

Reinterpretation of the Dimensions of the McBane Empathy Scale (1995) through Neuroscience

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Abstract

Empathy has been measured in several fields, such as psychology, marketing and sales force, which is why several scales have been developed. The contradictory effects of empathy on sales performance are partly attributed to the conceptualisation of empathy as a one-dimensional, bi-dimensional or multi-dimensional construct. This research aims to contribute to this debate by drawing on a review of the cognitive neuroscience literature and the contributions of the biomarketing paradigm to explain the neurochemical and neuroanatomical processes of empathy. we will focus our attention on the study of the scale of empathy proposed by McBane (1995). This neurological corroboration leads us to consider that empathy is composed of both the affective and cognitive dimensions and that emotional contagion is not a third dimension of empathy, but constitutes the phylogenetic basis of affective empathy. These neurochemical and neuroanatomical corroborations fundamentally reconfirm the number of dimensions proposed by McBane (1995) and constitute a solid theoretical groundwork that paves the way for future empirical research.

Keywords: Cognitive Empathy, Affective Empathy, Emotional Contagion, Mcbane (1995), Cognitive Neuroscience.

Introduction

The study of empathy is not a recent phenomenon. In fact, early work on individual differences has traced its roots to the work of Thorndike (1920; 1936); Hunt (1928); Thorndike and Stein (1937) on social intelligence. However, the difficulties in assessing social intelligence, the inability to distinguish social intelligence from general intelligence in particular, lead to the disappearance of this line of research. Research on social competencies has been revived with the work of Guilford (1967) on behavioural intelligence and also with the work of Dymond (1949); Hogan (1969) aiming at the development of empathy assessment scales. Personality and sociology psychologists have developed instruments that assess

aspects of interpersonal competence and social efficacy notably empathy (Hogan, 1969; Mehrabian & Epstein, 1972) and self-monitoring (Snyder, 1974; 1979).

Nevertheless, empathy is a complex concept for at least three reasons. First, its complexity stems from the fact that it belongs to several domains, hence the multiplicity of definitions proposed. Mainly, empathy originates from the psychology of aesthetics where the person is supposed to understand what the work of art should reflect. It quickly spread to other fields such as philosophy, psychology and psychotherapy, ... thus taking on several definitions (Favre et al., 2005, pp. 365-366). In marketing literature, empathy is defined as "the ability to identify and understand the other person's feelings, ideas and situation" (Futrell, 1988, p. 124).

Several scales have been developed to measure it, which is the second reason of the complexity for the study of empathy. Thirdly, this complexity involves the conceptualisation of empathy as a unidimensional, bi-dimensional or multi-dimensional construct.

Empathy has been measured in several fields, such as psychology, marketing and sales force (Delpechitre, 2013, p. 5), which is why several scales have been developed. One recognises three positions in the literature. During its early development, Delpechitre (2010, p.18) has noted that empathy has been studied in the work of Greenberg and Mayer (1964) and Lamont and Lunderstone (1977) as a one-dimensional concept. Certain authors have conceptualized the cognitive facet (Dawson et al., 1992; Giacobe et al., 2006; Homburg et al., 2009; Lamont and Lundstrom, 1977; Pettijohn, Pettijohn and Taylor, 1995; Wong and Sohal, 2003), others have studied the affective dimension (Deeter-Schmelz and Sojka, 2003; Greenberg and Mayer, 1964; Ricks and Veneziano, 1998; Tobolski and Kerr, 1952). However, Weitz, Sujana and Sujana (1986) note that the contradictory effects of empathy on sales performance are partly attributed to the conceptualisation of empathy as a one-dimensional construct.

Other researchers suggest studying empathy as a two-dimensional process, which includes both affective and cognitive empathy (Aggarwal et al., 2005; Homburg and Stock, 2005; Stock and Hoyer, 2005; Widmier, 2002).

The third category of researchers, such as Widmier (2002), McBane (1995); Arefi (2010, p. 695); Guilé (2010, p. 338); Ang and Goh (2010, p. 387) and Roy (2011, p. 17) conceptualizes empathy as a multidimensional construct.

Moreover, this debate around the unidimensionality and multi-dimensionality of empathy is also developed at the level of cognitive neuroscience. It refers to the results of neuroscience experiments, notably through the understanding and comparison of the neuroanatomical and neurochemical networks relating to each sub-construct of empathy. Several researchers, such as Shamay-Tsoory et al (2009), Shamay-Tsoory and Aharon-Peretz (2007) show that affective and cognitive empathy are based on different psychological and neurological mechanisms. On the other hand, others confirm the interaction between the cortical activity of cognitive and affective empathy (Hooker et al., 2010, p. 104).

Furthermore, marketing and cognitive neuroscience intersect, in a complementary approach, at the level of the paradigm developed by Bagozzi and Verbeke (2014) «Biomarketing». In fact, Biomarketing broadens the field of marketing by integrating recent discoveries in cognitive neuroscience related to the psychological dimensions of the salesperson. Through this paradigm, Bagozzi and Verbeke (2014) study the individual differences that can impact performance and emphasize that empathy is an explanatory factor of performance differences among salespeople. However, empathy is approached in this paradigm from a new angle, based on biological and neural analysis.

Through this research, we therefore try to explain the neuro-biological mechanisms that underlie empathy in order to contribute to the debate relating to the number of dimensions of empathy, paying particular attention to the study of the dimensions put forward by (McBane, 1995). After defining empathy and highlighting its different scales of measurement, we will focus our attention on the study of the scale of empathy proposed by McBane (1995) using the neuro-biological and neuro-chemical processes of empathy in order to definitively define its dimensions.

Empathy: Definitions and Measurement

Definitions of Empathy

As Georgieff (2009, p. 357) points out, empathy emerges from the field of aesthetics. It was originally named "Einfühlung" by (The German philosopher Vischer, 1873). Then it spread to England under the current term by the psychologist Lipps (1909) [Quoted by (Montag et al., 2008, p. 1261)]. As it belongs to several fields of research, several definitions are associated with empathy.

According to Pence and Vickery (2012, p. 162) empathy is «being centered on the other». Davis (1983, p. 113-114) defines empathy as «the tendency to spontaneously adopt the psychological point of view of others». It is also « the ability to perceive the internal frame of reference of another with accuracy, and with the emotional components and meanings » (Roger, 1959, p. 210). Furthermore, empathy «is, of course, neither compassion nor sympathy, but rather the concept introduced to account for the knowledge of others in the context of explanatory psychology» (Georgieff, 2009, p. 360). It is also « the process that prevents us from doing harm to others and motivates altruistic behavior» (Singer, 2006, p. 858).

