Departamento de Psicologia Social e das Organizações

Social cognitive consequences of differences in the emotional grounding of concepts: The role of embodiment.

Catarina Mesquita Melo e Azevedo

A Dissertation presented in partial fulfillment of the requirements for the Degree of

Doctor of Psychology

Supervisor:
Doctor Margarida Vaz Garrido, Assistant Professor
ISCTE – Lisbon University Institute, Portugal

Co-Supervisor:
Professor Gün R. Semin, Full Professor
William James Center for Research, ISPA-Instituto Universitário, Portugal

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Jury:

President: Professor Luís Antero Reto, Full Professor
Instituto Universitário de Lisboa (ISCTE-IUL), Portugal

Examiners: Doctor Francesco Foroni, Research Fellow
Scuola Internazionalle Superiore di Study Avanzati, Trieste, Italy

Doctor Mário Augusto Boto Ferreira, Associate Professor
Faculdade de Psicologia, Universidade de Lisboa, Portugal

Doctor Rui Alberto Costa-Lopes, Research Fellow
Instituto de Ciências Sociais, Universidade de Lisboa, Portugal

Doctor Elizabeth Collins, Research Fellow
Centro de Investigação e Intervenção Social, ISCTE-IUL, Portugal

Supervisor: Doctor Margarida Vaz Garrido, Assistant Professor
Instituto Universitário de Lisboa (ISCTE-IUL), Portugal

Co-supervisor: Professor Gün R. Semin, Full Professor
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Resumo

O presente trabalho examina a ancoragem afectiva da língua-nativa (L1) e da segunda-língua (L2), e como estas influenciam de forma diferente processos intra-individuais, inter-individuais e intergrupais. No primeiro capítulo enquadramos o trabalho na abordagem da Cognição Social Situada propondo a aplicação das suas premissas à comunicação linguística. No segundo capítulo revemos estudos que mostram diferenças no processamento de L1-L2 concluíndo que, provavelmente, estas línguas não são corporalizadas da mesma maneira.

No primeiro capítulo empírico examinamos esta premissa em dois experimentos de primação afectiva. Observámos efeitos de congruência apenas em L1 para pares de palavras primo-alvo, e em L1-L2 para pares de palavras/fotos (expressões faciais). Estes resultados sugerem diferenças na ancoragem afectiva de L1-L2 e que a presença de expressões faciais, facilitadoras de processos de simulação afectiva, anula os constrangimentos impostos por L2. O segundo conjunto de três experimentos revelou que L2 induz distância social e um processamento mais abstracto. Para além disso, a distância social induzida por L2 foi mediada por um construal-level mais abstracto, o que é consistente com a natureza descorporalizada de L2. No último conjunto de dois experimentos observou-se que a avaliação de frases de conteúdo afectivo, apresentadas em L1-L2, depende da sua valência e da pertença grupal dos alvos descritos. A simulação afectiva (medida com EMG) foi mais intensa em L1, e para o in-group, e as diferenças na simulação de frases do in-group/out-group foram realçadas em L2. O último capítulo apresenta os resultados principais, seus contributos e limitações, e sugestões para investigação futura.

Palavras-Chave: Cognição Social Situada; Corporalização; Bilinguismo; Segunda Língua.

Abstract

The present work examines the affective grounding of first-native (L1) and second-learned (L2) languages, and how they differently impact intra-individual, inter-individual and intergroup processes. In the first chapter we framed our work in the Socially Situated Cognition approach, and proposed the application of its assumptions to linguistic communication. In the second chapter we reviewed literature showing the differences in processing L1-L2, and concluded that these languages are not likely to be grounded in the same way.

