1. Introduction

As most teachers do, in the first day of class I ask my students to fill in a form with some basic information about them. Among other things, I ask them about their command of foreign languages, just to see what kind of academic literature they will be able to read. One of those students wrote the following as an answer:

   English: I can speak, understand, read, write, tell jokes and get angry.

My student was, as you can imagine, a “graciosillo” (‘jokster’), but nevertheless he hit the bullseye: there is more to the full command of a foreign language than the well-known four abilities, there is crucially the ability to socially interact in an appropriate way.

It is no news that patterns of communicative behaviour can change from language to language and from culture to culture. Different cultural groups have developed different communicative practices, rooted in different views on values, beliefs, attitudes, power relations, etc. Therefore, when faced with interaction in a different language/culture, most of us experience the feeling of not being at ease, and we all can report problems like the following:

- Being unable to understand and interpret other peoples thoughts, feelings and actions
- Having difficulty using or understanding facial expressions, tone of voice, jokes and sarcasm, common phrases and sayings (tending to understand them literally)
- Not understanding some unwritten social rules, such as standing too close to another person, or starting an inappropriate topic of conversation
- Appearing to behave 'strangely' or inappropriately, as the result of the inability to express feelings, emotions or needs in the expected way
- Appearing to be insensitive as the result of not having recognised how someone else is feeling
Thus, success in intercultural communication crucially depends, among other things, on the ability of the speakers to be aware of such differences and to try to avoid the possible misunderstandings that can arise. An essential task in the learning of a foreign language is, therefore, to know and be able to cope with such cultural differences.

Cross-cultural studies and intercultural pragmatics focus on the diversity of conversational styles in different cultures and the consequences of such diversity in situations where members of various cultural groups interact with each other. The privileged data in this area usually come from the analysis of fragments of actual conversations (business communication, classroom interaction, etc.).

Observable communicative behaviour is, however, only the tip of the iceberg, i.e., the visible and external manifestation of a more complex reality. A full understanding of how social behaviour and social abilities can be taught and learnt requires a capacity to identify the internal parameters that govern social interaction (cultural bases) and the internal capacities (neural bases) that underlie communicative behaviour.

The submerged iceberg is examined by social cognition studies. Social cognition is a new, though already well developed, multidisciplinary research field that builds on several other disciplines, such as neurophysiology, psychology and biology.

Social cognition encompasses any cognitive process that involves conspecifics, either at a group level or on a one-to-one basis. (Blakemore et al, 2004: 216)

Under the label of social cognition there is a wealth of investigation around the cognitive bases of the human capacity to behave adequately in the social milieu. More specifically,

SC involves the individual’s cognitive relationship to the social corpora (family, friends, institutions, etc.) and the ambient postulates that inform a culture, its technology, and the complex manifold of artefactual and environmental considerations that are transpersonal. There are two inextricably linked aspects to this: (a) the examination of the individual mind’s processes, encoding, and storage of social information; and (b) the examination of how the
The cultural side of social cognition (i.e., the role of culture in shaping conversational styles) is well known to linguists, and thus intercultural studies have largely benefited from the insights from sociologists and ethnographers. In contrast, scholars with a linguistic background (including pragmatists and second language teachers) are less familiar with the physical, neurological bases of social cognition; and yet, they provide crucial information about the underpinnings of social behaviour.

The aim of this presentation is to add the cognitive dimension to the overall picture. I want to invite you to dive into deep waters and to explore the underside of the submerged iceberg. My aim is to offer a general perspective of the fundamental questions and the main findings in the field of social neuroscience, on the assumption that any consideration about social interaction and second language learning must be based on what current research has revealed about the physical bases of our social ability. My purpose is to identify the issues that are directly relevant to our views on pragmatics and second language learning.

I will begin by presenting a state-of-the-art of social cognition from the point of view of neuroscience (section 2). Next, I will dwell on the development of social abilities in native speakers; this will include a discussion on how culture enters into the picture and relates to the neural underpinnings of human social abilities, how culturally determined skills are acquired and how the processing of social stimuli works (section 3). Before proceeding to the conclusions, I will explore the implications for second language learning: how the learner’s brain manages to deal with the difficulties of learning, what the processing strategies are, and what can be done to facilitate learning (section 4).

2. The neural bases of social cognition

2.1. The story of Phineas Gage

I will begin by introducing Phineas P. Gage (1823-1860), from New Hampshire, who worked as foreman in the construction of the Rutland &
Burlington Railroad in Vermont. His story is one of the most famous in the annals of medicine as the survivor of a horrible accident\textsuperscript{2}.

As reported on “The Boston Post” on 14th September 1848, 25-year old Gage was the victim of an explosion that shot a metal rod through his head. The iron bar entered under the left cheek bone and exited through the top of the head, and was later found some 30 yards from the site of the accident. Gage was momentarily stunned, but regained full consciousness within minutes and was able to talk and walk. To everyone’s’ amazement and against all expectation, he survived.

After some minor problems, by 1st January 1849 Gage was leading an apparently normal life: he could move and talk as before, and his intelligence, memory and learning capacities remained miraculously unaffected. He lived in reasonable physical health for another eleven years.

However, a crucial change was soon noticed by the people close to him. This change was reported by his physician, Dr John M. Harlow:

\textit{His contractors, who regarded him as the most efficient and capable foreman in their employ previous to his injury, considered the change in his mind so marked that they could not give him his place again. He is fitful, irreverent, indulging at times in the grossest profanity (which was not previously his custom), manifesting but little deference for his fellows, impatient of restraint of advice when it conflicts with his desires, at times pertinaciously obstinent, yet capricious and vacillating, devising many plans of future operation, which are no sooner arranged than they are abandoned in turn for others appearing more feasible. In this regard, his mind was radically changed, so decidedly that his friends and acquaintances said he was “no longer Gage.” (...)The equilibrium between his intellectual faculties and animal propensities seems to have been destroyed. (Harlow, J.M. (1868): "Recovery from a Passage of an Iron Bar through the Head" \textit{Publications of the Massachusetts Medical Society} 2: 327-347.)}

\textsuperscript{2} See Damasio 1994; Damasio et al 1994; Macmillan 2000; Adolphs 1999, 2006
So Gage, who had previously been considered a diligent, responsible, reliable, polite person, became irreverent, profane, irresponsible and socially inappropriate after the accident.

Gage’s story is doubly significant to the history of medicine: first, as the survivor of a tremendous accident; and second, because he provided Dr. John Harlow the foundation for establishing a direct correlation between a particular type of brain damage and the loss of social abilities. Thus, Gage’s story represents the emergence of modern social neuroscience.