In terms of his thesis on the impact of empathy on client perception, Delpechitre (2010, p. 22) has listed several definitions of empathy: Mead (1934) defines it as the fact of « as taking the role of the other», whereas Reik (1949) considers it to be « listening with the third ear » and Greenson (1960) equates it with « emotional knowledge ». As for Bohart and Grenberg (1997), they define it as « trying to sense, perceive, share or conceptualise how another person experiencing the world», not to mention Kohut (1984) who perceives empathy as «the capacity to think and feel oneself into the inner life of another person». Still in the marketing field, Sharma (2001, p. 126) adds that empathy means that « salespeople have an ability to put themselves in their consumers' position and are able to sense the emotions and feelings of consumers » Empathy suggests that. The empathy of the seller thus contributes to strengthening the persuasion of the consumer. Moreover, Futrell (1993, p. 143) stipulates that «several barriers to communication can be overcome if one gets into the buyer's shoes». He adds that by trying to understand what the buyer is saying, the seller will be able to better understand the factors that influence the buyer's decision. He will then be able to satisfy his needs and improve his performance.

We can therefore retain, on the basis of the definitions put forward, that empathy is the capability of a person to be centered on others and to perceive their internal frame of reference, both affective and cognitive, in order to better understand the factors that influence their purchasing decision. They will thus be able to react in an appropriate and altruistic way to satisfy the customer's needs and improve their performance.

The fact that empathy belongs to several fields of research makes it a subject of debate as to its definition, its components and its implications.

The Dimensions of Empathy

Several scales are proposed to measure empathy in sales. Far from being exhaustive, these different measurement scales are presented in the Table 01 (placed at the bottom in the paper).

However, some are criticised. Roy's study (2011, p. 8) aimed to highlight the impact of empathy on salesperson's performance. To measure empathy and its various facets, this author turned to the Interpersonal Reactivity Index (IRI) proposed by (Davis, 2000). It is a 28-item questionnaire with four dimensions each with seven items. Despite the fact that the IRI scale is the most developed at the level of the sales context, Yarnold et al (1996) did not confirm the stability of its dimensions, particularly the two dimensions of "fantasy" and "personal distress", which are strongly criticised (Beven et al., 2004; Lawrence et al., 2004).

Barrett and Lennard's (1981) R.I. scale was not originally developed to measure empathy, although it does include a dimension of cognitive empathy. Hogan's (1969) EM scale shows a low estimation of adjustment qualities (Sharpley & Cross, 1982). It is designed not to measure empathy, but to measure social competence (Davis, 1994). Plank, Minton and Reid's (1996) scale is operated with clients and therefore is not a topic for evaluation in this research since we are interested in empathy from the seller's perspective.

McBane (1995) studied empathy based on pioneering work that considered it to be one-dimensional (Greenberg and Mayer, 1964; Lamont and Lunderstome, 1977; Dawson et al., 1992). Starting from the idea that affective empathy, affective and cognitive empathy and emotional contagion may not have the same effect on the performance of the salesperson in a B-to-B industrial context, hence the interest in measuring each dimension separately. The results show that affective and cognitive empathy have a positive effect on performance, while emotional contagion has a negative impact on it. In conclusion, the author confines the multi-dimensional nature of empathy in three dimensions. The characteristics of this scale are summarized in the table 02 (placed at the bottom in the paper).

Dimensions of empathy according to the McBane (1995) scale

In terms of his scale, McBane (1995) developed three dimensions of empathy: affective, cognitive empathy and emotional contagion.

Affective empathy was developed in the field of sales by Greenberg and Mayer (1964) who suggest that the salesperson's ability to understand the customer's feelings helps them to adjust their presentation and consequently to close the sale. Affective empathy is defined by Mehrabian and Epstein (1972, p. 525) as « a vicarious emotional response to the perceived emotional experiences of others ». They add that the development of this trait is influenced by the person's environment and culture. Moreover, other researchers, such as Wai and Tiliopoulos (2012, p.794), Hooker et al (2010, p.100), Ang and Goh (2010, p.387) and Masten et al (2011, p.381), agree with this definition. Comer and Drollinger (1999) refer to affective empathy as «empathetic concern».

Cognitive empathy is considered to be the cognitive process of empathy (Davis, 1983b., p. 115). It involves « the imaginative transposing of oneself into thinking, feeling and acting of another and so structuring the world as he does (Dymond, 1949, p. 127). This understanding is distinguished by the fact that it takes place at an objective level (Barrett & Leonard, 1964, 1981; Kalliopuska, 1986; Rogers, 1986). The reaction or behaviour is based on the ability to perceive external information and stimuli (Guilé, 2010, p. 338). Through this cognitive empathy competency, the individual is able to anticipate the reactions of others (Coke et al., 1978, p. 753) while taking into account their beliefs, goals and intentions, which may be

different from their own (Hooker et al., 2010, p. 100), leading to positive outcomes (McBane, 1995, p. 350).

Emotional contagion is recognised as an aspect of empathy in the psychological literature (Moore, 1990), seen as the basis for altruistic behaviour (Rushton, 1980). Emotional contagion is defined as « emotion-induced emotion... It occurs when a person sees another's joy or suffering, and experiences joy or suffering themselves » (McBane, 1995, p. 354).

McBane (1995) has shown the importance of affective and cognitive empathy and emotional contagion for the salesperson in the practice of their activity. On the basis of affective empathy, the salesperson is concerned with the customer's well-being with an altruistic propensity to help (McBane, 1995, p. 351). Through cognitive empathy or perspective-taking, the salespeople do not allow themselves to sell a product that does not meet the customer's need (Weitz, 1981, p. 91). The effect of emotional contagion in sales has shown that reflecting the same feeling as the customer can influence the salesperson's performance.

The organisation of these three components in one- or multi-dimensional forms generates a debate not only in marketing, but also in neuromarketing, biology, developmental psychology and ethology (Shamay-Tsoory, 2011, p. 18). Cognitive neuroscience has studied empathy in its most basic process. At this level of research, attention is now focused on comparing the dimensions of empathy studied in the field of sales, particularly those developed using McBane's (1995) scale of measurement with their neurobiological and neurochemical bases.

Comparison of Neurological bases of Empathy

For all mammals, neurobehavioural mechanisms evolve to ensure human survival. DeWall and Thompson (2005) were interested in the ontogenic and phylogenetic evolution of empathy. It is considered to be a biological concept that is continuously evolving (Brothers, 1989, p. 10). We have a better understanding of the role of empathy when its alteration can cause antisocial personality disorders (Blair, 2001), autism (Baron-Cohen & Wheelwright, 2003; Charman et al., 1997), Asperger's syndrome (Shamay-Tsoory et al., 2002) and schizophrenia (Frith & Corcoran, 1996).

Functional neuro-imaging techniques allow the mapping of neuronal activity so as to provide neural tracings of the affective and cognitive empathy processes. The latter is considered by Decety and Svetlova (2012, p. 1) as « a variety of neurobiological systems and partially dissociable social, emotional and cognitive subsystems that operate in parallel fashion. In addition, these different subsystems have their own evo-lutionary history and neurobiological underpinnings ».

In fact, experimental studies in neuroscience have shown the existence of common cortical zones and other distinct ones responsible for empathic activity.

