

Without words being exchanged, a person's body language can attract or repel, signal welcome or create fear. It is a powerful mode of communication that is hardly understood in objective scientific terms. The COBOL consortium's proposal to develop a new theory for measuring the components of body language could form the basis of more reliable tools for detecting criminals, deterring terrorists and studying degenerative diseases.



**B**ody language is a powerful source of information about human emotions and intentions. In daily encounters between people, it constitutes a very important non-verbal means of communication and triggers immediate responses in us and in the observer, which are automatic and often out of our control. Despite its importance, there has been little scientific research to support the intuitive feeling that emotional body language (EBL) is perceived and understood effortlessly.

### Practical pay-offs

It is generally agreed that body language plays a key role in successful negotiations and in achieving consensus in cultural, commercial, political and business transactions. But while hundreds of studies have been conducted in face recognition, almost no research has been done on EBL. This is perhaps surprising because better understanding of body language would not only be scientifically rewarding but also have many practical uses.

It would, for instance, launch an innovative line of research on emotional disabilities such as autism, and on motor disorders in Parkinson's and Huntington's diseases. It may even contribute to the development of improved computer graphics and human-computer interfaces.

Furthermore, since EBL can deliberately be manipulated for the purposes of deceit or personal gain, accurate identification and measurement of the traits would permit the preparation of more reliable guidelines and countermeasures for investigators and security personnel.

The basic steps in understanding EBL are: perceiving the emotion; perceiving the biological movement; and recognising the intended action. These three elements are encountered at two distinct levels. At the primitive biological level, EBL is automatic, expressing emotions such as pain, fear and disgust. At the perceptual-cognitive level,



**“Everyone is exposed to an increasing variety of facial and bodily expressions of people from different races and cultures.”**



## AT A GLANCE

### Official Title

Communication with Emotional Body Language

### Coordinator

Tilburg University (The Netherlands)

### Partners

- Collège de France (France)
- Universität Tübingen (Germany)
- Weizmann Institute of Science (Israel)
- Eidgenössische Technische Hochschule Zürich (Switzerland)

### Further Information

Prof Beatrice de Gelder  
Tilburg University  
Stichting Katholieke Universiteit Brabant  
Faculty of Social and Behavioural Sciences  
Warandelaan 2-90153  
5000 Tilburg  
The Netherlands  
email: degelder@uvt.nl  
fax: +31 13 4662370

### Project cost

€ 2 139 929

### EU funding

€ 1 799 431

### Project reference

Contract No 043403 (NEST)

*We respond to gestures... in accordance with an elaborate and secret code that is written nowhere, known by none and understood by all.  
(Sapir, 1927)*

it is used intentionally and in a controlled fashion to steer, mislead or stimulate the observer.

### Cultural differences

An important consideration is that of intercultural variability in EBL. For example, there are major differences between eastern and western cultures concerning displays of anger but so far our understanding of this is mainly based on anecdotes.

With populations becoming increasingly international, everyone is exposed to an increasing variety of facial and bodily expressions of people from different races and cultures. Aside from occasional observations, these differences have not yet been investigated, and their role in social interaction and emotional communication has rarely been explored. Such cultural differences may occur at different stages of body language and may be related to perceptual differences and to cognitive factors.

There is evidence that people are generally more accurate at judging emotions expressed by members of their own cultural group than by those from a different group. However, most of this work relates to facial expressions. Extending it to the whole area of EBL would certainly be of value to professionals in sales, teaching, medicine and law enforcement.

Besides developing a framework for understanding cultural variability, COBOL's intention is to develop measurement tools for EBL and to apply them interactively in order to validate their quantitative and qualitative accuracy. Detection and analysis of gestures and body movements has so far been based on the statistical analysis of videos or simple trajectory

images, from which it is often difficult or impossible to obtain an accurate measurement.

COBOL aims to achieve a much deeper understanding and more precise modelling of the underlying structural components of EBL with the aid of novel mathematical and computational measurement tools.

Methods from kinematic and dynamic analysis will be combined with machine-learning and techniques for the spatial and temporal segmentation of complex action streams. Using this combination, the consortium will derive building blocks and determine the 'grammar' of the components.

This will permit the measurement and evaluation of even complex or ambiguous actions and sequences. In addition, it will, for the first time, provide a more detailed analysis of the individual components of EBL that are critical for eliciting emotional response.

The COBOL team will also blend its own original methods with neurobiological tools to study the potential association of EBL with self-awareness mechanisms. Certain kinds of EBL of a more social nature are intriguingly linked with acute situations of enhanced self-awareness, such as stage fright or embarrassment.

Recent studies have begun to uncover a fundamental organisation of human brain areas into corresponding internally- and externally-targeted processes. COBOL will examine the potential relationship of the two categories of EBL with the newly emerging cortical organisation. The result? Possibly a profound change in the way we understand and collaborate with one another.