognitive problems, the social support available, and the patient's level of awareness. Developing a specific and flexible treatment plan is essential in order to lead to cognitive improvement, and establish the necessary therapeutic alliance.

One of the most common rehabilitative approaches refers to *teaching task-specific routines*, which must be relevant to a specific setting (e.g., dressing, writing letters, traveling on a bus, playing solitaire and so on). After training, the patient should also be able to initiate and maintain the behavioral sequence in her/his daily life (Sohlberg & Raskin, 1996). This kind of routine is designed to produce automatic responses for specific procedures; in contrast, the therapeutic approach called *training the selection and execution of cognitive plans* aims to improve patients' ability to reinforce specific areas of executive functioning, also extending the results to related tasks. This approach considers several critical components (e.g., goal selection, planning/sequencing, initiation and so on) and suggests specific exercises to improve performance in those areas: examples are planning repeated activities in role-play situations, practicing specific tasks also in naturalistic contexts (e.g., getting a bus schedule), and completing activities according to time constraints.

A different rehabilitative approach is *teaching to use metacognitive routines*. In this case, patients have to modulate their own behavior by talking to themselves using self-instructional techniques (Alderman et al., 1995; Fish et al., 2008; Levine et al., 2000). This approach leads patients to regulate their behavior and autonomously complete goal directed activities. In line with these aims, Von Cramon and Matthes-von Cramon (1994) proposed *problem-solving therapy* groups, a treatment based on the idea of substituting the patient's impulsive behavior with a verbally-mediated, systematic analysis of the goal and the means by which it may be achieved. The problem-solving intervention focuses on the development of self-regulation strategies as the basis for maintaining an effective problem orientation (Rath et al., 2003).

Cognitive rehabilitation has also been used to successfully remediate the social perception deficit, i.e. deficit in emotion perception, commonly experienced by TBI patients (Bornhofen & McDonald, 2008). The treatment program consists of tasks involving the recognition of specific patterns of changes in facial expressions, voice tone and body posture during the expression of different kinds of emotions. These tasks consist in interpreting conventional emotional contexts (i.e., knowledge regarding emotions typically expressed in scenarios such as birthday parties, funerals, and so on), judging static (i.e., photograph) and dynamic (i.e., video or role-play) emotion cues and making social inferences on the basis of emotional demeanor and situational cues (i.e., regarding whether a speaker is sarcastic or lying, rehearsed via therapist modeling, video sequences and role play).

## 5. Communicative rehabilitation

People express their communicative ability via different expressive means, for instance, using linguistic, gestural and paralinguistic modalities. However, the majority of studies in the literature have focused primarily on remediation of the linguistic modality.

The major limit of interventions exclusively focused on language is that after the therapy patients are often impaired in solving communicative difficulties in everyday life situations. The pragmatic approach has been developed to overcome this limitation (for a review see Carlomagno et al., 2000). The pragmatic view has shifted the focus of therapeutic practice

from the patient's linguistic ability to the effective use of language in a given context and was first used with aphasic patients. Functional pragmatic therapies also focus on a patient's residual communicative abilities, such as for instance gestural and prosodic skills in aphasic patients, and look for alternative and compensatory communicative strategies with respect to the defective ones. Aten, Caligiuri and Holland (1982) were the first to develop a successful formal pragmatic therapy program, the *Functional Communication Treatment*, in which aphasic patients were confronted with simulated everyday life situations and trained in the use of non-verbal communicative strategies. Holland (1991) further expanded this treatment by introducing *Conversational Coaching* therapy. The aim of this method, based on the use of short monologues, is to train patients to control the quality of the monologue depending on the degree of familiarity with the listener – from relatives to unknown persons – and the informativeness of the script – from known information to improbable events. A further example of the use of the functional pragmatic approach, backed by experimental evidence, is *Promoting Aphasics Communicative Effectiveness* (Davis & Wilcox, 1985). The treatment requires that therapist and patient sit facing one another across a table on which are a set of printed stimulus cards. In turn, each participant takes a card and, without showing it, he tries to describe it to the other person. The therapeutic basis of this treatment is that it involves a progressive exercise within the setting of natural conversation, supported by a therapist eliciting compensatory strategies and providing useful feedback, which improves the patient's linguistic and communicative performance.