The Common Neural Networks of Empathy: The Mirror Neurons

As Ramachandran (2000, p. 1) stated, « that mirror neurons will do for psychology what DNA did for biology: they will provide a unifying framework and help explain a host of mental abilities that have hitherto remained mysterious and inaccessible to experiments. ». The activation of the Mirror Neuron System (MNS) in the brain, through a process called synchronisation, triggers other cortical areas responsible for emphatic understanding (Cheng et al., 2009; Singer and Fehr, 2005).

In fact, the discovery of the mirror effect of neurons started in an accidental way through an experiment on macaques, carried out by the team of neurologists of Rizzolatti et al (1996). The researchers concluded that the activity of mirror neurons is triggered by the execution of

an intentional action directed towards the achievement of a goal, or by the observation of the same action being carried out by another person (Rizzolatti et al., 1996; Cermolacce et al., 2005, p. 734), «in such a way that the neurons in the brain of the person observing imitate the neurons of the person observed; hence the qualitative 'mirror'» (De Keukelaere, 2005, p. 63). Through the observation of a person performing an action, the brain recruits a part of the same circuit responsible for performing the same action, Grezes and Decety (2001, p. 3) explain. These mirror neurons play a major role not only in imitation and learning, but also in social cognition (Georgieff, 2009, p. 60). Through the accumulation of actions performed and lived experiences, mirror neurons will create a « sub-personal instance of integrated simulation, i.e., automatic and tacit representation processes. Through their neurological imprint, mirror neurons build a direct and automatic link between the observer and the agent. This innate and automatic approach is clearly part of a description of the phenomenon related to empathy» (Cermolacce et al., 2005, p. 735). Research in neuro-imaging shows that affective and cognitive empathy is based on the activity of mirror neurons.

In fact, cortical zones are activated during the observation, the simulation and the execution of the action. The cortical location of mirror neurons is the ventral premotor cortex (F5) and parietal cortex (PF) (Rizzolatti et al., 2001, p. 662). These two main cortical zones are linked to others, of which we mention the dorsal premotor cortex, the supramarginal gyrus and the superior parietal lobule (Nummenmaa et al., 2008, p. 571). Other studies have shown that in addition to the premotor cortex, the region of the temporoparietal junction is activated (Jackson et al., 2006, p. 429; Lyons et al., 2006, p. 231) and that the inferior frontal cortex (Iacoboni et al., 2005, p. 530; Iacoboni et al., 1999, p. 2527) is involved in memorizing and understanding the behaviour of others. We present the schematization of the cortical activity of the mirror neurons responsible for observation, simulation and execution (Figure 01, placed at the bottom in the paper). From the aforementioned and in line with Rizzolatti et al. (2001, p. 661), we can understand that the common activity of affective and cognitive empathy is based on mirror neurons and premotor areas.

The Distinct Neural Networks

Bagozzi et al (2012); Schraa-Tam et al (2012) linked observable reactions of empathy to neurological activation in order to better understand the components of empathy classically presented in the literature. The recent neuroimaging research recognises two main dimensions of empathy, affective and cognitive. They begin to clarify the boundaries between affective and cognitive empathy by affirming that each is based on distinct neural networks (Decety and Mayer, 2008; Singer, 2006; Shamay-Tsoory et al., 2009). A summary diagram of the affective and cognitive components of empathy based on functional neuroimaging experiments is presented (Figure 02, placed at the bottom in the paper).

The cerebral zones linked to affective empathy

Although they share common arrangements, Harari et al (2010, p. 277) point out that affective and cognitive empathy are two distinct dimensions and are based on different neurological circuits. Nummenmaa et al (2008, p. 578) explain that affective empathy is distinguished from cognitive empathy by the involvement of other brain regions, such as the insular cortex (Wicker et al., 2003, p. 656), the right thalamus and the primary somatosensory cortex. Affective empathy is assumed to occur through the simulation process, which relies on the activity of brain imitation to facilitate the understanding of emotion and affective sharing (Decety & Jackson, 2004, p. 71; Preston & DeWaal, 2002). The simulation theory of empathy is conceptually related to the perception-action model (Preston & deWaal, 2002),

which suggests that the observation of emotional expression automatically activates motor representations in the mirror neuron system (Gallese & Goldman, 1998, p. 493; Gallese et al., 2004, p. 397; Gallese, 2007, p. 659). The mirror neurons record the observed emotion that will be identified with a representation already incorporated in the observer that may facilitate the decoding of the observed subject's emotional state (Adolphs, 2002, p. 169; Preston and de Waal, 2002). The results of Hooker et al (2010, p. 101); Nummenmaa et al (2008, p. 571) show that the main neuronal areas involved in the reflection of emotions are the ventrolateral premotor cortex and the inferior parietal cortex. These regions include the connected motor cortex, such as the precentral gyrus (BA 4, 6) and the inferior frontal gyrus (GFI) (BA 44, 45) (Carr et al., 2003, p. 5498; Pfeifer et al, 2008, p. 2079) and the connected somatosensory cortex (CSR) in the inferior parietal lobe, such as the post-central gyrus (BA 3) and supramarginal gyrus (BA 40) (Adolphs et al., 2002, p.170; Gazzola et al., 2006, p.1825), the left superior frontal gyrus and the orbitofrontal cortex (Farrow et al., 2001, p.2433). Völlm et al (2006, p. 92) distinguish cortical areas relevant to specific actions of verbal and non-verbal types. The precuneus, the middle temporal gyrus and the superior and inferior temporal cortex are activated upon emotional interaction of the non-verbal type which is based solely on observation. Living and feeling the emotion pass through the areas of the orbitofrontal, the frontal temporal gyrus and the medial superior gyrus. We note that the superior frontal gyrus and the inferior frontal gyrus are activated at the moment of the verbal emotional interaction.

The cerebral zones linked to emotional contagion

McBane (1995) has highlighted that emotional contagion is a dimension of affective empathy. However, neuroscience research considers that emotional contagion is not a dimension that forms empathy, but rather its basis. DeWaal (2008) considers emotional contagion to be the first phylogenetic system of affective empathy. Sharma-Tsoory (2011, p. 19) adds that « The basic emotional contagion system is thought to support our ability to empathize emotionally » and not a dimension of it.

The cerebral zones linked to cognitive empathy

The distinction between affective and cognitive empathy occurs at the level of the prefrontal cortex (PFC) according to the results of the meta-analysis by Steele and Lawrie (2004). The cognitive function is concentrated at the dorsolateral level and the emotional function is mainly concentrated at the medial level. The study by Masten et al (2011, p. 381) confirms these results and underlines that affective empathy occupies the limbic region, notably the dorsal anterior cingulate cortex and the anterior islet. Cognitive empathy is rather related to the regions of mentalization which include the Ventromedial Prefrontal Cortex (VMPFC), Medial Cortex and Dorsomedial Cortex (VMPFC, MPFC, DMPFC), Posterior Superior Temporal Sulcus (pSTS), Temporal Poles (TP), Posterior Cingulate Cortex (PCC) and the Precuneus. Moreover, these results are shared by other researchers by way of example and without claiming to be exhaustive: (Frith and Frith, 1999, 2003, 2006; Beer and Hughes, 2010; Singer, 2006; Hynes et al., 2006; Vollm et al., 2006; Gallagher and Frith, 2003).

