

EXPERIENCES AND TOOLS

KATIUSCIA SACCO, ROMINA ANGELERI,
LIVIA COLLE, ILARIA GABBATORE, BRUNO G. BARA
& FRANCESCA M. BOSCO

ABaCo: Assessment Battery for Communication

Introduction

Human communication is one of the most complex social activity: it is a process of meaning construction which cooperatively involves all participants taking part in the interaction. Various clinical conditions may lead to impairments of communicative abilities: developmental disorders (e.g., autism, specific language impairment, Down syndrome), brain pathologies (e.g., closed head injury, right hemisphere damage, aphasia), psychiatric disorders (schizophrenia), disorders of old age (e.g. dementia). The assessment of a patient's abilities and disabilities is the crucial starting point for planning an efficient rehabilitation path, where residual capacities are strengthened and, whenever possible, impaired components are restored. However, while the phonological, syntactic and semantic components of language can be assessed by numerous tests, instruments for the evaluation of pragmatic aspects of communication are scarce (see Sacco et al., 2008 for a more detailed analysis of the existing instruments for the assessment of communication).

The Assessment Battery for Communication (ABaCo) has been created to be a theoretically grounded, wide-range clinical instrument. Its theoretical bases stem from Cognitive Pragmatics theory (Airenti, Bara & Colombetti, 1993; Bara, 2010), a theory of

the cognitive processes underlying human communicative exchanges, framed within the inferential model of communication (Grice, 1975) and the speech acts perspective (Austin, 1962; Searle, 1969). The theory has been shown to be able to make predictions on typically developing children (Bucciarelli, Colle & Bara, 2003; Bosco, Bucciarelli & Bara, 2004; 2006; Bosco & Bucciarelli, 2008; Bosco, Vallana & Bucciarelli, 2012), atypically developing children (Bara, Bosco & Bucciarelli, 1999; Bara, Bucciarelli & Colle, 2001; De Marco, Colle & Bucciarelli, 2007), patients with traumatic brain injury (Bara, Tirassa & Zettin, 1997; Bara, Cutica & Tirassa, 2001; Angelieri et al., 2008), patients with right and left focal brain lesions (Cutica, Bucciarelli & Bara, 2006), patients with Alzheimer's disease (Bara, Bucciarelli & Geminiani, 2000) and patients with schizophrenia (Bosco, Bono & Bara, 2012). In this view, communication is the ability to comprehend and produce linguistic and extralinguistic communication acts, accompanied by suitable paralinguistic features, appropriate with respect to discourse and social norms, and fluently integrated within the conversation. The ABaCo assesses each of these components, encompassing the major aspects involved in communication. In this paper, we will briefly describe the features of the battery, and summarize its psychometric properties, providing some suggestions for clinical application.

The Battery

The battery includes 5 scales: Linguistic, Extralinguistic, Paralinguistic, Context, and Conversation. As each scale, except Conversation, is divided into 'comprehension' and 'production', the battery comprises 9 subscales. Overall, there are 180 items: 72 are based on the examiner's prompts, and 108 on videotaped scenes each lasting 20-25 seconds. Administration of the full battery takes about one and a half hours. However, the battery is modular, then it is possible to administer each scale separately to provide clinicians with a flexible tool. Performance is evaluated for each item on the basis of a series of dimensions, derived by the Cognitive Pragmatics theory, underlying the investigated communicative phenomena. Dimensions can be seen as the steps necessary to comprehend or produce the relative communicative phenomena; thus, the more complex the pragmatic phenomena, the more steps it will comprise.

The *Linguistic* and *Extralinguistic* scales assess the comprehension and production of communication acts, expressed respectively through spoken language (linguistic scale) or gestures (extralinguistic scale).

The following tasks are used to assess the *comprehension* of linguistic and extralinguistic acts.

- Basic communication acts (assertions, questions, requests, commands)¹. In the linguistic scale, the examiner asks the patient to evaluate the truthfulness of assertions, to answer simple questions, to perform actions on request, to execute orders. In the extralinguistic scale, the examiner shows the patient short videos where an actor makes an assertion, asks a question, makes a request or issues a command through the use of gestures. The patient has to understand the act produced by the actor.

1. Basic speech acts have been proposed by Kasher (1981).

EXPERIENCES AND TOOLS

- Standard communication acts (simple, i.e. direct and conventional indirect, and complex, i.e. non conventional indirect) and non-standard communication acts (simple and complex irony; simple and complex deceptions)². The examiner shows the patient short videos where two agents are engaged in a communicative interaction: the actor asks her partner a question and the partner replies. The patient has to understand the communication act produced by the partner.