Within the pragmatic approach, an important setting for practicing pragmatic therapies is the group (Marshall, 1999). Group communication treatments focus on initiating conversation and conveying a message, understanding the communication disorder, being aware of personal goals and progress and having confidence in being able to communicate in personally relevant situations (Elman & Bernstein-Ellis, 1999).

Ehrlich and Sipes (1985) described a model of group intervention specifically for TBI patients based on the functional pragmatic approach. The treatment consisted of four modules focused on improving non-verbal communication, appropriate communication in context, message repair and message cohesiveness. The therapist role-played and videotaped both appropriate and inappropriate examples of target behavior. The videos were examined and reviewed by the group under the supervision of the therapist, who pointed out the inappropriate behavior and suggested possible appropriate alternatives. After treatment patients showed improvements in the reformulation of inappropriate messages, sentence cohesion and in the introduction and development of conversational topics.

TBI patients have been found to have, in particular, social communication problems (Dahlberg et al., 2006). Social communication interventions include therapies such as group discussion, forming communication goals, modeling, role-playing, feedback, self-monitoring, behavioral rehearsal and social reinforcement (Struchen, 2005). For example, Bellon and Rees (2006) examined the role of social context on language and communication skills among TBI patients, demonstrating the notable benefits of carefully structured supportive social networks. The key component of their rehabilitation intervention was the presence of a mentor, who prompted the patients and gave them cues and models of positive behavior; this kind of social support stimulated patients' positive self-image, positive self-talk and inter-personal language. Ylvisaker (2006) presented an intervention for TBI patients based on self-coaching which was aimed at improving planned, goal-oriented and successful behavior.

Lastly, further rehabilitative treatments focus on training the partners who communicate with patients affected by TBI (Togher et al., 2004); the goal of such interventions is to

improve the quality of conversational interactions, enhance the listener's ability to comprehend and promote the patient's communicative attempts. The listener's attitude can in fact shape the patient's language, communicative behavior and motivation, reducing the social isolation typically resulting as an outcome of brain injury.

## 6. Conclusions

Traumatic brain injury, (TBI), patients show a series of communicative difficulties, however such difficulties may vary across the communicative tasks and the expressive modalities investigated, showing large individual differences with specific areas of weakness and strength. One of the first steps in designing an effective rehabilitation program is thus to define an in-depth and articulate assessment of the deficit/preserved ability of a specific patient taking into consideration different pragmatic phenomena and expressive modalities. Empirical studies also suggest that cognitive abilities, such as executive functions and theory of mind, may have a role in the communicative performance of brain-damaged subjects, however only a few studies have systematically investigated the role played in TBI by ToM and executive function impairment and such relationship is not sufficiently explained. Further studies are thus necessary to clarify this relationship and to support the possibility of including specific cognitive training in treatment aimed at improving communicative ability in TBI patients.

Several communicative rehabilitation treatment programs already exist and the effectiveness of functional pragmatic therapy after TBI is supported by empirical data. However, given the limited number of studies in the literature and the small samples considered, further confirmation is necessary.

## 7. Acknowledgments

This research was supported by the University of Turin (Ricerca scientifica finanziata dall'Università di Torino, fondi ex-60% 2007)