This analysis of empathy at a neuroanatomical level leads us to confirm the idea that affective and cognitive empathy do not share the same cortical zones. Despite this cortical distinction, most behaviours, especially those that are integrated into social interactions, imply the neuronal activation of the two circuits, affective and cognitive (Hynes et al., 2006, p. 475; Schulte-Ruther et al., 2007, p. 1356).

Neurochemical Comparison between Affective and Cognitive Empathy

Although the empathic response relies on several neurotransmitters, affective empathy and cognitive empathy are primarily driven by oxytocin and dopamine respectively.

In fact, affective empathy is produced in the human body through the secretion of oxytocin, which targets in particular the amygdala, hippocampus, brain stem, heart, and regions of the spinal cord that regulate the nervous system (Decety and Svetlova, 2012, p. 1). Oxytocin is a neurotransmitter activated essentially to stimulate attachment to others, for example during childbirth and breastfeeding, to develop social behaviours and to promote the development of trust and empathy, in the context of a couple in this case (Lambert and Lotstra, 2005 and Hurleman et al., 2010).

Cognitive empathy is based on dopamine, which is a neurotransmitter of information (Decety and Chaminade, 2003, p. 133). The particularity of dopamine is that the majority of the released neurotransmitters are returned by the dopaminergic system for reuse (Gerra et al., 2007). It plays a key role in the development of memory, learning, attention and reward anticipation (Berridge and Robinson, 1998, p. 309). Lackner et al (2010) located dopamine at the level of the cognitive empathy activity in a study conducted on children.

Furthermore, DeWaal (2008) confirms that affective empathy develops relatively earlier than cognitive empathy.

Following this comparison, conducted on the basis of studies of the neurochemical and developmental mechanisms of empathy, we join Shamay-Tsoory (2011) and Shamay-Tsoory and Aharon-Peretz (2007) in confirming the two-dimensional nature of empathy.

Conclusion

Although empathy is one of the subjects much discussed in the context of sales, rarely do studies address it in its deep neural dimension. It is a broad and complex concept, of which the definition, measures and consequences are difficult to define.

However, while marketing research has been able to identify most of the components and determinants of empathy, it has not sufficiently explored the internal processes that govern them. One possible way to achieve this result is to go through a literature review of the cognitive neurosciences and the contributions of the Biomarketing paradigm. We have tried to explain these micro-processes and to determine the number of dimensions of empathy based on the discussion about the scale proposed by McBane (1995) which is widely used in the marketing context.

Working from neuroanatomical and neurochemical explanations, we confirm the distinction between affective and cognitive empathy, hence the consideration of empathy as a two-dimensional construct. Moreover, the results of the literature review from neuroscience have shown that emotional contagion is involved in the process of affective empathy and this is done by borrowing the same neural circuits. This neurological corroboration leads us to consider that empathy is composed of both the affective and cognitive dimensions and that emotional contagion is not a third dimension of empathy, but constitutes the phylogenetic basis of affective empathy. These neurochemical and neuroanatomical corroborations fundamentally reconfirm the number of dimensions proposed by McBane (1995) and constitute a solid theoretical groundwork that paves the way for future empirical research.

This research is an initiative that aims at the study of empathy across barriers between disciplines. Communication between marketing and cognitive neuroscience has fostered a fruitful crossover that has helped us confirm the number of dimensions of empathy and that encourages us to conduct further research.

References

- Adolphs, R. (2002). "Neural systems for recognizing emotion". *Current opinion in neurobiology*, 12(2), 169-177.
- Aggarwal, P., Castleberry, S. B., Ridnour, R., & Shepherd, C. D. (2005). "Salesperson empathy and listening: Impact on relationship outcomes". *Journal of Marketing Theory and Practice*, 16-31.
- Ang, R. P., & Goh, D. H. (2010). "Cyberbullying among adolescents: The role of affective and cognitive empathy, and gender". *Child Psychiatry & Human Development*, 41(4), 387-397.
- Arefi, M. (2010). "Present of a causal model for social function based on theory of mind with mediating of Machiavellian beliefs and hot empathy". *Procedia-Social and Behavioral Sciences*, 5, 694-697.
- Bagozzi, R. P., & Verbeke, W. J. (2014). "Biomarketing: An emerging paradigm linking neuroscience, endocrinology, and genetics to buyer–seller behavior". *The Routledge Companion to the Future of Marketing*, 107.
- _____, Bergami, M., Marzocchi, G. L., & Morandin, G. (2012). "Customer–organization relationships: Development and test of a theory of extended identities". *Journal of Applied Psychology*, 97(1), 63.
- Baron-Cohen, S., & Wheelwright, S. (2003). "The friendship questionnaire: An investigation of adults with Asperger syndrome or high-functioning autism, and normal sex differences". *Journal of autism and developmental disorders*, 33(5), 509-517.
- Barrett-Lennard, G. T. (1964). "*The relationship inventory: Forms OS-M-64, OS-F-64 and MO-M-64 plus MO-F-64*". Unpublished manuscript, University of New England, Australia.
- _____. (1981). "The Empathy Cycle". *Journal of Counselin Psychology*, 28, 91-100.
- Beer, J. S., & Hughes, B. L. (2010). "Neural systems of social comparison and the "above-average" effect". *Neuroimage*, 49(3), 2671-2679.
- Berridge, K. C., & Robinson, T. E. (1998). "What is the role of dopamine in reward: hedonic impact, reward learning, or incentive salience?". *Brain Research Reviews*, 28(3), 309-369.
- Beven, J. P., O'Brien-Malone, A., & Hall, G. (2004). "Using the interpersonal reactivity index to assess empathy in violent offenders". *International Journal of Forensic Psychology*, 1(2), 33-41.
- Blair, R. J. R. (2001). "Neurocognitive models of aggression, the antisocial personality disorders, and psychopathy". *Journal of Neurology, Neurosurgery & Psychiatry*, 71(6), 727-731.
- Bohart, A., & Greenberg, L. (1997). "Empathy and Psychotherapy: An Introductory Overview. In: Bohart A, Greenberg L, eds. Empathy Reconsidered: New Directions in Psychotherapy". *Washington, DC: American Psychological Association*, 325.
- Brothers, L.A., (1989). "Biological perspective on empathy". *Am. J. Psychiatry* 6 (1), 10–19.
- Carr, L., Iacoboni, M., Dubeau, M. C., Mazziotta, J. C., & Lenzi, G. L. (2003). "Neural mechanisms of empathy in humans: a relay from neural systems for imitation to limbic areas". *Proceedings of the national Academy of Sciences*, 100(9), 5497-5502.