Natural as it might seem today, the conclusion that there may be a direct link between the brain and social behaviour was hard to believe in the mid of 19th century, and Dr. Harlow was never given much credit:

...the intellectual atmosphere of the time made it somewhat more acceptable that there was a neural basis for processes such as movement or even language rather than for moral reasoning and social behaviour. (Damasio et al, 1994: 22)

In fact, as Adolphs (1999) points out, the change in Gage’s personality remained a mystery until it could be interpreted in the light of similar patients in modern times. Antonio and Hanna Damasio, Ralph Adolphs and their colleagues, who work at the University of Iowa and the Caltech Institute, re-opened Gage’s case and investigated his skull using modern neural imaging techniques (Damasio et al 1994; Damasio 1994). They conclude that the affected brain region was the prefrontal cortex.

This finding is consistent with what these researchers had previously found about people with lesions to the same brain area\(^3\): modern patients with this sort of injury have serious difficulties organising and planning future activity, exhibit socially inappropriate behaviour and are characterised by a lack of concern for others, i.e., they are unable to function in society due to a severe “defect in rational decision making and the processing of emotions” (Damasio et al 1994, Damasio 1994).

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\(^3\) The findings in Damasio et al (1994) have been used and subsequently developed in much research work and further implementations. Wagar and Thagard (2004) have developed a computational model for decision making. The results of Damasio et al. (1994) have been contested by other researches, but the debate concerns neuroanatomic details that are not relevant for my current purpose.
Like Gage, these patients develop something that’s been dubbed “acquired sociopathy.” They perform normally on IQ tests, and have normal language, memory, and perception, but are unable to guide their behavior with respect to other people. They can’t make decisions that are in their best interests, typically fail to hold a job, and are unable to maintain lasting social relationships. (Adolphs 2006: 15)

At this point, the sense in which this story is relevant for our current purposes should be clear. What neuroscientists have found is, first, that our social behaviour can be explained in neuroanatomic terms—an idea that was difficult to accept not only in the 19th century, but even today, since we still tend to understand ourselves in dualistic terms (i.e., in terms of a dichotomy between body and mind; Damasio 1994); and second, that our social ability is not merely the result of the operation of a general, all-purpose, cognitive device that simply has to learn a given set of social rules, but of a dedicated system specialised in dealing with social information. Any damage to the physical organisation of this system correlates with a failure in social interaction, leaving other capacities unaffected. And if this system is lost, its functioning cannot be regularly taken over by other brain areas.

2.2. “The woman who knows no fear” 4

Almost in the same year that they were publishing their results about Gage, Ralph Adolphs and the Damasios were working on a different case, which represents a significant story as well. The patient is known as S.M., a 43-year old woman. She is reported to be a woman “with normal IQ, a high-school education, (...) stable and cheerful, with no indication of depression (...). Her visual-perceptual discrimination was normal.” (Adolphs et al 1994: 669). None of these features seem to be particularly noticeable. However, she has earned a place in the history of medicine as the woman who knows no fear... or at least, who cannot recognise a fearful expression in a face.

When she was 30 and while she was recovering from epilepsy at hospital, her doctors found that she suffered a rare disease (Urbach-Wiethe

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4 This title heading is borrowed from an article by Jennifer Altman on this topic (New Scientist magazine, 17 December 1994, page 20).
disease), which caused the accumulation of calcium in a particular region of her brain, namely in her amygdala, an almond-shaped organ that is primarily related to the processing of emotions; as a consequence of the disease, her amygdala was destroyed.

Adolphs and his colleagues asked her permission to carry out a series of experiments and test one of their hypotheses about the role of the amygdale in social cognition. What they found was really amazing: she could not identify negative expressions in a face. She was baffled by any picture showing a fearful expression. She also had problems perceiving other "negative" emotions if expressed in combination with other types of feelings, such as anger and surprise. In contrast, she could identify positive emotions, such as happiness, and she could also recognise familiar faces. The conclusion of this study is the following:

> From our results, the amygdala appears necessary both to recognize basic emotion of fear in facial expressions, and to recognize many of the blends of multiple emotions that the human face can signal. The amygdala may be an important component of the neural systems subserving social cognition in part because fine-grained recognitions of the emotion signaled by faces is essential for successful behaviour in a complex social environment. (Adolphs et al 1995: 672)

S.M. and the neuroscientists’ team have been collaborating since then. In 2005 they found that her inability to recognize fearful expressions was due to impairment in the fixation on the relevant features of the faces (Adolphs et al 2005). Whereas normal people tend to focus on the eyes and the mouth, patients with amygdala lesions tend to fix their attention on the nose instead, a feature of the face which is clearly less relevant to the recognition of emotions.

In 2007 a new experiment was carried out (Spezio et al 2007) to gain further understanding of the problem. Instead of using photographs of facial expressions, the scientists tested S.M.’s reactions in real life social interaction. Since their working hypothesis was that her impairment caused a failure to fixate informative features of the faces, they used an eye tracker device to record the fixation of her eyes during the interaction. What they found is that her injury did not cause a reduction in “overall gaze to the face during conversations, but instead changed the way gaze was deployed to the face”. “S.M. made nearly no fixations on the eyes
during a social interaction (...), but spent most of the time looking at the mouth.” (Spezio et al 2007: 3394, 3996)

The story of S.M. represents a further instance of how social cognitive neuroscience has addressed the question of identifying the neural bases of our social behaviour by investigating more specific and basic aspects. This particular research has shown that other brain areas, such as the amygdala, are relevant for a normal social interaction since they are responsible for the processing of some emotions. Eye contact is a major ingredient in face-to-face interaction, and constitutes a pre-requisite for the recognition of the emotions in facial expressions\(^5\). In fact, the expressions shown on our faces are so important to the modulation of the verbally communicated content that emoticons have been created to try to convey basic emotion in written texts.

2.3. “Through the mirror”

Consider now a totally different situation. At a clothing store, a man is looking at himself in a mirror while wearing a t-shirt with a tag from the shop. What is he doing? What does he intend to do? What might happen next? All these are questions that any of us can answer without much difficulty. But there is yet another question which does not seem that easy: How do we know all this? How do we know what he is thinking and what he intends to do? Can we actually read someone else’s mind? A decade ago most neuroscientists and psychologists would have explained this ability as the result of a rapid reasoning process, not unlike the kind used, for instance, to solve a logical problem. Nowadays, the answer is a very different one.

Let’s move from the United States to Europe, to Italy. By the same years in which the Iowa and Caltech research team were investigating on Gage and S.M., the researchers of the Neuroscience Department of the University of

\(^5\) The finding that the amygdala plays a major role in social cognition in human interaction is consistent with previous work on primates. As reported in Cacioppo and Bernston (2005), rhesus monkeys with lesions in the amygdala lack the ability for effective social interaction. As a consequence, they are ostracised by their conspecifics and perish without the support of their troop. This is due to the crucial role of the amygdale in the normal perception and production of expressive displays and behaviour. Macaque monkeys with lesions in the amygdale are uninhibited animals.
Parma, Giacomo Rizzolatti and Vittorio Gallese, among others (Gallese 2007; Gallese et al 1996, 2001, 2004; Rizzolatti et al 2006) were working on hand and mouth movements with macaque monkeys. They were investigating the brain areas related to movement, particularly the neurons that control movement in goal-directed actions, such as grasping a piece of fruit. Almost by chance, the Parma team found that the very same neurons that activate when an individual is performing an action also fire when the individual sees someone else perform the same action. This means that the motor cells are active not only when making a movement, but also when watching it. The same neurons were immediately sought for, and found, in the human brain as well. Since these neurons in some sense reflect other individual’s actions, they were labelled mirror neurons.