In the first empirical chapter we examined this assumption in two affective priming experiments. Congruency effects were observed only in L1 for prime/target word pairs, and in L1-L2 for pairs of word/photos (facial expressions). These results suggest different groundings of L1-L2, and that the presence of facial expressions, that facilitate affective simulation processes, may overrule L2 constraints. The second set of three experiments revealed that L2 induces social distance and a more abstract type of processing. Moreover, the social distance induced by L2 was mediated by a more abstract construal-level that is consistent with the disembodied nature of L2. The last set of two experiments indicates that the evaluation of sentences with affective content, presented in L1-L2, depends on their valence and on the group membership of the described targets. Affective simulation (measured with EMG) was more intense in L1, and for the in-group, and differences in simulation of in-group/out-group sentences were enhanced in L2. The last chapter presents a summary of the main findings, their contributions and limitations, and suggests future research directions.

Key-words: Socially Situated Cognition; Embodiment; Bilingualism; Second-Language;

American Psychological Association (PsycINFO Classification Categories and Codes)
2300 Human Experimental Psychology
2340 Cognitive Processes
2560 Psychophysiology
2720 Linguistics & Language & Speech
3000 Social Psychology

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General Overview

In an increasingly globalized world people talk, read and listen to information, make decisions, try to persuade others, acquire, produce and distribute knowledge. This happens in a multilingual, multicultural world where distances and differences are shortened trough the utilization of a common language.

While the current reality of multicultural societies requires the participation in two (if not more) linguistic communities research has been emphasizing the relevance of understanding how one processes, comprehends and experiences first-native (L1) and second-learned (L2) languages. If these languages have different affective groundings, as we shall argue, they should have a different impact on intra-individual, inter-individual and intergroup processes. The main goal of the current work is to experimentally explore this argument.

Theoretically, the current work rests on two main assumptions. First, we shall argue that linguistic communication should be analyzed and interpreted in line with a Socially Situated Cognition approach (SSC; Semin & Garrido, 2015; Semin, Garrido, & Palma, 2012, 2013; Semin & Smith, 2002; 2013; Smith & Semin, 2004, 2007). This approach emphasizes a macro level of analysis of social-cognitive phenomena and considers the joint impact of body, mind, physical and social context on cognition (e.g., Barsalou, Niedenthal, Barbey, & Ruppert, 2003; Niedenthal, Barsalou, Winkielman, Krauth-Gruber, & Ric, 2005; Smith & Semin, 2004).

In **Chapter 1** we review the traditional and symbolic perspectives in social cognition from a critical point of view, describe the SSC approach and apply its assumptions to linguistic communication. Namely, we argue that 1) linguistic communication is an emergent phenomenon; 2) language is a tool for adaptive action; 3) language is a tool to distribute and extend cognition, allowing for the offloading of cognition into the environment, individuals and groups; 4) language is a tool for social coupling, and communication is biologically grounded; and 5) language comprehension is embodied, being grounded on sensorimotor experiences. We explore this last assumption in greater detail, by reviewing embodied theoretical accounts of language (e.g., Barsalou, 1999a; 2008), and by presenting evidence from behavioral, psychophysiological and neuropsychological studies demonstrating that understanding both concrete and abstract concepts entails at least partial simulations of

perception (e.g., Zwaan & Yaxley, 2003), action (e.g., Glenberg & Kaschak, 2002) and affective states (e.g., Foroni & Semin, 2009).

Second, we shall argue that first-native and second-learned languages are not embodied in the same way. This assumption will be detailed in **Chapter 2.** Our argument relies on the fact that L1 and L2 usually have different socialization histories. L1 is typically learned early in life in rich emotional contexts (e.g., family life, with peers), which generally integrate information from all sensory modalities. L2 is frequently acquired in more emotionally neutral settings (e.g., school, work) that do not offer many opportunities for affective socialization, and it is learned and used without significant involvement of the majority of sensory modalities (e.g., Harris, Gleason & Ayçiçeği, 2006; Pavlenko, 2008; Perani & Abutalebi, 2005).