- Cermolacce M., Laurence D., Naudin J., & Parnas J. (2005). "Are we all people specialists? Intersubjectivity, Theory of Mind and Schizophrenia". *L'Evolution Psychiatry*; 70, 731-744.
- Charman, T., Swettenham, J., Baron-Cohen, S., Cox, A., Baird, G., & Drew, A. (1997). "Infants with autism: an investigation of empathy, pretend play, joint attention, and imitation". *Developmental psychology*, 33(5), 781.
- Cheng, Y., Chou, K.-H., Decety, J., Chen, I.-Y., Hung, D., & Tzeng, O. J.-L., (2009). "Sex differences in the neuroanatomy of human mirror neuron system: a voxel-based morphometric investigation". *Neuroscience*, 158, 713–720.
- Coke, J. S., Batson, C. D., & McDavis, K. (1978). "Empathic mediation of helping: A two-stage model. *Journal of Personality and Social Psychology*", 36, 752-766.
- Comer, L. B., & Drollinger, T. (1999). "Active empathetic listening and selling success: A conceptual framework". *Journal of Personal Selling & Sales Management*, 19(1), 15-29.
- Davis, M. H. (2000). "Personal Communication Regarding Correlations Between Cognitive and Affective Empathic Abilities and Scales on the Interpersonal Reactivity Index (IRI)", StPetersburg, Eckerd College.
- (1983). "Measuring individual differences in empathy: Evidence for a multidimensional approach". *Journal of personality and social psychology*, 44(1), 113.
- (1994). "*Empathy: A social psychological approach*". Westview Press.
- (1983b). "Measuring individual differences in empathy: Evidence for a multidimensional approach". *Journal of Personality and Social Psychology*, 44, 113-126.
- Dawson, L. E., Jr., Soper, B., & Pettijohn, C. E. (1992). "The effects of empathy on salesperson effectiveness". *Psychology & Marketing*, 9, 297-310.
- De Keukelaere, S. (2005). « Des découvertes révolutionnaires en sciences cognitives. Les paradoxes et dangers de l'imitation ». *Automates intelligents*, 63.
- De Waal, F. B. (2008). "Putting the altruism back into altruism: the evolution of empathy". *Annu. Rev. Psychol.*, 59, 279-300.
- , Thompson, E., & Proctor, J. D. (2005). "Primates, monks and the mind". *Journal of Consciousness Studies*, 12(7), 38-54.
- Decety, J., & Chaminade, T. (2003). "Neural correlates of feeling sympathy". *Neuropsychologia*, 41(2), 127-138.
- & Jackson, P. L. (2004). "The functional architecture of human empathy". *Behavioral and cognitive neuroscience reviews*, 3(2), 71-100.
- & Meyer, M. (2008). "From emotion resonance to empathic understanding: A social developmental neuroscience account". *Development and psychopathology*, 20(04), 1053-1080.
- & Svetlova, M. (2012). "Putting together phylogenetic and ontogenetic perspectives on empathy". *Developmental cognitive neuroscience*, 2(1), 1-24.
- Deeter-Schmelz, D. R., & Sojka, J. Z. (2003). "Developing effective salespeople: Exploring the link between emotional intelligence and sales performance". *The International Journal of Organizational Analysis*, 11(3), 211-220.
- Delpechitre, D. (2010). "*The development and validation of the Customer's Perception of the Salesperson's Empathy (CPSE) Scale*" (Doctoral dissertation, PURDUE UNIVERSITY).
- . (2013). "Review and assessment of past empathy scales to measure salesperson's empathy". *Journal of Management and Marketing Research*, 13, 1.
- Dymond, R. F. (1949). "A scale for the measurement of empathic ability". *Journal of consulting psychology*, 13(2), 127.

- Farrow, T. F., Zheng, Y., Wilkinson, I. D., Spence, S. A., Deakin, J. W., Tarrier, N., & Woodruff, P. W. (2001). "Investigating the functional anatomy of empathy and forgiveness". *Neuroreport*, 12(11), 2433-2438.
- Favre, D., Joly, J., Reynaud, C., & Salvador, L. L. (2005). « Empathie, contagion émotionnelle et coupure par rapport aux émotions ». *Enfance*, 57(4), 363-382.
- Frith, C. D., & Frith, U. (1999). "Interacting minds--a biological basis". *Science*, 286 (5445), 1692-1695.
- _____, & Corcoran, R. (1996). "Exploring Ftheory of mind_ in people with schizophrenia". *Psychol. Med.* 26 (3), 521– 530.
- _____, & Frith, U., (2006). "The neural basis of mentalizing". *Neuron* 50, 531–534.
- Frith, U., & Frith, C. D. (2003). "Development and neurophysiology of mentalizing. Philosophical Transactions of the Royal Society of London". Series B: *Biological Sciences*, 358(1431), 459–473.
- Futrell, C. (1993), "*Fundamentals of selling*". Homewood, IL: Irwin.
- _____(1988), "*Fundamentals of Selling*" (2nd ed.), Homewood, IL: Irwin
- Gallagher, H. L., & Frith, C. D. (2004). "Dissociable neural pathways for the perception and recognition of expressive and instrumental gestures". *Neuropsychologia*, 42(13), 1725–1736.
- Gallese, V. (2007). "Before and below 'theory of mind': embodied simulation and the neural correlates of social cognition". *Philosophical Transactions of the Royal Society of London B: Biological Sciences*, 362(1480), 659-669.
- _____, & Goldman, A. (1998). "Mirror neurons and the simulation theory of mind-reading". *Trends in cognitive sciences*, 2(12), 493-501.
- _____, Keysers, C., & Rizzolatti, G. (2004), "A unifying view of the basis of social cognition". *Trends in cognitive sciences*, 8(9), 396-403.
- Gazzola, V., Aziz-Zadeh, L., & Keysers, C. (2006). "Empathy and the somatotopic auditory mirror system in humans". *Current biology*, 16(18), 1824-1829.
- Georgieff, N. (2009). "Empathy today: At the crossroads of neurosciences, psychopathology and psychoanalysis". *La psychiatrie de l'enfant*, 51(2), 357-393.
- Gerra, G., Leonardi, C., Cortese, E., Zaimovic, A., Dell'Agnello, G., Manfredini, M., & Raggi, M. A. (2007). "Homovanillic acid (HVA) plasma levels inversely correlate with attention deficit-hyperactivity and childhood neglect measures in addicted patients". *Journal of Neural Transmission*, 114(12), 1637-1647.
- Giacobbe, R. W., Jackson, D. W., Crosby, L. A., & Bridges, C. M. (2006). "A contingency approach to adaptive selling behavior and sales performance: selling situations and salesperson characteristics". *Journal of Personal Selling and Sales Management*, 26(2), 115–142.
- Greenberg, H. M., & Mayer, D. (1964). "A new approach to the scientific selection of successful salesmen". *Journal of Psychology*, 57, 113-123.
- Greenson, R. R. (1960). "Empathy and its vicissitudes". *International Journal of Psychoanalysis*, 41, 418-424.
- Grezes, J., & Decety, J. (2001). "Functional anatomy of execution, mental simulation, observation, and verb generation of actions: a meta-analysis". *Human brain mapping*, 12(1), 1-19.
- Guile, J. M. (2010). "Disentangling cognitive processes from neural activation and psychic mechanisms: the example of empathy". *Journal of Physiology-Paris*, 104(6), 337-341.
- Guilford, J. P. (1967). "The nature of human intelligence".