Thus, mirror neurons provide a new answer to the question of how we know what is in someone else’s mind. Our mind-reading capacities come from the activation of motion-related neurons. Thus, when we see a goal-directed action performed by another individual, we do not merely guess what is s/he doing, we do not (explicitly and consciously, or implicitly) reason about her/his intentions, but rather we have “a direct internal experience” of the action itself (Rizzolatti et al, 2006: 56), which explains why we can understand it in such a quick and easy way.

Mirror neurons provide the neurological link between intention and action. This correlation can be found not only for simple actions, but extends to more complex series of events. The effect is that there are specific chains of mirror neurons that appear to encode full templates for specific actions and their goals. Therefore, if an action (for instance, grasping a cup) can have different goals (to drink from it or to clean it), a different chain will be formed for each one:

Interestingly, we found that most of the neurons we recorded discharged differently during the grasping part of the monkey’s action, depending on its final goal [grasping a piece of fruit to eat it, or to place it in a container]. This evidence illustrated that the motor system is organized in neuronal chains, each of which encodes the specific intention of the act. (Rizzolatti et al. 2006: 59)
In this sense, as can be easily gathered, neural chains are highly relevant to the understanding of social behaviour, including socially determined courses of actions.

Moreover, recent research has shown that mirror neurons play a significant role not only in the interpretation of actions, but also in the understanding of emotions. Thus, the same mirror neurons that fire when experiencing a particular feeling --for instance, pain (Singer and Frith 2005) or disgust (Wicker et al 2003)--, also fire in the brain of those who observe the experiencer of the feeling. Psychologists had always talked about empathy and emotional contagion; now we have a more precise understanding of how empathy and emotional contagion work.

Taken together, such data strongly suggest that humans may comprehend emotions, or at least powerful negative emotions, through a direct mapping mechanism involving parts of the brain that generate visceral motor responses. Such a mirror mechanism for understanding emotions cannot, of course, fully explain all social cognition, but it does provide for the first time a functional neural basis for some of the interpersonal relations on which more complex social behaviors are built. (Rizzolatti et al 2006: 60)

2.4. “Rain Man”

The reader will probably remember the following scene from a famous film:

[A character has stopped in the middle of the street because the sign said DON'T WALK. An angry driver is yelling at him]

**Motorist**: Hey you! Hey dipshit! Move it! You ain't gonna move, I'll move you!

**Raymond**: Have to get to K-Mart. 400 Oak Street. The sign said 'Don't Walk'. Have to get to K-Mart. (taken from http://www.imdb.com/title/tt0095953/quotes)

The scene comes from *Rain Man* (Barry Levinson, 1988), an Academy Award winning film. This movie introduced the problem of autism to the general public through the character of Raymond, played by Dustin
Hoffman. The conversation between Charlie (Raymond’s brother, played by Tom Cruise) and Dr Bruner can illustrate the folk view on autism:

**Charlie:** *He's not crazy, he's not retarded but he's here.*

**Dr. Bruner:** *He's an autistic savant. People like him used to be called idiot savants. There's certain deficiencies, certain abilities that impairs him.*

**Charlie:** *So he's retarded.*

**Dr. Bruner:** *Autistic. There's certain routines, rituals that he follows.*

**Charlie:** *Rituals, I like that.*

**Dr. Bruner:** *The way he eats, sleeps, walks, talks, uses the bathroom. It's all he has to protect himself. Any break from this routine leaves him terrified.* (taken from [http://www.imdb.com/title/tt0095953/quotes](http://www.imdb.com/title/tt0095953/quotes))

Autism⁶ is a brain development disorder that occurs in differing degrees and comes in a variety of forms, usually known as “autistic spectrum disorders” (ASD), and which are commonly characterised by a triad of impairments (Frith et al, 1991; British National Autistic Society: http://www.nas.org.uk/nas/jsp/polopoly.jsp?d=211):

1. **Social communication:** People with autism have difficulties with both verbal and non-verbal language. Many have a very literal understanding of language, and think people always mean exactly what they say. They can find it difficult to use or understand:
   - facial expressions or tone of voice
   - jokes and sarcasm
   - common phrases and sayings; an example might be the phrase *It’s cool*, which people often say when they think that something is good, but strictly speaking, means that it’s a bit cold.
2. **Social interaction:** People with autism often have difficulty recognising or understanding other people’s emotions and feelings, and expressing their own, which can make it more difficult for them to fit in socially. They may:
   - not understand the unwritten social rules which most of us pick up without thinking: they may stand too close to another person for example, or start an inappropriate subject of conversation
   - appear to be insensitive because they have not recognised how someone else is feeling

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• prefer to spend time alone rather than seeking out the company of other people
• not seek comfort from other people
• appear to behave 'strangely' or inappropriately, as it is not always easy for them to express feelings, emotions or needs.

3. Social imagination: Social imagination allows us to understand and predict other people’s behaviour, make sense of abstract ideas, and to imagine situations outside our immediate daily routine. Difficulties with social imagination mean that people with autism find it hard to:
• understand and interpret other peoples thoughts, feelings and actions
• predict what will happen next, or what could happen next
• understand the concept of danger, for example that running onto a busy road poses a threat to them
• engage in imaginative play and activities: children with autism may enjoy some imaginative play but prefer to act out the same scenes each time
• prepare for change and plan for the future
• cope in new or unfamiliar situations.

From the above list, the reader can immediately see ways in which autism is relevant to the understanding of the neural underpinnings of social cognition: autism is an impairment of social cognition with a biological origin; in other words, autism can be defined as a genetic deficit in the ability to predict and explain the behaviour of other humans in terms of their mental states, i.e., a sort of mindblindness, as Baron-Cohen (1995) dubbed it. Autism is to social cognition what Broca’s aphasia is to grammar.

Interestingly enough, Williams syndrome, which is a genetic disease resulting from the deletion of some genes on chromosome 7, instantiates the inverse pattern of autism: Williams syndrome patients show mental retardation together with hypersociability and strengths in language, music and face recognition; that is, serious impairments in non-social domains together with very unusual social skills and with “an exaggerated

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7 Patients with Broca’s aphasia “produce little (or at least labored) speech, which is poorly articulated and telegraphic, involving omission of so-called 'function' or 'closed-class' words (articles, auxiliaries, etc.). Their speech relies heavily on nouns, and (to a far smaller degree) verbs. Their written communication follows this same production-comprehension dissociation, with impaired writing but often less severe disturbance to reading.” (Swinney, 1998)
interest in other people and remarkable expressiveness and social communicative abilities.” (Adolphs 2003: 176) The dissociation between social and the rest of cognitive abilities is a further argument for the modularity of social cognition.