The following tasks are used to assess the *production* of linguistic and extralinguistic acts.

- Basic communication acts. The examiner asks the patient to produce assertions, questions, requests and commands; the examiner provides the semantic content of the requested act. For example, the examiner asks the patient "Tell me that you are cold", or "Order me to be quiet". In the linguistic scale the patient has to produce linguistic acts; in the extralinguistic scale the patient has to produce gestural acts.

- Standard and non-standard communication acts. The examiner shows the patient short videos where two agents are engaged in a communicative interaction: the actor asks her partner a question. The patient has to produce a communication act in reply. In the linguistic scale the question asked by the actor is linguistic and the patient has to reply verbally. In the extralinguistic scale the question asked by the actor is gestural and the patient has to reply through gestures.

The *Paralinguistic scale* assesses the comprehension and production of those aspects that generally accompany a communication act, such as gesticula-

tion, facial expressions, prosody.

The following tasks are used to assess the *comprehension* of paralinguistic aspects.

- Basic communication acts. The examiner shows the patient short videos where an actor, speaking an invented language, makes an assertion, asks a question, makes a request or gives a command. The patient has to understand the type of act produced by the actor, through the paralinguistic indicators. The examiner verbally provides four possible answers, only one of which is correct.

- Communication acts expressing an emotion. The examiner shows the patient short videos where an actor, speaking an invented language, expresses a basic emotion (including anger, sadness, happiness, fear). The patient has to understand the emotion, through the paralinguistic indicators. The examiner provides four possible answers, only one of which is correct.

- Acts characterized by a paralinguistic contradiction. Acts characterized by a paralinguistic contradiction are acts in which the expressed content is in contrast with the paralinguistic indicators utilized in its production. For example, saying "I like it very much" while one's voice and attitude reveal that one does not like it at all. The examiner shows the patient short videos where two agents are engaged in a communicative interaction: the actor verbally expresses something that is in contrast with the paralinguistic indicators. The patient has to understand the actor's mental state, detectable through the paralinguistic indicators.

The following tasks are used to assess the *production* of paralinguistic aspects.

- Basic communication acts. The examiner asks the patient to produce assertions, questions, requests and commands, paying special attention to the paralinguistic indicators; the examiner provides the semantic content of the requested act. For example, the examiner tells the patient "Ask me whether it is sunny today" or "Tell me that it is sunny today".

- Communication acts expressing an emotion. The examiner asks the patient to produce communication acts colored by a specific emotion or mood; the examiner provides the semantic content of the requested act and the emotion with which it has to be expressed. For example, the examiner asks the patient "Tell me that you have received a letter. Tell me that in an happy way".

The *Context scale* assesses the adequacy/inadequacy of a communication act with respect to discourse norms and social norms.

The following tasks are used to assess the *comprehension* of discourse and social norms:

- Discourse norms³. The examiner shows the patient short videos where two agents are engaged in a communicative interaction: the actor asks her partner a question; the partner replies either according to the norms of discourse or giving a generic, false, irrelevant or ambiguous answer. The patient has to detect and explain the adequacy/inadequacy of the partner's reply. For example, in an item representing inadequacy with respect to the Gricean maxim of quantity, the actor asks "Where are you going precisely?" and the partner replies "I'm going out".

2 For definitions of standard vs. non standard, and simple vs. complex communication acts see Airenti, Bara & Colombetti, 1993; Bosco & Bucciarelli, 2008.

3 Here 'discourse norms' coincide with Grice's maxims (Grice, 1975); indeed, Gricean maxims establish the most important norms of discourse as they serve as rules for a rational and effective communication.

- Social norms. The examiner shows the patient short videos where two agents are engaged in a communicative interaction: the actor asks her partner a question; the partner replies either according to the norms of social appropriateness or in a manner which is not appropriate in the given social context. For example, the actor asks "Could you lend me your pen?" and the partner replies in a very impolite way "I don't want to be disturbed!"

In order to assess the *production* of communication acts in accordance with the norms of social appropriateness, the examiner asks the patient to produce communication acts requiring different levels of formality/informality; the examiner provides the semantic content of the requested act.

The *Conversation scale* assesses the ability to appropriately participate in a conversation, complying with the topics of the discourse (topic maintenance, topic introduction/initiation, topic shift) and turn-taking (taking one's turn, allowing the other person to have his turn, reference to interlocutor). Examiner and patient are engaged in a conversation, where the examiner introduces two topics, for a total duration of 4-6 minutes.