- Harari, H., Shamay-Tsoory, S. G., Ravid, M., & Levkovitz, Y. (2010). "Double dissociation between cognitive and affective empathy in borderline personality disorder". *Psychiatry research*, 175(3), 277-279.
- Hogan, R. (1969). "Development of an empathy scale". *Journal of consulting and clinical psychology*, 33(3), 307.
- Homburg, C., & Stock, R. M. (2005). "Exploring the conditions under which salesperson work satisfaction can lead to customer satisfaction". *Psychology & Marketing*, 22(5), 393-420.
- _____, Wieseke, J., & Bornemann, T. (2009). "Implementing the marketing concept at the employee-customer interface: the role of customer need knowledge". *Journal of Marketing*, 73(July), 64– 81.
- Hooker, C. I., Verosky, S. C., Germine, L. T., Knight, R. T., & D'Esposito, M. (2010). "Neural activity during social signal perception correlates with self-reported empathy". *Brain research*, 1308, 100-113.
- Hunt, T. (1928). "The measurement of social intelligence". *Journal of Applied Psychology*, 12(3), 317.
- Hurlemann, R., Patin, A., Onur, O. A., Cohen, M. X., Baumgartner, T., Metzler, S., & Kendrick, K. M. (2010). "Oxytocin enhances amygdala-dependent, socially reinforced learning and emotional empathy in humans". *The Journal of Neuroscience*, 30(14), 4999-5007.
- Hynes, C. A., Baird, A. A., & Grafton, S. T. (2006). "Differential role of the orbita frontal lobe in emotional versus cognitive perspective-taking". *Neuropsychologia*, 44(3), 374-383.
- Iacoboni, M., Molnar-Szakacs, I., Gallese, V., Buccino, G., Mazziotta, J. C., & Rizzolatti, G. (2005). "Grasping the intentions of others with one's own mirror neuron system". *PLoS Biol*, 3(3), e79.
- _____, Woods, R. P., Brass, M., Bekkering, H., Mazziotta, J. C., & Rizzolatti, G. (1999). "Cortical mechanisms of human imitation". *Science*, 286(5449), 2526-2528.
- Jackson, P. L., Meltzoff, A. N., & Decety, J. (2006). "Neural circuits involved in imitation and perspective-taking". *Neuroimage*, 31(1), 429-439.
- Kalliopuska M. (1986). "Empathy and the experiencing of loneliness". *Psychological Reports*, 59(3), 1052-1064.
- Kohut, H. (1984). *"How does analysis cure?"* Chicago: The University of Chicago Press.
- Lackner, C. L., Bowman, L. C., & Sabbagh, M. A. (2010). "Dopaminergic functioning and preschoolers' theory of mind". *Neuropsychologia*, 48(6), 1767-1774.
- Lambert, N., & Lotstra, F. (2005). "L'attachement. De Konrad Lorenz à Larry Young : de l'éthologie à la neurobiologie". *Cahiers critiques de thérapie familiale et de pratiques de réseaux*, (2), 83-97.
- Lamont, L.M. & Lundstrom, W.J. (1977). "Identifying successful industrial salesmen by personality and personal characteristics". *Journal of Marketing Research*, 14, 517-529.
- Lawrence, E. J., Shaw, P., Baker, D., Baron-Cohen, S., & David, A. S. (2004). "Measuring empathy: reliability and validity of the Empathy". *Quotient. Psychological medicine*, 34(05), 911-920.
- Lyons, D. E., Santos, L. R., & Keil, F. C. (2006). "Reflections of other minds: how primate social cognition can inform the function of mirror neurons". *Current opinion in neurobiology*, 16(2), 230-234.
- Masten, C. L., Morelli, S. A., & Eisenberger, N. I. (2011). "An fMRI investigation of empathy for 'social pain' and subsequent prosocial behavior". *Neuroimage*, 55(1), 381-388.

- McBane, D. A. (1995). "Empathy and the salesperson: A multidimensional perspective". *Psychology & Marketing*, 12(4), 349-370.
- Mead, G. H. (1934). *Mind, self & society from the standpoint of a social behaviorist*. Chicago: University of Chicago Press.
- Mehrabian, A., & Epstein, N. (1972). "A measure of emotional empathy1". *Journal of personality*, 40(4), 525-543.
- Mitchell, R. L., & Phillips, L. H. (2015). "The overlapping relationship between emotion perception and theory of mind". *Neuropsychologia*, 70, 1-10.
- Montag, C., Gallinat, J., & Heinz, A. (2008). "Theodor Lipps and the concept of empathy: 1851-1914". *American Journal of Psychiatry*, 165(10), 1261-1261.
- Moore, B.S. (1990). "The origins and development of empathy". *Motivation and Emotion*, 14, 75-80.
- Nummenmaa, L., Hirvonen, J., Parkkola, R., & Hietanen, J. K. (2008). "Is emotional contagion special? An fMRI study on neural systems for affective and cognitive empathy". *Neuroimage*, 43(3), 571-580.
- Pence, M. E., & Vickery, A. J. (2012). "The roles of personality and trait emotional intelligence in the active-empathic listening process: Evidence from correlational and regression analyses". *International Journal of Listening*, 26(3), 159-174.
- Pettijohn, C. E., Pettijohn, L. S., & Taylor, A. J. (1995). "The relationship between effective counseling and effective selling behaviors". *Journal of Consumer Marketing*, 12(1), 5-15.
- Pfeifer, J. H., Iacoboni, M., Mazziotta, J. C., & Dapretto, M. (2008). "Mirroring others' emotions relates to empathy and interpersonal competence in children". *Neuroimage* 39, 2076–2085.
- Plank, R. E., Minton, A. P., & Reid, D. A. (1996). "A short measure of perceived empathy". *Psychological reports*, 79(3 suppl), 1219-1226.
- Preston, S. D., & De Waal, F. B. (2002). "Empathy: Its ultimate and proximate bases". *Behavioral and brain sciences*, 25(1), 1-20.
- Ramachandran, V. S. (2000). "Mirror neurons and imitation learning as the driving force behind "the great leap forward" in human evolution".
- Reik, T. (1948). *Listening with the third ear*. New York: Farrar, 1949.
- Ricks, J., & Veneziano, L. (1998). "The effect of gender and selected personality traits on objective and subjective measures of sales performance". *Journal of Marketing Management*, 8(2), 7-21.
- Rizzolati, G., Fadiga, L., Fogassi, L., & Gallese, V. (1996a). "Premotor cortex and the Recognition of motor actions". *Cognitive Brain Research*, 3, 131-141
- _____, Fogassi, L., & Gallese, V., (2001). "Neurophysiological mechanisms underlying the understanding and imitation of action". *Nat. Rev. Neurosci.* 2, 661–670.
- Rogers, C. R. (1959). "A theory of therapy, personality, and interpersonal relationships: as developed in the client-centered framework".
- Roy, J. (2011). « L'INFLUENCE DE L'EMPATHIE SUR LA PERFORMANCE DES VENDEURS : UNE EXPLORATION PAR L'INDEX DE RÉACTIVITÉ IMPERSONNELLE (IRI) ». Proposition de communication, 10th International Conference, Marketing Trends, Paris, January 20-22, 2011.
- Rushton, J. P. (1980). *Altruism, socialization, and society*. Englewood Cliffs, NJ: Prentice-Hall.