All the findings about mirror neurons, the relevance of the amygdala to the processing of faces and emotions (especially, fear and other threatening stimuli), and the role of the frontal lobes in social behaviour have shed new light on autism as an impairment in the ‘social brain’, as Ashwin et al (2007) call it. In addition, the fact that autism does not necessarily correlate with mental retardation or deficits in other cognitive skills, such as language, reasoning or memory offers an argument for the specificity of social abilities. Thus, taken together, all these facts provide compelling evidence for the autonomy of the systems supporting social cognition.

2.5. The ‘social brain’

A human-specific, universal system

It is time to recapitulate on the data we have discussed so far in the previous sections, and to draw some consequences from it. Since the mid-nineties cognitive neuroscience has developed very fast. Meaningful correlations among certain brain areas and social behaviour have been discovered which provide partial, but very significant, answers to the question of what the neural bases of social cognition are. The stories of Phineas Gage and S.M., and the discovery of mirror neurons, are representative instances of the kind of issues that cognitive neuroscientists deal with.

The conclusion seems straightforward: what has been identified and described is a universal, human-specific set of biological mechanisms that determine social behaviour. Our ability to behave in society in an appropriate way does not merely depend on general, all-purpose...
cognitive capacities; on the contrary, our brain contains neural systems that specialise in processing different kinds of socially relevant information. We humans have biological, innate predispositions for certain abilities, such as recognizing faces and emotions, following eye gaze, acting out a fictitious situation or identifying the intentions of others; and there are also innate constraints and predispositions that allow infants to learn about specific kinds of recurrent features of the social world quickly and efficiently, as Schaller et al (to appear) point out. None of these skills can be understood as a result of instruction; they are instances of nothing more than the normal development of the normal capacities of all members of our species, just like being able to speak or to stand up and walk on our feet.

A specialised, modular domain

The specificity of these systems also suggests that social cognition should be conceived of as a modular mechanism or, more precisely, as a domain-specific capacity. A domain is a functional or anatomical component dedicated to the processing of a particular class of data. It processes only the sort of information to which it is sensitive: for instance, vision (a well-established modular domain) is sensitive to shape, colour and light patterns only; other simultaneous, but non-complying stimuli (for instance, auditory stimuli) cannot be processed by the visual system. A domain deals with information of a specific kind and format only, which means that it imposes certain conditions on the input. In addition, domains process their data in an automatic, predetermined way. Finally, domain-specificity allows for a further prediction as well. A modular cognitive ability can be lost without any significant loss in other cognitive abilities. In this sense, a domain is a dissociable system. Indeed, this is precisely what we find: social abilities can be lost as the result of an injury

10 “Six-month-old infants perceive animate action and follow gaze direction, which enables them to build up experiences on the basis of which they predict people’s actions in familiar contexts. By 9 months of age, infants understand that people have goals and persist in behaving until they see that their goal has been reached (avoiding obstacles and persisting past accidents and failures in the process) – being happy when the goal is reached and disappointed if it is not. By 14 months of age, infants begin to understand full-fledged intentional action – including the rudiments of the way people make rational decisions in choosing action plans for accomplishing their goals in particular reality contexts and selectively attending to goal-relevant aspects of the situation. This kind of understanding leads to some powerful forms of cultural learning, especially imitative learning...” (Tomasello et al 2005: 680) See also Saxe (2006)
or a disease, as illustrated by Gage’s and S.M.’s stories, or as the result of a genetic disorder, as shown by autism.

An adaptive evolution

The emergence of such a specific and complex system for managing social interaction comes as no surprise from an evolutionary perspective. All the species that live in groups have to find a solution for the tension between two opposing factors: on one hand, collaboration among group members can enhance prospects for survival; but, at the same time, other members can be potential competitors as well. As Schaller et al (to appear: 2) point out, our brain evolved

...to help our ancestors make functional decisions in an environment that included other people as a prominent feature. Some of those people were relatives; some were strangers. Some were socially dominant; some were meek. Some were potential allies; others were potential enemies. Some were potential mates; others were potential competitors for those mates. Many aspects of human cognition – especially the processes that define the conceptual territory of social cognition – are adapted to the recurrent problems and opportunities posed by these other members of ancestral human populations.

While some species, such as bees, display rigid behaviour, we humans have developed more complex and flexible forms of behaviour. In this sense, social cognition is the response to the “especially challenging demands of a complex social life of constant competition and cooperation with others in the social groups.” (Hermann et al 2007: 1360). The human solution requires, as Adolphs (2001: 231) states, “the ability to construct representations of the relations between oneself and others, and to use those representations flexibly to guide social behavior.”

3. The development of social abilities

The previous considerations support the view that social cognition is a universal system. However, this universality can be found “primarily at the level of evolved psychological mechanisms, not of expressed cultural
behaviours”, as Barkow et al (1992: 5) put it. Of course, all neuroscientists acknowledge the importance of the cultural context within which an individual grows up, as the complementary environmental counterpart of the innate cognitive capacity.

3.1. The acquisition of culture

In fact, normal human development depends crucially on both biological and cultural inheritance: social cognition will not mature adequately if it is not deployed in a social milieu. This is known as the Dual Inheritance Theory: (Tomasello 1999). In other words, the development of an individual depends on the social and cultural context within which s/he grows.

What we usually call culture is a collection of ways of thinking and behaving that members of a group share as a result of the process of socialisation and that determine their beliefs and behaviour. It is commonly agreed that individuals acquire the set of norms and values of their culture.

In fact, social cognition allows for an extraordinary degree of variation across cultural groups. As Tomasello (1999: 518) has pointed out, “human cultural traditions and artifacts accumulate modifications over time, whereas this does not seem to be the case for nonhuman primate cultural traditions”. This is indeed a unique feature of human social cognition, a feature that Tomasello et al (2005: 721) called ‘locality’. “Individual groups of humans develop their own unique ways of symbolizing and doing things – and these can be very different from the ways of other groups, even those living quite nearby.”

Cultural diversity can be explained in terms of different ranking of values in different cultures. Ethnographers and scholars working on intercultural pragmatics have largely examined the relation between cultural features and communicative behaviour, so this is a topic that I will not pursue here.

Becoming a “normal” member of a group requires “learning” to think, believe and act as other members in the group do. But how does this

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11 See Janney and Arndt (1992), (1993); Jackendoff (1992); see also Piller (2007) for a critical view.
process take place? From the point of view of social neuroscience the relevant problem is how culture interacts with the social neural system; more specifically, how culture gets incorporated into the ‘social brain’.