## 8. References

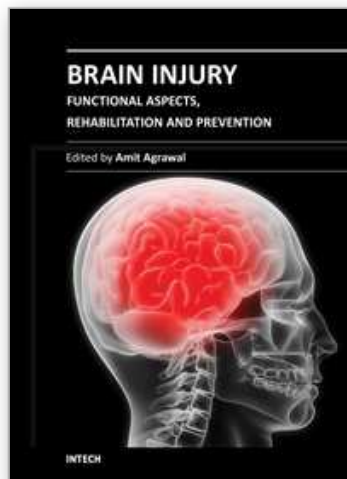
- Alderman, N., Fry, R. K. & Youngson, H. A. (1995). Improvement in self-monitoring skills, reduction of behavior disturbance and the dysexecutive syndrome: Comparison of response cost and a new programme of self monitoring training. *Neuropsychological Rehabilitation*, Vol. 5, No.3, (December, 2008), pp. 193-221, ISSN 0960-2011
- Angeleri, R., Bosco, F. M., Zettin, M., Sacco, K., Colle, L. & Bara, B. G. (2008). Communicative impairment in traumatic brain injury: A complete pragmatic assessment. *Brain and Language*, Vol. 107, No.3, (Decembre 2008), pp. 229-245, ISSN 0093-934X
- Aten, J. L., Caligiuri, M. P., & Holland, A. L. (1982). L., Caligiuri, M. P., & Holland, A. L. (1982). The efficacy of functional communication therapy for chronic aphasic patients. *Journal of Speech and Hearing Disorders*, Vol. 47, No. 1, (April 1982), pp. 93-96, ISSN 0022-4677.
- Bara, B. G., Cutica, I., & Tirassa, M. (2001). Neuropragmatics: Extralinguistic communication after closed head injury. *Brain and Language*, Vol. 77, No. 1, (April 2001), pp. 72-94, ISSN 0093-934X.
- Baron-Cohen, S., Leslie, A. & Frith, U. (1985). Does the autistic child have a Theory of Mind? *Cognition*, Vol. 21, No. 1, (April 1985), pp. 37-46, ISSN 0010-0277.



- Bellon, M., & Rees, R. (2006). The effect of context on communication: a study of the language and communication skills of adults with acquired brain injury. *Brain Injury*, Vol. 20, No. 10, (January 2006), pp. 1069-1078, ISSN 0269-9052.
- Bibby, H., & McDonald, S. (2005). Theory of mind after traumatic brain injury. *Neuropsychologia*, Vol. 43, No. 1, (April 2005), pp. 99-114, ISSN 0028-3932.
- Bornhofen, C., & McDonald, S. (2008). Treating deficits in emotion perception following traumatic brain injury. *Neuropsychological Rehabilitation*, (December 2008), Vol. 18, No. 1, pp. (22-44), ISSN 0960-2011.
- Braun, C. M. J., Lissier, F., Baribeau, J. M. C., & Ethier, M. (1989). Does severe traumatic closed head injury impair sense of humor? *Brain Injury*, Vol. 3, No. 4, (October-December 1989), pp. (345-354), ISSN 0269-9052
- Carlomagno, S., Blasi, V., Labruna, L., & Santoro, A. (2000). The role of communication models in assessment and therapy of language disorders in aphasic adults', *Neuropsychological Rehabilitation*, Vol. 10, No. 3, (April 2000), pp. (337-363), ISSN 0960-2011
- Cummings, L. (2007). Pragmatics and adult language disorders: past achievements and future directions. *Seminars in Speech & Language*. Vol. 28, No. 2. (May 2007), pp. 96-110, ISSN 0734-0478
- Chen, B. A., Epstein, J., & Stern, E. (2010). Neural plasticity after acquired brain injury: Evidence from functional neuroimaging. *PM&R*, Vol. 2, No. (12 Supp. 2), (December 2010), pp. S306-S312, ISSN 1934-1482
- Crawford, S., & Channon, S. (2010). Mentalising and social problem-solving after brain injury. *Neuropsychological Rehabilitation*, Vol. 20, No. 5, (May 2010), pp. (739-759), ISSN 0960-2011.
- Dahlberg, C., Hawley, L., Morey, C., Newman, J., Cusick, C. P., & Harrison-Felix, C. (2006). Social communication skills in persons with post-acute traumatic brain injury: Three perspectives. *Brain Injury*, Vol. 20, No. 4, (April 2006), pp. 425-435, ISSN 0269-9052
- Dardier, V., Bernicot, J., Delanoë, A., Vanberten, M., Fayada, C., Chevignard, M., Delaye, C., Laurent-Vannier, A & Dubois B. (2011). Severe traumatic brain injury, frontal lesions, and social aspects of language use: A study of French-speaking adults. *Journal of Communication Disorders*, Vol. 44, No. 3, (June 2011) pp. (359-378), ISSN 0021-9924.
- Davis, G., & Wilcox, M. (1985). *Adult Aphasia Rehabilitation: Applied Pragmatics*, NFER-Nelson, ISBN 0-933914-07-4, Windsor.
- Docking, K., Murdoch, B. E., & Jordan, F. M. (2000). Interpretation and comprehension of linguistic humor by adolescents with head injury: A group analysis. *Brain Injury*, Vol. 14, No. 1, (January 2000), pp. 89-108, ISSN 0269-9052
- Ehrlich, J.S., & Sipes, A.L (1985). Group treatment of communication skills for head trauma patients', *Cognitive Rehabilitation*, Vol. 3, No. 1 (January-February 1985), pp. 32-37, ISSN 1062-2969.
- Elman, R. J., & Bernstein-Ellis, E. (1999). The efficacy of group communication treatment in adults with chronic aphasia, *Journal of Speech, Language and Hearing Research*, Vol. 42, No. 2, (April 1999), pp. 411-419, ISSN 1092-4388.
- Fish, J., Manly, T., & Wilson, B. A. (2008). Long-term compensatory treatment of organizational deficits in patients with bilateral frontal lobe damage. *Journal of the International Neuropsychological Society*, Vol. 14, No.1 (January 2008), pp. 154-163, 1355-6177
- Frith, C. D.. (1992). *The cognitive neuropsychology of schizophrenia*, Hove, UK and Hillsdale, ISBN 0-86377-224-2, NJ: Erlbaum
- Frith, U. (1989). Autism and "theory of mind.", In *Diagnosis and treatment of autism*, Gillberg Christopher [Ed], pp. (33-52), ix, 450, Plenum Press, ISBN 0-306-43481-4, New York, NY, US.