We explore this idea by reviewing the main studies in the bilingualism and embodiment domains that suggest the higher emotional intensity and the stronger affective grounding of L1 over L2. More specifically, we review evidence showing that L2: may serve a distancing function (e.g., Movahedi, 1996; Santiago-Rivera, Altarriba, Poll, Gonzalez-Miller, & Cragun, 2009); is usually associated with reduced self-reported emotional intensity (e.g., Dewaele, 2004, 2008); induces lower skin conductance responses (SCRs; Harris, 2004; Harris, Ayçiçeği, & Gleason, 2003) at least for taboo words and childhood reprimands; is associated with an impaired recall (e.g., Anooshian & Hertel, 1994); triggers less automatic processing of affective content (e.g., Degner, Doycheva, & Wentura, 2012; Segalowitz, Trofimovich, Gatbonton, & Sokolovskaya, 2008); and leads to less biases in decision-making and to more rational choices (e.g., Costa, Foucart, Hayakawa et al., 2014; Keysar, Hayakawa, & An, 2012).

We then present evidence from recent studies suggesting that the affective grounding of L1 and L2 may be different, since affective simulation does not occur to the same extent in both languages (e.g., Foroni, 2015). Finally, in the end of this chapter we present a critical view of the main findings, we propose specific methodological improvements, and we advance some suggestions regarding future studies.

Based on the theoretical accounts and empirical evidence (reviewed in Chapters 1 and 2), we argue that L1 and L2 are not likely to be affectively grounded and simulated to the same extent. Consequently, we suggest that intra-individual (i.e., how one processes affective information), inter-individual (i.e., how one perceives and evaluates others in terms of social

distance), and intergroup (i.e., how emotional information about social groups is simulated and evaluated) processes are shaped by the different groundings of L1-L2. These ideas were tested in several experiments presented in three empirical chapters - **Chapters 3, 4** and **5**.

In **Chapter 3**, we examine the empirical question of whether the affective processing of L1 and L2 is grounded to the same extent. Previous evidence suggests that affective priming effects rest on the affective grounding of language Specifically, the activation of facial muscles in response to valenced visual prime stimulus facilitated response to congruent targets when muscular resonance was not blocked (e.g., Foroni & Semin, 2012). Consistently, the same muscle activity was observed in response to verbal stimuli, which shaped subsequent affective judgments when there was potential for motor resonance (Foroni & Semin, 2009).

In Chapter 3 we present two affective priming experiments. In Experiment 1 we investigated the affective processing of native and second languages by using valenced words as primes and targets, and by asking participants to complete two blocks of trials - one in L1 and one in L2 - with order of presentation counterbalanced between participants. Participants were then instructed to evaluate as quickly and accurately as possible the second word presented. In Experiment 2 we also examined the potential role of emotional facial expressions on the simulation of L1 and L2 words. Participants were presented both with L1/L2 words-photos (facial expressions) and photos-L1/L2 words pairs and were asked to evaluate the second stimulus presented.

In **Chapter 4** we examined the impact of the linguistic context (L1, L2) on judgments of perceived social distance from fictitious and real social targets (i.e., the experimenter). We suggest that construal-level should be the mechanism explaining the relation between linguistic context (L1, L2) and perceived social distance, relying on two main arguments. First, in L2 (vs. L1) the availability of sensorimotor information is reduced (see for a review Chapter 2 of this dissertation), and this type of information constitutes a low-level characteristic of a situation (Maglio & Trope, 2012). Thus, we reasoned that L2 should activate a higher level mindset than L1. Second, higher (vs. lower) construal-level induces higher perceived social distance between the self and a target (Stephan, Liberman, & Trope, 2011).

We test these assumptions in three experiments, in which linguistic context was manipulated by asking participants to write a short neutral story either in L1 or L2. Social

distance was measured both as familiarity and similarity to the self (Experiment 1) and resources allocation (Experiment 3). Construal-level was measured both as conceptual level of processing using the Behavior Identification Form (BIF; Vallacher & Wegner, 1989) in Experiment 2, and as perceptual level of processing with the Shape Task (Kimchi & Palmer, 1982) in Experiment 3. In these experiments we have also considered the role of L2 age of acquisition as an important moderator of linguistic context effects.