A frequent answer among anthropologists has been that cultural values and ways of thinking are representations which get communicated and transmitted from individual to individual and from one generation to the next in an epidemiological way:

> Consider a social group ( ... ). Each member of the group has, in his or her head, millions of mental representations, some short-lived, others stored in long-term memory and constituting the individual’s ‘knowledge’. Of these mental representations, some — a very small proportion — get communicated repeatedly, and end up being distributed throughout the group, and thus have a mental version in most of its members. When we speak of cultural representations, we have in mind — or should have in mind — such widely distributed, lasting representations. (Sperber, 1994: 33).

This account, however, puts too much emphasis on the representational, explicit side of culture. I do not mean to contend the idea that there are indeed cultural representations that are transmitted as such, but rather to suggest that this is not the main way in which most cultural values and routines are internalised. In addition, an approach in terms of epidemiological propagation of representations would entail that learning the values of a different culture is merely a matter of identifying the relevant set of representations and incorporating them into the individual’s mental database without any further effort. However, the difficulties that the learners of a foreign language experience show that things cannot be that simple.

Other philosophers have proposed a different account. Bourdieu (1980:55), for instance, emphasises the role of practice:

> The habitus, a product of history, produces individual and collective practices —more history — in accordance with the schemes engendered by history. It ensures the active presence of past experiences, which, deposited in each organism in the form of schemes of perception, thought and action, tend to guarantee the
‘correctness’ of practices and their constancy over time, more reliably than all formal rules and explicit norms.

This account focuses on the implicit and non-representational side of the acquisition of culture, which may be a desirable move, but the proposal is not clear enough about the actual way in which this sort of implicit learning takes place.

3.2. The formation of mirror neuron chains

The approaches put forward by anthropologists and philosophers to the problem of how cultural values are internalised are speculative hypotheses. Modern social neuroscience can provide a more convincing explanation with a sound empirical support. This new explanation is based on what has been discovered about mirror neurons. As the reader will remember, mirror neurons activate when an individual sees a goal-directed action performed by another individual; in the observer’s brain the neurons fire that are active when the individual is performing the action her/himself. In complex activities, mirror neurons have been found to form chains that, in some sense, “encode” particular sequences of related actions. A complex activity is, then, stored as a single chain of simpler subevents.

Now, in children, the acquisition of the social patterns of their culture is carried out through a process of implicit learning, by which they internalise the practices of their group. Implicit learning, such as the kind that takes place in family life, is the result of the formation of millions of stable neural chains of mirror neurons. The same procedure extends to all kinds of social behaviour, which ensures the propagation of culture-specific practice. The activation of mirror neurons and the formation of neural chains constitute the biological device that underlies our innate ability to learn and internalise cultural experiences.

A number of properties of the development of social cognition can be immediately related to the underlying neurological process. To begin with, it can account for the fact that social learning is primarily implicit. The process of formation of mirror neurons chains is an innate, automatic response, and requires neither the existence of any explicitly represented event, nor the subject’s awareness or her/his motivation to learn. The fact
that social learning is basically a kind of implicit learning does not mean, of course, that explicit reinforcement has no role at all in the transmission of cultural patterns, or that explicitly taught representations should be completely discarded. Indeed, it is obvious that the explicit communication of cultural values has a privileged place in institutional education; however, it should be kept in mind that this sort of socialisation practice is a secondary source for social learning, not an inherent requisite for human social cognition to develop in a normal way.

Second, chain formation provides empirical support for the idea that knowledge is organised in larger units that include sequences of events, participants and relations, in a way that reduces processing effort and allows predictions about the expected course of events. When a link in a neural chain is activated, the whole chain and its intermediate links are activated as well, so the internalised outcome is made readily accessible, with no need to access any explicit representation of the whole event.\textsuperscript{12}

Third, it can explain a feature of the acquisition of social abilities, namely that this acquisition process develops in a very fast way. This is so not only “because there are so many ways to acquire it: directly from experience and indirectly from observation or cultural transmission” (Frith and Frith 2006: 39), but rather because we humans have a specific, dedicated system for social cognition that favours the acquisition of socially relevant skills. It has been shown by Mesoudi et al (2006) that information with a social load, such as gossip, is transmitted and remembered in a more accurate way than any kind of factual information. Our cognition is, therefore, biased towards socially related knowledge. The emergence of this system appears as the evolutionary response to the need to attune every individual to the systems of the other members of the group in a relatively short period of time.

Fourth, it can account for the stability of implicit knowledge as well: once acquired, it is very difficult to modify this kind of knowledge, let alone remove it. This is probably so because neural chain formation is not merely a way to store information: it is not just like putting new books on a shelf or saving new files in a computer. Chains of neurons are both the information and its own support. When a chain is formed, the physical

\textsuperscript{12} This does not mean, of course, that individuals cannot have conscious access to the contents of a script, with a complete representation of its constitutive parts and the relations among them; rather, what it predicts is that representation is not a necessary requisite for the internalisation of a complex activity.
organisation of the brain itself changes to some extent\textsuperscript{13}. This feature will prove to be crucial for the understanding of the differences between native and non-native learners.

And last, but not least, it provides an explanation not only for the acquisition of patterns of action, but also for the acquisition of patterns of emotions and of emotion display. As mentioned before, mirror neurons also play a major role in the understanding of emotions, so the previous considerations can be extended to the way in which emotions are displayed and understood. Mirror neurons provide an explanation for some external manifestations of empathy as well. When two persons empathise, they tend to display the same emotions, adopt the same gestures, and behave in a similar way. This sort of behavioural contagion is the result of the attunement in their mirror systems\textsuperscript{14}. Thus, children implicitly learn how to react in different situations, how emotions are manifested, what emotions can be displayed and what should be avoided.

To sum up, chains of mirror neurons are, thus, at the basis of implicit learning, and make it possible to explain how implicit knowledge is acquired and organised, for both actions and emotions.

3.3. The processing of social information

In the previous section, an answer has been offered to the problem of how culture is incorporated into the ‘social brain’. But there is still a relevant question: once an individual has matured in her/his culture, what are the processes that take place in her/his brain when dealing with socially relevant stimuli?

Though neuroscientists have found compelling evidence that the perception of a stimulus with a social load triggers the activation of all the brain areas that are involved in social cognition (orbitofrontal cortex,
amygda, premotor cortex), they cannot provide a detailed answer to this question. They can, however, offer some significant hypotheses.

The ‘social brain’ can be conceived of as a postperceptual processing device, which receives visual information and relates it to information from other brain systems (memory, attention, decision making...). It is responsible for linking perceptual representations to behaviour on the basis of the emotional or social value of the stimuli.

According to Adolphs (1999, 2001, 2003) and Frith and Frith (2006), the stimulus is first recognised and evaluated to yield a global representation. Such global representations can be seen as the result of a process of categorisation, i.e., of identifying and labelling the stimulus. The way in which the stimulus is categorised determines the subject’s response to it and her/his subsequent behaviour. Categorisation is an automatic process, one that is far beyond the conscious control of the subject, as is the identification of visual stimuli. This sort of process is called stimulus-driven, or “bottom-up”. For instance, current research has shown the important role of the amygdala in processing stimuli related to danger and threat, as a built-in feature of primate cognition --a feature that enhances the individual’s prospects for survival by prompting a rapid and automatic reaction.