A detailed presentation of the battery has been presented in Sacco et al. (2008).

Psychometric Properties, Equivalent Forms, Normative Data

Psychometric measures of reliability, content validity and construct validity have been obtained on a non-clinical sample of 390 participants. The battery has shown to be a reliable tool for the evaluation of communicative abilities: the scales that make up the battery comprise coherent items; the internal consistency of the scales range from $\alpha = .52$ to α

$= .91$, satisfactory values as indicated by values of $\alpha > .5$. Actually, the values are all $> .7$, with the exception of the Context scale, which shows a lower internal consistency given the comparatively small number of items of this scale. Besides, experts in pragmatic language provided an independent validation of the content of the instrument: they judged the items to be appropriate, i.e. able to measure the pragmatic ability they are intended to address (each item was rated on a five-point Likert-type scale and all values across experts are > 4), and to be suitable for the developmental age as well as for adult patients (all values across experts are > 4). Finally, factor analysis indicated that one common ability underlines the entire structure of the battery (a one-factor solution accounts for 63% of the variance) suggesting that the theoretical construct is well-conceptualized and operatively well-defined. A detailed description of the psychometric properties of the battery can be found in Sacco and colleagues (2008).

Two equivalent forms of the battery have been constructed using the data from the same sample of 390 healthy participants, and then tested in a sample of 30 patients with traumatic brain injury. The two forms show good psychometric performance (for details, see Bosco et al., 2012). The development of such alternative forms of the test makes ABaCo a precious tool for the evaluation of communicative rehabilitation programs, as the two forms can be used at two different points in time, typically before and after the clinical intervention.

Normative data for individuals aged 15-75 have been computed on a sample of 300 healthy and cognitively intact participants of different ages and educational levels. The sample used to develop the norms was recruited

according to the Italian National Institute of Statistics (ISTAT) indications so as to be representative of the population from which it was drawn. The main clinical utility of these norms is that they enable clinicians to determine the degree to which communicative abilities are impaired in patients of different ages and educational levels (the two variables found to affect participants' scores) by comparing their scores against those achieved by the corresponding normative group. Norms are reported in Angeleri and colleagues (2012).

Conclusions

ABaCo is a clinical instrument of neuropsychological assessment which can be used either as a comprehensive battery for the evaluation of pragmatic impairment in patients with communicative disorders during the clinical assessment phase, or as a tool for evaluating the efficacy of a rehabilitation program. So far, the battery has been used to test communicative abilities in traumatic brain injury patients (Angeleri et al., 2008), schizophrenic patients (Colle et al., 2013), and work is in progress on other neurological and psychiatric populations. The battery is available both in paper form and in digital form, the latter allowing automated statistical analysis (Angeleri et al., in press).

References

- AIRENTI, G., BARA, B.G. & COLOMBETTI, M. (1993). Conversation and behavior games in the pragmatics of dialogue. *Brain & Language*, 17, 197-256.
- ANGELERI, R., BARA, B.G., BOSCO, F.M., COLLE, L. & SACCO, K. (2014). Batteria per l'Assessment della Comunicazione (ABaCo). Firenze, IT: Giunti O.S. Organizzazioni Speciali.