- Glosser, G. (1993). Discourse production patterns in neurologically impaired and aged populations. In H. H. Brownell & Y. Joannette (Eds.), *Narrative discourse in neurologically impaired and normal aging adults*, pp. 191-211. Singular Publisher Group, ISBN 1565930835, 9781565930834, San Diego
- Grice, H.P. (1989). *Studies in the ways of words*, Harvard University Press, ISBN 0-674-85271-0, Cambridge.
- Happé, F. G. E., Brownell, H., & Winner, E. (1999). Acquired theory of mind impairments following stroke. *Cognition*, No. 70, (April 1999), pp. 211-240, ISSN 0010-0277.
- Happé, F., & Loth, E. (2002). Theory of mind and tracking speaker's intentions. *Mind and Language*, No. 17, (December 2002), pp. 24-36, ISSN 0268-1064.
- Hartley, L. L., & Levin, H. S. (1990). Linguistic deficits after closed head injury: A current appraisal. *Aphasiology*, 4, 353-370, ISSN 0268-7038
- Hartley, L. L., & Jensen, P. J. (1992). Three discourse profiles of closed-head-injury speakers: Theoretical and clinical implications. *Brain Injury*, Vol. 6, No. 3, (May 1992), pp. 271-282, ISSN 0269-9052.
- Holland, A. L. (1991). Pragmatic aspects of intervention in aphasia. *Journal of Neurolinguistics*, Vol. 6, No. 2, (December 1991) pp. 197-211, ISSN 0911-6044.
- Joannette, Y., & Brownell, C.A. (Eds.) (1990). *Discourse ability and brain damage: Theoretical and empirical perspectives*. Springer-Verlag, ISBN 0387970444, New York
- Kolb, B., & Gibb, R. (1999). Neuroplasticity and recovery of function after brain injury. In D. T. Stuss, G. Winocur, & I. H. Robertson (Eds.), *Cognitive Neurorehabilitation*, pp. 9-25. Cambridge University Press, ISBN 0521581028, Cambridge, United Kingdom
- Kramer, J.H. & Quinlan, L. (2007). Beside frontal lobe testing, In: *The human frontal lobes: Functions and disorders, 2nd edition*, B.L. Miller & J.L. Cummings, (Eds.), pp. 279-291, The Guilford Press, ISBN 1593853297, New York
- Levine, B., Robertson, I.H., Clare, L., Carter, G., Hong, J., Wilson, B.A., Duncan, J., & Stuss, D.T. (2000). Rehabilitation of executive functioning: An experimental-clinical validation of goal management training. *Journal of the International Neuropsychological Society*, Vol.6, No.3, (March 2000), pp. 299-312, ISSN 1355-6177
- Marquardt, T.P., Rios-Brown, M., Richburg, T., Seibert, L.K., & Cannito, M.P. (2001). Comprehension and expression of affective sentences in traumatic brain injury. *Aphasiology*, Vol.15, No.10-11, (May 2000), pp. 1091-1101, ISSN 1464-5041
- Marshall, R. (1999). *Introduction to Group Treatment for Aphasia: Design and Management*, Butterworth-Heinemann, ISBN 0750670134, Woburn, Massachusetts
- Martin, I. & McDonald, S. (2003). Weak coherence, no theory of mind, or executive dysfunction? Solving the puzzle of pragmatic language disorders. *Brain and Language*, Vol.85, No.3, (June 2003), pp. 451-466, ISSN 0093934X
- Mateer, C.A. (1999). The rehabilitation of executive disorders, In: *Cognitive neurorehabilitation* D.T. Stuss, G. Winocur, & I.H. Robertson, (Eds.), pp. 314-332, Cambridge University Press, ISBN 0521691850, Cambridge, United Kingdom
- McDonald, S. (1993). Viewing the brain sideways? Right hemisphere versus anterior models of non-aphasic language disorders. *Aphasiology*, Vol.7, No.6, (May-June 1993), pp. 535-549, ISSN 0268-7038
- McDonald, S., Flanagan, S., Martin, I., & Saunders, C. (2004). The ecological validity of TASIT: A test of social perception. *Neuropsychological Rehabilitation*, Vol.14, No.3, (July 2004), pp. 285-302, ISSN 0960-2011
- McDonald, S., & Pearce, S. (1996). Clinical insight into pragmatic theory: Frontal lobe deficits and sarcasm. *Brain and Language*, Vol.61, No.1, (April 1996), pp. 81-104, ISSN 0093-934X