This does not entail that culture has no bearing on categorisation; on the contrary, both basic instinctive responses and culture-sensitive information come into play. In fact, automatic responses can be modulated by implicitly acquired knowledge. For example, fear seems an instinctive reaction; however, the set of animals that are considered threatening depend heavily on culture, so the responses of their members, though automatic, are the result of a cultural view of danger. This is true even for facial expressions, as Adolphs et al (1995: 672) have suggested:

*Facial expressions can convey both basic emotions whose expression and recognition may be partly innate, as well as subtler emotions whose meaning is partially determined by culture.*

The same goes for social stereotypes. A stereotype represents a quick-and-simple way to categorise people about whom one knows little as individuals; it makes it possible to guide and predict behaviour, even if one
can be aware of the fact that stereotypes are too simplistic and very often plainly incorrect. They are not individual constructions, but complex, culturally learnt categories that represent shared conceptualisations and produce automatic reactions: they are a further instance of how our brain tends to privilege efficiency over accuracy.

However, bottom-up processes do not represent the whole story. There is more to social processing than automatic responses, be they instinctive or implicitly learnt. Research on the way we judge people has shown that explicitly acquired knowledge can affect social behaviour in a conscious way as well. Frith and Frith (2006) point out that the perception of out-group members can elicit both positive and negative feelings. For instance, viewing a face from another race unconsciously produces activation of the amygdala as some sort of threatening stimulus; however, there is empirical evidence that people try to suppress this response by activating a conscious process of self-regulation that reanalyses the stimulus and the global categorisation delivered by the automatic systems, and tries to find new assessment of the individual by explicitly including other considerations. This kind of process, which does not depend on the properties of the stimulus, but rather on the knowledge of the subject, is called task-driven or “top-down” process.

The effect of top–down processes on all our predictions of social behaviour is an example of a general cognitive process that applies to all the information that we process, either from the physical or from the social world. Thus, top–down processes allow us to become aware of what we are doing and in this way allow us to repair and redirect inappropriate but powerful automatic responses. (Frith and Frith 2006: 44)

One of the most salient features of social cognition is the fact that it responds not only to perceptual, physical properties of stimuli, but also to learnt social judgements with no perceptual motivations. There are a number of categories, such as those related to social roles, which do not necessarily have a direct, visible correlate, but are ultimately a product of the brain itself; however, they have a central function in our behaviour. A young doctor will be approached preferably as a doctor (which is something that you cannot see, but have to know), than as a young individual (which is something you can directly perceive). In such cases,

additional information is used to go beyond what can be directly perceived, a crucial step for guiding behaviour in social interaction. In this way, social cognition both creates specific categories and provides the mechanisms for dealing with them, including the need to inhibit automatic responses. This shows the tension between stimulus-driven processing and the sensitivity to culture-created distinctions.

To sum up, as Adolphs (2001: 231) puts it,

*Social cognition guides both automatic and volitional behavior by participating in a variety of processes that modulate behavioral response: memory, decision-making, attention, motivation and emotion are all prominently recruited when socially relevant stimuli elicit behavior.*

Thus, social cognition draws on both biology and culture, and brings into play both automatic and conscious processes. The relationship among these categories is not a simple one, since there is not a direct, one-to-one mapping. The intertwining can be appreciated from several points of view: on the one hand, what is learnt through exposure to a given culture is acquired through a biologically determined set of devices; on the other hand, a significant part of the knowledge we acquire as members of a culture is internalised and yields automatic responses; and finally, conscious thinking can inhibit automatic reactions. This complex network of connexions can be represented as in the following diagram:
4. Implications for second language learning

Neuroscientists have found brain areas dedicated to the processing of socially relevant data that are to some extent independent from other cognitive abilities; the ‘social brain’ follows specific paths of development and specific processing routes. It is time to explore the implications of such a system for second language learning. As mentioned in the Introduction, the problems in the acquisition of a second language that both teachers and student report are the following (repeated here for convenience):

- Being unable to understand and interpret other peoples thoughts, feelings and actions
- Having difficulty using or understanding facial expressions, tone of voice, jokes and sarcasm, common phrases and sayings (tending to understand them literally)
- Not understanding some unwritten social rules, such as standing too close to another person, or starting an inappropriate topic of conversation
- Appearing to behave 'strangely' or inappropriately, as the result of the inability to express feelings, emotions or needs in the expected way
- Appearing to be insensitive as the result of not having recognised how someone else is feeling

The first significant fact is the striking resemblance between this list and that which enumerated impairments in autism. What this reveals in an obvious way is that the difficulties that learners experience are problems with social cognition, as if the whole social brain collapsed when speaking a different language. Why is this so?

4.1. Mirror neurons and second language learning

Mirror neurons proved to be a relevant system for implicit learning, including all sorts of practical and social learning. We should therefore expect that the mirror system could contribute to facilitating the learning of a foreign language and to acquiring its social practices. However, it seems that this prediction is not borne out, as the difficulties experienced by learners show. Rather, what has been commonly assumed is that there is a critical period for language learning, and after that period, the ability
to learn decreases significantly. In fact, transfer from the first language into a second language, and from the common social practices of one’s native culture into another culture, indicates that, once established, the values of a language and a culture can hardly be modified\textsuperscript{16}.

\textit{Once such assumptions are formed, they remain relatively stable and their influence on social interaction becomes almost automatic. Events that contradict them do not change them, but tend rather to be interpreted as incorrect, ununderstandable, or abnormal.} (Janney and Arndt 1992: 31)

Is there any biological explanation for this somewhat unexpected fact?

Nowadays, most neuroscientists believe that critical periods are not completely rigid and inflexible; they are not critical, just especially ‘sensitive’, and relate to biological changes in the brain’s ability to be shaped by experiences\textsuperscript{17}. In a developmental study about the adolescent brain, Blakemore and Choudhury (2006) have reported the existence of a number of significant neural changes linked to puberty and adolescence. Their findings strongly suggest that the social system, once initialised with the input data from the individual’s native environment, might lose the capacity for incorporating new data after puberty, so social cognition tends to fossilise. This is not unlike what can be found in the domain of grammar: there is a critical period in the acquisition, so once the individual has acquired a particular grammar, or particular phonological system, s/he cannot build a different one on the same innate basis.

\textit{Much like sound categorisation during language acquisition (...)}, experience with executive functions and certain social cognitive skills might be much more difficult to incorporate into brain networks once they are established after puberty. (Blakemore and Choudhury, 2006: 307)

This may come as a rather unexpected fact. There has been common agreement on the specificity of grammar as a modular system, and on the particular development of paths and periods for its acquisition\textsuperscript{18}. Social routines have been considered, on the contrary, as external norms, as a

\textsuperscript{16} See, for example, Kasper (1992), Escandell-Vidal (1996b)
\textsuperscript{17} Blakemore and Frith (2005).
\textsuperscript{18} DeKeyser (2000).
set of non-constitutive, conventional routines merely “added” in interaction. The neural specificity of the systems involved in social cognition and their dissociation from other cognitive capacities have shown that the social brain is not very different from the language faculty. A new piece of evidence has thus been found that completes the picture of social cognition and supports its specificity as a neural system.