- Schraa-Tam, C. K., Rietdijk, W. J., Verbeke, W. J., Dietvorst, R. C., Van Den Berg, W. E., Bagozzi, R. P., & De Zeeuw, C. I. (2012). "fMRI activities in the emotional cerebellum: a preference for negative stimuli and goal-directed behavior". *The Cerebellum*, 11(1), 233-245.
- Schulte-Rüther, M., Markowitsch, H. J., Fink, G. R., & Piefke, M. (2007). "Mirror neuron and theory of mind mechanisms involved in face-to-face interactions: a functional magnetic resonance imaging approach to empathy". *Journal of cognitive neuroscience*, 19(8), 1354-1372.
- Shamay-Tsoory, S. G. (2011). "The neural bases for empathy". *The Neuroscientist*, 17(1), 18-24.
- _____, Aharon-Peretz, J., & Perry, D. (2009). "Two systems for empathy: a double dissociation between emotional and cognitive empathy in inferior frontal gyrus versus ventromedial prefrontal lesions". *Brain*, 132(3), 617-627.
- _____, Tomer, R., Yaniv, S., & Aharon-Peretz, J. (2002). "Empathy deficits in Asperger syndrome: A cognitive profile". *Neurocase*, 8(2), 245-252.
- _____, & Aharon-Peretz, J., (2007). "Dissociable prefrontal networks for cognitive and affective theory of mind: a lesion study". *Neuropsychologia* 45, 3054-3067.
- Sharma, A. (2001). "Consumer decision-making, salespeople's adaptive selling and retail performance". *Journal of Business Research*, 54(2), 125-129.
- Sharpley, C. F., & Cross, D. G. (1982). "A psychometric evaluation of the Spanier Dyadic Adjustment Scale". *Journal of Marriage and the Family*, 739-741.
- Singer, T. (2006). "The neuronal basis and ontogeny of empathy and mind reading: review of literature and implications for future research". *Neuroscience & Biobehavioral Reviews*, 30(6), 855-863.
- _____, & Fehr, E. (2005). "The neuroeconomics of mind reading and empathy. *The American Economic Review*, 95(2), 340-45.
- Snyder, M. (1974). "Self-monitoring of expressive behavior". *Journal of personality and social psychology*, 30(4), 526.
- Steele, J. D., & Lawrie, S. M. (2004). "Segregation of cognitive and emotional function in the prefrontal cortex: a stereotactic meta-analysis". *Neuroimage*, 21(3), 868-875.
- Stock, R. M., & Hoyer, W. D. (2005). "An attitude-behavior model of salespeople's customer orientation". *Journal of the academy of marketing science*, 33(4), 536-552.
- Thorndike, E. L. (1920). "Intelligence and its uses". *Harper's magazine*.
- _____, (1936). "Factor analysis of social and abstract intelligence". *Journal of Educational Psychology*, 27(3), 231.
- _____, & Stein, S. (1937). "An evaluation of the attempts to measure social intelligence". *Psychological Bulletin*, 34(5), 275.
- Tobolski, F. P., & Kerr, W. A. (1952). "Predictive value of the empathy test in automobile salesmanship". *Journal of Applied Psychology*, 36, 310-311.
- Vollm, B. A., Taylor, A. N., Richardson, P., Corcoran, R., Stirling, J., McKie, S., & Elliott, R. (2006). "Neuronal correlates of theory of mind and empathy: a functional magnetic resonance imaging study in a nonverbal task". *Neuroimage*, 29(1), 90-98.
- Wai, M., & Tiliopoulos, N. (2012). "The affective and cognitive empathic nature of the dark triad of personality". *Personality and Individual Differences*, 52(7), 794-799.
- Weitz, B. A. (1981). "Effectiveness in sales interactions: a contingency framework". *The Journal of marketing*, 85-103.

- _____, Sujan, H., & Sujan, M. (1986). "Knowledge, motivation, and adaptive behavior: A framework for improving selling effectiveness". *The Journal of marketing*, 174-191.
- Wicker, B., Keysers, C., Plailly, J., Royet, J. P., Gallese, V., & Rizzolatti, G. (2003). "Both of us disgusted in My insula: the common neural basis of seeing and feeling disgust". *Neuron*, 40(3), 655-664.
- Widmier, S. (2002). "The effects of incentives and personality on salesperson's customer orientation". *Industrial Marketing Management*, 31(7), 609-615.
- Wong, A., & Sohal, A. (2003). "Service quality and customer loyalty perspectives on two levels of retail relationships". *Journal of services marketing*, 17(5), 495-513.
- Yarnold, P. R., Bryant, F. B., Nightingale, S. D., & Martin, G. J. (1996). "Assessing physician empathy using the Interpersonal Reactivity Index: A measurement model and cross-sectional analysis". *Psychology, Health & Medicine*, 1(2), 207-221.

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Table 01

Empathy Measurement Scales

Authors / Years	Field of research	Description & notes relevant to the scale
*Dymond (1949) Empathy test	*Psychology	The aim is to accurately measure the degree of perception of the other. The result is that the person can achieve a high level of perception without being empathetic. Also this scale has the problem of length in administration and a problem of validity. Researchers such as Davis (1994), Chlopan et al (1985) have questioned the validity of this scale.
*Kerr and Speroff (1954) Empathy test *Tobolski and Kerr (1952) Empathy test	*Psychology *Interpersonal behaviour in the field of sales	-
Feshbach and Roe (1968)	*Psychology Measuring affective and cognitive empathy in children	Researchers who have adopted this scale have criticised it for its poor psychometric properties and for the difficulty of understanding its concepts (Eisenberg-Berg and Lennon, 1980; Hoffman, 1982).
*Barrett and Lennard (1964-1981) Relationship Inventory (RI)	*Sales	The RI scale consists of four dimensions and is characterised by very strong psychometric properties.
Hogan (1969) Empathy measurement (ME)	*Sales Measures the extent of the salesperson's performance (affective empathy). A scale that is considered one-dimensional and consists of 64 items.	Cross and Sharpley (1982) have noticed the EM scale with weak psychometric properties and Davis (1994) has stated that EM is not a scale for measuring empathy, but rather used as a measure of social competence. Johnson, Play, and Smither (1983) found the four factors to be relatively uncorrelated.
*Mehrabian and Epstein (1972) questionnaire measure of emotional empathy of Mehrabian	*Social psychology (affective empathy)	Likert scale from -4 to 4. The scale consists of 7 items. Baron-Cohen and Wheelwright (2004) estimate that the scale is unclear. Mehrabin (1996) has adapted the QMEE scale and developed the BEES Emotional Empathy Scale which focuses on the affective dimension of empathy with 30 items.