In our final empirical chapter (**Chapter 5)** we investigated the impact of group membership and language on the affective simulation and judgments of emotional sentences. Previous evidence suggests that group membership impacts both emotional mimicry (e.g., Bourgeois & Hess, 2008) and judgments (e.g., Beaupré & Hess, 2003) when emotional facial displays of social targets are presented. Based on this evidence we had three main goals in this chapter. First, to examine whether the effects of group membership on emotional mimicry and judgments are also observed when presenting linguistic affective stimuli (i.e., emotional sentences), since language comprehension also entails affective simulation (e.g., Foroni & Semin, 2009). Second, to investigate whether language impacts affective simulation and judgments, since L1 and L2 are suggested to have different affective groundings (e.g., Foroni, 2015). Finally, to examine whether the effects of group membership on affective simulation and judgments are modulated by the language in use.

In two Experiments, we asked participants to make judgments of intensity, probability and valence of happiness and anger-related sentences. Sentence described both in-group and out-group targets and were presented both in L1 and L2. In Experiment 2 the activity of the *corrugator supercilii* (i.e., associated with frown) and *zygomatic major* (i.e., associated with smile) muscles was also recorded through the use of facial electromyography (EMG).

Finally, in **Chapter 6**, we present a summary of the main findings, highlight the contributions of the present research, and discuss the impact of this research for the bilingualism and embodiment fields. Additionally, we present the limitations of this work and suggest future research directions to investigate the embodiment of L1 and L2 and its implications for intra-individual, inter-individual and intergroup processes.

CHAPTER ONE:

PERSPECTIVES ON LANGUAGE AND COGNITION

It is virtually impossible to imagine human life without communication. People use communication to express what they feel and what they think, to make decisions, to talk with old friends and to make new ones, to persuade others, to tell the truth, and to lie. We communicate through words, facial expressions, gestures, touch and signs, and we do so face-to-face, by phone, writing, texting, by email, video or through social media. Communication requires a sender, a message, a receiver, and a channel, and it is situated in a specific social context, has a social target, is time limited, and must be linguistically structured through the use of social rules and conventions (Semin 2000). Thus, it is not possible to understand complex communicative processes without acknowledging that communication has a deep social essence: it involves our relationships with others, it is built upon a share understanding of meaning, and it is how people influence each other (Vaughan & Hogg, 2014).

Whereas communication appears to be an "effortless, efficient and reasonably accurate process" (Semin, 2000, pp. 599), it is also a complex one. For example, in any communicative situation the sender is also the receiver (and vice-versa); and there may be multiple, and sometimes ambiguous or contradictory messages, passed through several communication channels (Vaughan & Hogg, 2014). Moreover, in multilingual settings there may be cognitive costs due to language switching (e.g., Green, 1998; Meuter & Allport, 1999), as well as misunderstandings due to the violation of social rules, cultural and conversational conventions that constrain successful cross-cultural communication (e.g., Farnia & Wu, 2012; Al-Zubeiry, 2013). Thus, if one considers all these complexities, human communication constitutes a major social accomplishment (Higgins, 1981, 1992).

Although traditional approaches in social psychology recognize that communication mediates much of social behavior, the social, environmental, and bodily constraints inherent to the communication process are still largely ignored. Social psychology's emphasis on social cognition and, more recently, on brain processes has led many to consider that the field is generally more focused on studying individual information processing, and brain processes and structures rather than human interaction (Vaughan & Hogg, 2014). Considering that communication takes place in a continuously changing physical and social environment (e.g., Semin & Smith, 2002) and that it plays a central role in shaping cognition (e.g., Forgas, 1981; Markus & Zajonc, 1985; Semin, 2001), the study of communication, predominantly through language, is still under-investigated in social cognition and social psychology (e.g., Holtgraves & Kashima, 2008; Vaughan & Hogg, 2014), particularly from a situated and embodied point of view.