Now the question is why it should be so: why social cognition should come with an “expiry date”. A tentative answer could be provided along the following lines. The social neural system has to be attuned to the patterns of the group in a relatively short period of time; its mission is to deliver fast, simple and stereotypical responses to familiar situations, without having to calculate every situation anew, which would result in a slow and effortful social processing. It might well be, then, that evolution has favoured a system that is extraordinarily active during a given period of time only -in which it has to establish the relevant chain connections-, but that cannot keep this high level of activation forever. In addition, as was mentioned before, the internalisation of native culture patterns does not merely fill available gaps on a shelf, but builds the adequate shelf. Brain resources are powerful, but limited, so there is always a cost to any cognitive operation. This can explain why chains of mirror neurons, once created, can hardly be modified at all.

4.2. A different processing strategy

This does not entail, however, that learning after puberty is impossible, or that mirror neurons stop working after that age. In fact, there are many different things we usually learn as adults, such as accountancy, laws, or driving a car. And mirror neurons keep doing their job as facilitators of learning through imitation. A crucial difference, however, can be found between social abilities, on the one hand, and the acquisition of factual

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19 This is, at least, what can be hypothesised in view of the following considerations:

*The prefrontal cortex participates in implementing a particular mechanism by which we acquire, represent, and retrieve the values of our actions. This mechanism relies on generating somatic states, or representations of somatic states, that correspond to the anticipated future outcome of decisions. Such ‘somatic markers’ steer the decision-making process toward those outcomes that are advantageous for the individual, on the basis of the individual’s past experience with similar situations. Such a mechanism may be of special importance in the social domain, where the enormous complexity of the decision space typically precludes an exhaustive analysis* (Adolphs 2001: 235)
knowledge and practical skills, on the other, which crucially do not involve social information.

As for social information, the fact that the storage of new patterns is not completely free and available after a given period does not turn learning into an impossible task. It may still be possible, but through a different strategy, namely, by using the same system that stores factual information. In other words, we can learn the norms of interaction of a different culture, but we can no longer benefit from the quick-and-ready organisation and processing routines of our social systems. Instead, we have to store such norms as (regular) factual information, not as implicit knowledge.

This is, indeed, what we presumably do, as Blakemore and Frith (2005: 462) point out:

*We also assume that there is, in addition, an all-purpose ‘mind-machine’ that is not specifically geared to particular stimuli, but can cope with almost anything. This is like a general learning system that simply responds to associations of experience. Again speculatively, we suggest that this general mechanism might take over if a module is faulty. It would make any learning different from normal fast learning, but still feasible.*

This would explain why late learning of social norms is “different from the type of learning that occurs naturally during sensitive periods.” (Blakemore and Frith, 2005: 461). In addition, it will be consistent with DeKeyser’s (2000: 518) findings: “Learners with high verbal ability can use explicit learning mechanisms to bypass the increasingly inefficient implicit mechanisms.”

The difficulties for late learning of the social patterns of a different culture are not limited to the inability to internalise new information in an implicit way after a given period; if that was not enough, a further problem arises, namely the fact that the automatic social devices of the learner will still continue using her/his native, internalised cultural values, which can be very different from those of the target language and culture, and which will cause transference and intercultural misunderstandings. To avoid them, the learner will have to set up a secondary self-regulation process in order to inhibit the automatic response whenever it is
inadequate to the newly acquired norms. This will require first building an explicit representation of the situation and all socially relevant details, then inhibiting her/his automatic responses and finally replacing them by consciously monitored reactions. This would explain both the persistence of pragmatic transfer (even across various generations of immigrant families, as Kasper, 1992 has reported), and the slow and effortful interaction of non-native speakers.

What is different in learners’ processing is the division of labour between conscious and automatic processes in social interaction: conscious processes take control of the interaction, and top-down and monitoring tasks have a leading role in avoiding the interference of internalised, automatic processes based on the social categories of their first language. This situation can be summarised in the following graph:

4.3. What can teachers do?

Social cognition can, thus, explain the difficulties that learners of a second language experience. Can it also provide some suggestions for teachers to facilitate learning? Answering this question would require an experienced second language teacher, which unfortunately, do not have. However, some tentative hints can be offered about how to maximise the possibilities of social cognition.

The nature of input

The first consideration has to do with the nature of the input. Most current approaches to second language teaching emphasise that the
student has to learn from real life situations: purely structural learning (such as the kind normally used for learning Latin or Ancient Greek) can hardly develop communicative competence. This idea receives further support from what social neuroscientists have discovered. The mirror system activates with goal-directed actions, so any kind of learning will presumably be enhanced and facilitated if linked to concrete tasks. Goal-directed activities in which language itself is not in focus, but is a means to achieving a superordinate purpose have every chance of producing better results. The methods based on activities with a motor counterpart, such as in the classical ‘total physical response’ method (Asher 1969), could possibly exploit the mirror system in an even deeper way. True, those methods will not adjust the social cognition values overnight, but nevertheless they will foster implicit learning by boosting the associative links between language use and social experience.

Also related to the nature of the input is the role of conscious learning and awareness. The emphasis on implicit learning, practical abilities and communicative methods has pushed the role of the explicit representations to the background, and explicitly taught content has been neglected in some influential methods. However, current approaches to social cognition have shown the significant role of conscious self-regulation and of top-down (task-driven) processing in inhibiting undesired automatic reactions, as a means of attempting to avoid intercultural misunderstandings. In fact, if implicit learning capacities are not available for social cognition after a given period, and if the social patterns of a different culture have to be learnt, explicit representations will have to play a major role. Raising awareness about cultural differences and the social parameters governing them is a necessary step towards social adequacy in a foreign language20.

The learner’s profile

Apart from the nature of the input, the nature of the learner has to be taken into account as well. The development pattern of social cognition as a biological system suggests that there should be significant age differences in the way a new language and its culture are learnt, depending on the activation status of implicit learning mechanisms. The

20 Advantages of explicit learning can also be found for grammar, and apparently we are witnessing the birth of a new ‘focus-on-form’ era (DeKeyser, 2007).
prediction is that children will learn more deeply and adults will learn faster. This is in fact what has been suggested in the literature on the psychology of learning:

*Children do better in terms of ultimate attainment because many elements of language are hard to learn explicitly (...); adults learn faster because their capacities for explicit learning let them take shortcuts.* (DeKeyser 2003: 335)

The prediction is that children will learn more deeply and adults will learn faster. This is in fact what has been suggested in the literature on the psychology of learning:

*...full-scale immersion is necessary for children to capitalize on their implicit learning skills, and formal rule teaching is necessary for adolescents and adults to draw on their explicit learning skills.*

The fact that late learning has to resort to explicit representations does not necessarily entail that these should remain conscious forever. In fact, explicitly learned abilities become automatic when repeated. This is what happens, for instance, when learning to drive a car: sequences of movements have to be explicitly learned, together with conditions and restrictions on performance. But after some practice, all these tasks are carried out with less and less effort, until they become automatic. Such unconscious actions, without having exactly the same status as implicitly acquired patterns, eventually become routine and produce the effect of smooth interaction.