- McDonald, S. & Van Sommers, P. (1993). Pragmatic language skills after closed head injury: Ability to negotiate requests. *Cognitive Neuropsychology*, Vol.10, No.4, (August 1993), pp. 297-315, ISSN 0264-3294
- Pearce, S., McDonald, S., & Coltheart, M. (1998). Interpreting ambiguous advertisements: The effect of frontal lobe damage. *Brain and Cognition*, Vol.38, No.2, (November 1998), pp. 150-164, ISSN 0278-2626
- Perkins, M.R. (2000). The scope of pragmatic disability: A cognitive approach, In: *Pragmatics and clinical applications*, N. Müller (Ed.), pp. 7-28, John Benjamins Pub Co, ISBN 9027243387, Amsterdam
- Rath, J.F., Simon, D., Lagenbahn, D.M., Sherr, R.L., & Diller, L. (2003). Group treatment of problem-solving deficits in outpatients with traumatic brain injury: A randomized outcome study. *Neuropsychological Rehabilitation*, Vol.13, No.4, (September 2003), pp. 461-488, ISSN 0960-2011
- Russeaux, M., Vérigneaux, C., & Kozlowski, O. (2010). An analysis of communication in conversation after severe traumatic brain injury. *European Journal of Neurology*, Vol.17, No.7, (July 2010), pp. 922-929, ISSN 1468-1331
- Sohlberg, M.M., & Raskin, S. (1996). Principles of generalization applied to attention and memory interventions. *Journal of Head Trauma Rehabilitation*, Vol.11, No.2, (April 1996), pp. 65-78, ISSN 0885-9701
- Struchen, M. (2005). Social communication intervention, In: *Rehabilitation for Traumatic Brain Injury*, W.M. High, A.M. Sander, M. Struchen, & K.A. Hart (Eds.), pp. 88-117, Oxford University Press, ISBN 0195173554, Oxford, New York
- Stuss, D.T. (2007). New approaches to prefrontal lobe testing, In: *The human frontal lobes: Functions and disorders*, 2<sup>nd</sup> edition B. L. Miller, & J. L. Cummings (Eds.), pp. 292-305, The Guilford Press, ISBN 1593853297, New York
- Tager-Flusberg, H. (2006). Defining language phenotypes in autism. *Clinical Neuroscience Research*, Vol.6, No.3, (October 2006), pp. 219-224, ISSN 1566-2772
- Tirassa, M., Bosco, F.M., & Colle, L. (2006). Sharedness and privateness in human early social life, *Cognitive Systems Research*, Vol.7, No.2-3, (June 2006), pp. 128-139, ISSN 1389-0417
- Togher, L., McDonald, S., Code, C., & Grant, S. (2004). Training communication partners of people with traumatic brain injury: A randomized controlled trial. *Aphasiology*, Vol.18, No.4, (April 2004), pp. 313-335, ISSN 0268-7038
- Turkstra, L., McDonald, S., & DePompei, R. (2001). Social information processing in adolescents: Data from normally developing adolescents and preliminary data from their peers with traumatic brain injury. *Journal of Head and Trauma Rehabilitation*, Vol.16, No.5, (October 2001), pp. 469-483, ISSN 0885-9701
- von Cramon, D.Y., & Matthes-von Cramon, G. (1994). Back to work with a chronic dysexecutive syndrome. *Neuropsychological Rehabilitation*, Vol.4, No.4, (December 1994), pp. 399-417, ISSN 0960-2011
- Ylvisaker, M. (2006). Self-coaching: a context-sensitive, person-centred approach to social communication after traumatic brain injury. *Brain Impairment*, Vol.7, No.3, (December 2006), pp. 246-258, ISSN 1443-9646
- Ylvisaker, M., Szekeres, S., Henry, K., Sullivan, D., & Wheeler, P. (1987). Topics in cognitive rehabilitation therapy, In: *Community re-entry for head injured adults*, M. Ylvisaker & E. Gobble (Eds.), pp. 137-220, Little, Brown Book Group, ISBN 0316968803, United Kingdom