EXPERIENCES AND TOOLS

- ANGELERI, R., BOSCO, F.M., GABBATORE, I., BARA B.G. & SACCO, K. (2012). Assessment Battery for Communication (ABaCo): Normative data. *Behavior Research Methods*, 44, 845-61.
- 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 & Language*, 107, 229-245.
- AUSTIN, J.L. (1962). *How to do things with words*. Oxford, UK: Clarendon Press.
- BARA, B.G. (2010). *Cognitive Pragmatics*. Cambridge, MA: MIT Press.
- BARA, B.G., BOSCO, F.M. & BUCCIARELLI, M. (1999). Developmental pragmatics in normal and abnormal children. *Brain & Language*, 68, 507-528.
- BARA, B.G., BUCCIARELLI, M. & COLLE, L. (2001). Communicative abilities in autism: Evidence for attentional deficits. *Brain & Language*, 77, 216-240.
- BARA, B.G., BUCCIARELLI, M. & GEMINIANI, G. (2000). Development and decay of extra-linguistic communication. *Brain & Cognition*, 43, 1-3.
- BARA, B.G., CUTICA, I. & TIRASSA, M. (2001). Neuropragmatics: Extralinguistic communication after closed head injury. *Brain & Language*, 77, 72-94.
- BARA, B.G., TIRASSA, M. & ZETTIN, M. (1997). Neuropragmatics: Neuropsychological constraints on formal theories of dialogue. *Brain & Language*, 59, 7-49.
- BOSCO, F.M., ANGELERI R., ZUFFRANIERI, M., BARA, B.G. & SACCO, K. (2012). Assessment battery for communication: Development of two equivalent forms. *Journal of Communication Disorders*, 45, 290-303.
- BOSCO, F.M., BONO, A. & BARA, B.G. (2012). Recognition and repair of communicative failures: The interaction between theory of mind and cognitive complexity in schizophrenic patients. *Journal of Communication Disorders*, 145, 181-197.
- BOSCO, F.M. & BUCCIARELLI, M. (2008). Simple and complex deceptions and ironies. *Journal of Pragmatics*, 40, 583-607.
- BOSCO, F.M., BUCCIARELLI, M. & BARA, B.G. (2004). The fundamental context categories in understanding communicative intention. *Journal of Pragmatics*, 36, 467-488.
- BOSCO, F.M., BUCCIARELLI, M. & BARA, B.G. (2006). Recognition and repair of communicative failures: A developmental perspective. *Journal of Pragmatics*, 38, 1398-1429.
- BOSCO, F.M., VALLANA, M. & BUCCIARELLI, M. (2012). The inferential chain makes the difference between familiar and novel figurative expressions. *Journal of Cognitive Psychology*, 24, 525-540.
- BUCCIARELLI, M., COLLE, L. & BARA, B.G. (2003). How children comprehend speech acts and communicative gestures. *Journal of Pragmatics*, 35, 207-241.
- COLLE, L., ANGELERI, R., VALLANA, M., SACCO, K., BARA B. G. & BOSCO, F. M. (2013). Understanding the communicative impairments in schizophrenia: A preliminary study. *Journal of Communication Disorders*, 46, 294-308.
- CUTICA, I., BUCCIARELLI, M. & BARA, B. G. (2006). Neuropragmatics: Extralinguistic pragmatic ability is better preserved in left-hemisphere-damaged patients than in right-hemisphere-damaged patients. *Brain & Language*, 98, 12-25.
- DE MARCO, I., COLLE, L. & BUCCIARELLI, M. (2007). Linguistic and extralinguistic communication in deaf children. *Journal of Pragmatics*, 39, 134-158.
- GRICE, H. P. (1975). Logic and conversation. In P. Cole and J. L. Morgan (Eds.), *Syntax and Semantics 3: Speech acts* (pp. 41-58). New York, NY: Academic Press.
- KASHER, A. (1981). Minimal speakers and necessary speech acts. In F. Coulmas (Ed.), *Festschrift for Native Speaker* (pp. 93-101). Mouton, NE: The Hague.
- SACCO, K., ANGELERI, R., BOSCO, F. M., COLLE, L., MATE, D. & BARA, B. G. (2008). Assessment Battery for Communication – ABaCo: A new instrument for the evaluation of pragmatic abilities. *Journal of Cognitive Science*, 92, 111-157.
- SEARLE, J.R. (1969). *Speech acts*. Cambridge, UK: Cambridge University Press.

SUMMARY. *The Assessment Battery for Communication (ABaCo) is a clinical instrument for the evaluation of communicative abilities in patients with neurological or psychiatric disorders, such as aphasia, right hemispheric damage, closed head injury, dementia, autism and schizophrenia. ABaCo consists of 5 scales, assessing both comprehension and production of various kinds of pragmatic phenomena, using different means, such as linguistic, extralinguistic and paralinguistic communication. Normative data for individuals aged 15–75 have been collected: they enable clinicians to determine the degree to which communicative abilities are impaired in patients of different ages and educational levels by comparing their scores against those achieved by the corresponding normative group. Moreover, the battery comprises two equivalent alternative forms, so that patients can be assessed and re-assessed before and after a rehabilitation program, thus obtaining a reliable measure of treatment efficacy. This paper presents the battery and summarizes its properties and possible applications.*

Keywords: *assessment; communication*

Katiuscia Sacco, Romina Angeleri, Livia Colle, Ilaria Gabbatore, Bruno G. Bara, Francesca M. Bosco, Center for Cognitive Science and Department of Psychology, University of Torino, Torino, Italy. Katiuscia Sacco, Livia Colle, Bruno G. Bara, Francesca M. Bosco, Neuroscience Institute of Torino, Torino, Italy.