Recently, the idea that cognition is grounded on the same systems as those used for perception, action and emotion has received much empirical support (see for review, Barsalou, 1999a; 2008; Glenberg, 2010; Niedenthal, Barsalou, Winkielman, Krauth-Gruber, & Ric, 2005; Winkielman, Niedenthal, & Oberman, 2008). More specifically, evidence with a multidisciplinary flavor revealed that even high-level cognition, such as language comprehension, involves (at least partial) simulations of sensorimotor experiences with the world (see for review Fischer & Zwaan, 2008; Gallese & Lakoff, 2005; Glenberg & Gallese, 2012; Meteyard, Cuadrado, Bahrami, & Vigliocco, 2012; for special issue see Borghi & Pecher, 2011).

In the following sections we will briefly describe how cognition and language have been framed in the traditional Social Cognition perspective largely characterized by amodal, symbolic and decontextualized processes (e.g., Collins & Loftus, 1975; Fiske & Taylor, 1991; Newell & Simon, 1972; Pylyshyn, 1984; see also Hamilton, Devine, & Ostrom, 1994), and then introduce the Socially Situated Cognition approach, where the physical and social context assume a particularly relevant role (*SSC*; see Semin & Garrido, 2015; Semin, Garrido, & Palma, 2012, 2013; Semin & Smith, 2002; 2013; Smith & Semin, 2004).

1.1. Traditional Perspectives

1.1.1. Cognition isolated in the mind

In the late 1960's, and largely influenced by the 'cognitive revolution', social psychology attempted to overcome the behaviorist conception of mind as a "black box" (Skinner, 1963; Thorndike, 1940; Watson, 1930) that should not and could not be objectively investigated. The cognitive approach to social psychological phenomena resulted in a new conceptual and empirical approach – social cognition. Reaffirming the importance of cognition, social cognition proposed that a full understanding of the social behavior demands the identification of the structure and content of mental representations, and of the respective underlying cognitive processes (e.g., Hamilton, et al., 1994). Adopting an elementarist philosophical perspective and the information processing model, social cognition assumes a microscopic, individual, and symbolic approach to cognition (see Garrido, Azevedo, & Palma, 2011; Semin, et al., 2012, 2013; Semin & Garrido, 2015) and to communication (see H. Clark, 1996; Lindblom & Ziemke, 2007; Semin, 2000).

The elementarist perspective (Hume, 1739/1978; Locke, 1690/1979) adopted by the early social cognitive approach is characterized by the segmentation and analysis of the scientific problems into their several components that, only when subsequently combined, permit a global understanding of psychological phenomena. As a result of the cognitive revolution, developments on the information processing field allowed the separation of mental operations into sequential stages, specifying the cognitive processes that were presumed to mediate the presentation of a stimuli and the observed response (Fiske & Taylor, 1991). The information processing theory adopts the computer metaphor, describing these mediation processes in terms of inputs and outputs, encoding, processing, and retrieval of information. Most importantly, the computer was adopted, not only as a theoretical metaphor, but also as a methodological tool to explain and predict cognitive processes (e.g., Anderson, 1976; Newell & Simon, 1972; Schank & Abelson, 1977), such as impression formation and social memory (e.g., Hastie, 1988; Linville, Ficher, & Salovey, 1989; Smith, 1988).

The traditional perspective on social cognition methodologically sustains a microscopic level of analysis, which is essentially representation- and individual- centered. Namely, it argues that cognition is for representation, processing and computation, and perceivers are assumed to passively construct, automatically activate, and abstractly apply symbolic representations (see Garrido et al., 2011; Semin et al., 2012, 2013; Semin & Garrido, 2015). Indeed, according to this perspective, mental representations (i.e., attitudes and stereotypes) are activated and applied by relatively automatic processes that are independent from the context and the perceiver's goals (e.g., Hamilton & Trolier, 1986; Snyder, 1981). According to Gardner (1987) the major assumption of this "new science of mind" is the belief that when talking about cognitive processes one should speak about mental representations and to posit a level of analysis separated from the biological and neurological, on the one hand, and from the cultural and sociological, on the other.