and Epstein (QMEE)		
Davis (1980) Interpersonal Reactivity Index (IRI)	*Sales	Two dimensions with four factors expressing affective and cognitive empathy. The four dimensions are: "perspective-taking", "empathic-concern", "fantasy" and "personal distress". Yarnold et al. (1996) did not confirm the stability of the four dimensions and added a fifth dimension called implication. The IRI scale (Davis, 1980) is considered to be the most developed measure of empathy and has been picked up by (Baron-Cohen and Wheelwright, 2004; Muncer and Ling, 2006). However, the latter two dimensions are strongly criticized (Beven, O'Brien-Malone and Hall, 2004; Lawrence et al., 2004).
McBane (1995)	*Sales	Two-dimensional scale applied in the sales area.
Plank, Minton and Reid (1996)	*Sales	Empathy is studied through 7 items on a seven-point scale ranging from "strongly disagree" to "strongly agree". The scale is administered from the client side, which began to measure affective and cognitive empathy as a two-factor scale, but then the researchers found it difficult to interpret, which is why they adopted the idea of a one-dimensional scale.
*Baron-Cohen and Wheelwright (2004) Empathy Quotient scale (EQ)	*Psychology	The scale has three dimensions: cognitive, emotional reactivity and social skills with 60 items and asks about the perception of empathy.
*Jolliffe and Farrington (2006) Basic empathy scale (BES)	*Social psychology 720 Teenagers aged 15 years old	A scale with two dimensions: affective and cognitive empathy with 20 items on a five-point scale ranging from "strongly disagree" to "strongly agree".
*Ang and Goh (2010, p. 390) Basic Empathy Scale	Psychology the psychiatric development of the teenager	Five-point Likert scale, which includes affective and cognitive empathy.
Hooker et al. (2010, p.102)	*Psychology The study of the cortical zones of affective empathy	The Interpersonal Reactivity Index (IRI) with 28 items by Davis (1996). Scenarios based on social scenes using facial coding algorithms (FACS).

	and cognitive empathy	
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Table 02

Characteristics of the Empathy Scale (McBane, 1995)

Construct	Source	Number of dimensions	Number of items	Scale
Empathy	McBane (1995)	Affective empathy	9	7-point metric scale from "strongly disagree" to "strongly agree".
		Cognitive empathy		
		Emotional contagion		

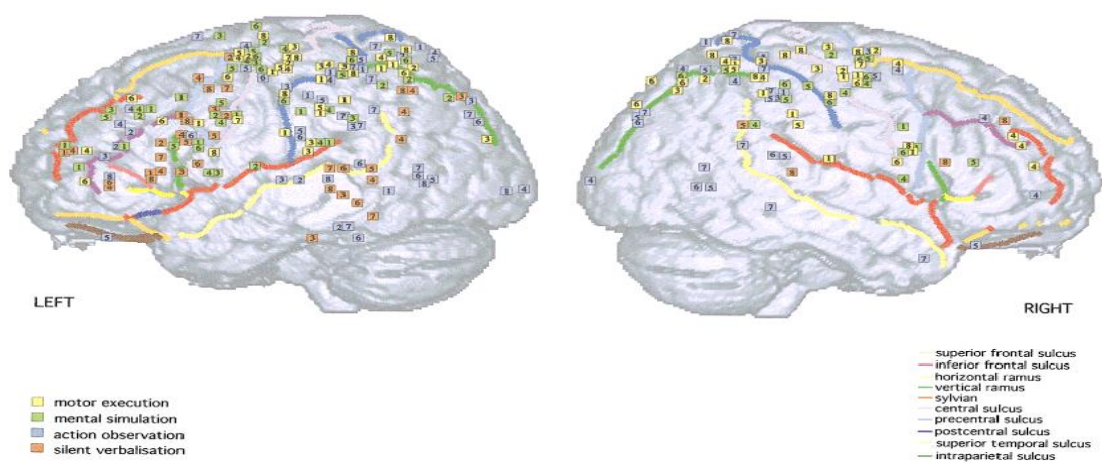


Figure 01: The neurological bases of mirror neurons
Grèzes and Decety (2001, p. 6)

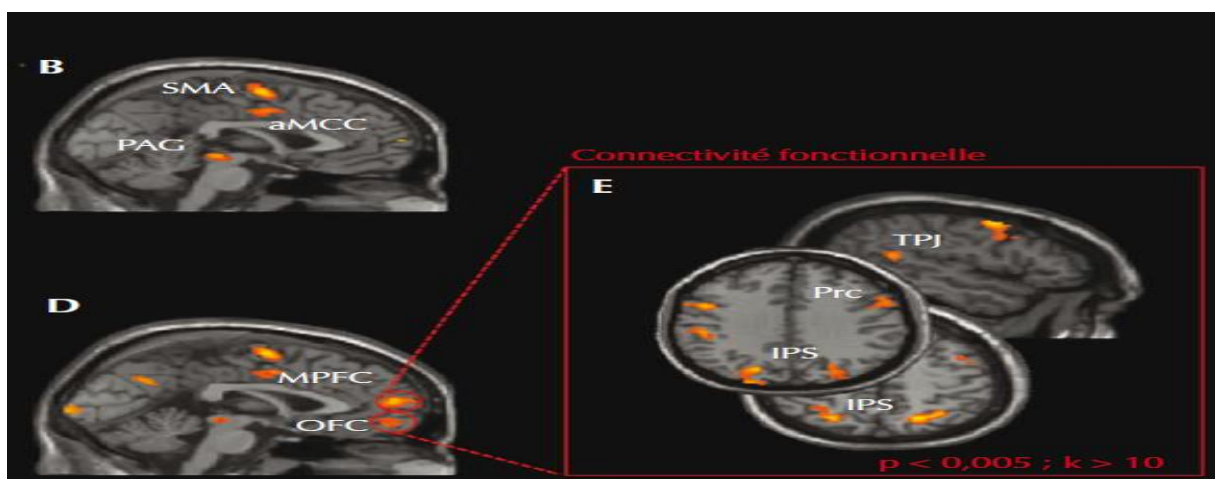


Figure 02: Location of neural networks of empathy
Source: Decety (2012, p.138)