## **Brain Injury - Functional Aspects, Rehabilitation and Prevention**

Edited by Prof. Amit Agrawal

ISBN 978-953-51-0121-5

Hard cover, 226 pages

**Publisher** InTech

**Published online** 02, March, 2012

**Published in print edition** March, 2012

The present two volume book "Brain Injury" is distinctive in its presentation and includes a wealth of updated information on many aspects in the field of brain injury. The Book is devoted to the pathogenesis of brain injury, concepts in cerebral blood flow and metabolism, investigative approaches and monitoring of brain injured, different protective mechanisms and recovery and management approach to these individuals, functional and endocrine aspects of brain injuries, approaches to rehabilitation of brain injured and preventive aspects of traumatic brain injuries. The collective contribution from experts in brain injury research area would be successfully conveyed to the readers and readers will find this book to be a valuable guide to further develop their understanding about brain injury.

### **How to reference**

In order to correctly reference this scholarly work, feel free to copy and paste the following:

Francesca M. Bosco and Romina Angeleri (2012). Communicative Impairment After Traumatic Brain Injury: Evidence and Pathways to Recovery, Brain Injury - Functional Aspects, Rehabilitation and Prevention, Prof. Amit Agrawal (Ed.), ISBN: 978-953-51-0121-5, InTech, Available from:  
<http://www.intechopen.com/books/brain-injury-functional-aspects-rehabilitation-and-prevention/communicative-impairment-after-traumatic-brain-injury-evidence-and-pathways-to-recovery->

**INTECH**  
open science | open minds

### **InTech Europe**

University Campus STeP Ri  
Slavka Krautzeka 83/A  
51000 Rijeka, Croatia  
Phone: +385 (51) 770 447  
Fax: +385 (51) 686 166  
[www.intechopen.com](http://www.intechopen.com)

### **InTech China**

Unit 405, Office Block, Hotel Equatorial Shanghai  
No.65, Yan An Road (West), Shanghai, 200040, China  
中国上海市延安西路65号上海国际贵都大饭店办公楼405单元  
Phone: +86-21-62489820  
Fax: +86-21-62489821

© 2012 The Author(s). Licensee IntechOpen. This is an open access article distributed under the terms of the [Creative Commons Attribution 3.0 License](https://creativecommons.org/licenses/by/3.0/), which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

IntechOpen

IntechOpen