**Scripts as analytical tools**

Both for those learners that require implicit scenarios and for those that need explicit representations, teachers may find the notion of script as an analytical tool very useful. This notion was borrowed from Artificial Intelligence:

*A script is a structure that describes appropriate sequences of events in particular contexts (...) a predetermined stereotyped sequence of actions that defines a well-known situation.* (Shank and Abelson, 1977: 41)
For the AI developers, a script was a means to analyse, describe and model the way in which knowledge is stored, organised and retrieved, which can provide a common template for the computational implementation of behaviour. The fact that, at a neural level, learning can be seen as a process of formation of chains of mirror neurons provides empirical support for the notion of script as an adequate concept in the account of social behaviour.

The notion of script has also been adopted by a number of researchers in the field of pragmatics. It has the obvious advantage of allowing both analysing and describing whole situations as sequences of features, conditions, participants and activities, and conceiving sequences of events as single processing units. In this sense, it has turned out to be a powerful conceptual instrument. On the one hand, scripts can explain an individual’s behaviour and her/his understanding of similar behaviour in others; scripts represent as well the main source of expectations regarding courses of actions: it is very easy to show that when presented with a familiar activity, we all know what comes next; finally, scripts provide an elegant explanation of cultural differences.

In addition, the notion of script can be further extended to the analysis of emotions, as Russell (1991, 2005) has suggested. There is “…great similarity, but not always identity, across cultures in the way in which emotions communicable by facial expression are categorized. There is also, surprisingly, evidence for differences as well.” (Russell 1991: 426). Thus, to account for cross-cultural diversity, Russell has suggested that emotions are not simple concepts, but rather have to be analysed in more basic features, in a way not unlike the sequences of actions that make up complex activities. In this sense, he suggests that the notion of script can be also useful to explain the differences in the categorisation of emotions, which should be understood as a sequence of subevents rather than as homogeneous concepts. As Russell (1991: 442) puts it,

*In happiness, you desire something, get it, feel pleasure, smile, and, perhaps feel kind toward others. For other concepts, the story is more complicated. Jealousy might include anger, but jealousy implies a surrounding situation, a social relationship involving three people, specific motives, behaviors, and consequences. These*
implications must be understood to know what the word jealousy means.

The same explanation goes for the norms that different cultures establish about the control of emotional expression, which Russell calls display rules:

*These display rules might dictate that at a funeral, for example, grief should be inhibited, displayed, or exaggerated. Peoples of different cultures thus expect different behavioral consequences of specific emotions. Again, I propose that these expectations are incorporated into the meaning of terms and that this aspect of meaning can vary with culture.* (Russell, 1991: 444)

So, display rules can vary from culture to culture, but once they have been internalised, they automatically determine behaviour, with no need for conscious access to any sort of explicit representation.

Finally, it is worth devoting a few words to the debate about the notion of culture and its role in intercultural communication. Some scholars reject the common, “essentialist” view of culture as a set of norms and representations shared by the members of a group, which they find too static and artificial. They reject as well the “pervasive association between ‘intercultural communication’ and ‘misunderstanding’” (Piller 2007: 214). Instead, they defend a constructivist approach, in which culture is conceived of as a dynamic notion that speakers construct in discourse. So, the idea that in intercultural communication there are two different systems of values that can enter into conflict should be replaced by a scenario in which negotiation and the search for a common ground and a shared context have a leading role.

Perhaps that would be a desirable situation, but it does not seem feasible at all. To begin with, negotiation and the search for a common ground

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22 Piller (2007: 211) considers the following definition of culture as the prototype of the essentialist view:

“the deposit of knowledge, experience, beliefs, values, attitudes, meanings, social hierarchies, religion, notions of time, roles, spatial relationships, concepts of the universe, and material objects and possessions acquired by a group of people in the course of generations through individual and group striving. (Samovar and Porter 2003: 8), quoted by Piller (2007:211)
both require, to some extent, laying one’s cards on the table: this means that the interlocutors should have an explicit representation of the current situation, of what is shared and what is not, and how to build a common ground, which is precisely the kind of approach to culture that one was supposed to try to avoid. Inevitably, each participant will enter the communicative exchange with some initial assumptions, most of which are not even consciously and explicitly represented by the participants themselves; native speakers have implicitly learned the patterns of their group, so they do not usually have conscious access to the particular values and settings that determine their social behaviour.

**Conclusion**

It is time to conclude. The findings in the field of social neuroscience suggest that our understanding of social cognition has to be articulated in a way that should be compatible with its dual nature, i.e., as a biological system and as a product of culture; as a processing device with a neural basis, and as a social mirror that depends on the exposure to a specific culture for its development and operation; as innate feature of neural architecture, and as an emergent social construction; as a universal faculty and a culture-specific set of skills. The result is a complex processing system, in which predetermined responses, implicitly acquired routines and explicitly learnt norms all have a precise role in the production and understanding of social behaviour.

Many of the ideas that had usually been taken for granted about social cognition were—we know now—hypotheses and superficial speculations that did not hold any water. What we currently know about the neural underpinnings of human social abilities casts new light on these issues: some of those ideas are being questioned, whereas others have received empirical support. Current research has provided a more solid foundation to the debate and a firmer ground on which to establish new approaches to social behaviour and intercultural communication.

Among those findings, the one with the most far-reaching theoretical consequences is that social cognition qualifies as a domain specific system, with its own procedure and its own processing paths. In this sense, social and grammatical faculties have proven to be more similar than what had been assumed. In addition, a new approach to the division between body
and mind, between biology and psychology will no doubt be a central topic for debate in the coming years. The central role of the mirror system in understanding the behaviour of others has influenced our view on cognition from an approach based on representations towards the idea of embodiment.

All this perfect machinery for picking up and internalising social norms of behaviour can collapse as the result of certain diseases or accidents; in such cases, the result is not very different from what happens to learners of a second language: for some period, their social ability seems to have disappeared. Not only do they lack the set of internalised patterns of the target culture, but their own cultural experience does not prove helpful either in intercultural communication. These kinds of learner difficulties find a natural explanation in terms of the properties of the underlying social system. However, the brain can resort to different strategies to alleviate those problems.

Our current understanding of how our social brain works has largely benefited from what neuroscientists have discovered in the last decade: they have offered many sound answers to a host of intriguing questions; and yet there is still much to learn. This is what makes the research in the field of social cognition and second language learning a fascinating enterprise.
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