This approach was also incorporated in the study of communication, of language and in the study of language-social cognition relationship. Many authors have adopted an individualist approach for studying language processes, assuming that production and comprehension are the result of individuals in isolation producing and comprehending language in a vacuum (see H. Clark, 1996). For instance, in a social interaction context, one agent might encode his/her mental state into some form suitable for communication, such as language, and another agent would receive and decode the transmitted message and thus come to an understanding of the first agent mental states (see Lindblom & Ziemke, 2007).

Language is thus regarded as “timeless” and “subjectless”, and not as production of any one particular speaker (e.g., Ricoeur, 1955). Regarding language in this way made it possible to examine the relationship between specific linguistic properties (e.g., lexical semantics, grammatical categories) and cognitive process that were also conceptualized as timeless and subjectless (see for review Semin, 2001).

Therefore, despite the important emphasis in the scientific examination of mental structures and processes, the traditional social cognition perspective confined the study of psychological processes to the cranial vault (see Semin, et al., 2012, 2013). Namely, cognitive and communicative processes were detached from the social and physical contexts where they take place and individuals were considered passive spectators of the world. Notably, the traditional perspective sustains a symbolic approach to cognition and language. According to this approach, the mind is a mechanism for syntactically manipulating symbols and cognitive processes are disconnected from the body, as described in the next section.

1.1.2. Amodal Theories

The computer metaphor adopted by the traditional social cognition perspective implies that: a) the mind’s software is autonomous from the body and brain hardware (Block, 1995; Dennett, 1969) and that b) high-level cognition, such as inference, categorization, memory, and language processing is performed using abstract amodal symbols (e.g., Collins & Loftus, 1975; Newell & Simon, 1972). According to this view, knowledge exists in a semantic memory system separated from the brain’s modal systems for perception (e.g., vision, audition), action (e.g., movement, proprioception), and introspection (e.g., conscious experience of emotion, motivation, and cognition) (see Barsalou, 1999a, 2008). High-level cognition is performed using abstract amodal symbols that do not establish any analogical relation with the experienced world – they are merely transductions - and do not have any modality specific feature. Instead, these symbols make redescriptions of the original experiences, establishing an arbitrary relation with the states that produce them (Collins & Loftus, 1975; Newell & Simon, 1972; Pylyshyn, 1984).

For example, when experiencing a member of a category (e.g., a chair) all the relevant information arises in the modal systems – perceptual, motor, and somatosensory systems. These modal systems correspond to all the relevant sensorimotor information about the category: how the chair looks like, how it feels like, the sound it makes when dragging it, the actions one can perform with it, among others. When all the sensorimotor information is

activated in the respective modal systems, there is a transduction process in the brain, in which modal states of different and separated modal systems are transduced into abstract amodal symbols. These symbols constitute conceptual contents, which represent knowledge about the category of a chair. When performing higher-order cognitive tasks, such as language comprehension, these amodal symbols are activated. In sum, amodal approaches sustain that when hearing or reading the word *chair* the transductions of the modal states (i.e., the amodal symbols) are activated, and not the original modal states *per se* (see Barsalou, 2008).

Therefore, concepts are represented in our mind in a propositional way, using for example properties, statements, frames, and semantic networks (e.g., Fodor, 1998; Pylyshin, 1973). Two known examples of these amodal theories applied to language are the Hyperspace Analogue to Language (HAL, Burgess & Lund, 1997) and the Latent Semantic Analysis (LSA, Landauer & Dumais, 1997). These accounts sustain that the meaning of words is learned from their statistical distribution across language, which means from their intra-linguistic or word-to-word relationships. In HAL, the statistical distribution of each word in a large corpus is defined by its frequency of co-occurrence with other words. For the LSA, the statistical distribution of words is defined by its relationship with other words, considering whether they appear together and the frequency with which they co-appear in a large collection of text documents (see for review Meteyard, Cuadrado, Bahrami, & Vigliocco, 2012).

Hence, in these accounts, perception, action and emotion are regarded as "low-level" peripheral processes, and low and high-level processes are considered as mutually independent. Consequently, perceptual, motor, and somatosensory systems are object of investigation *per se*, as peripheral input and output devices, but are not regarded as relevant for the understanding of central cognitive processes, such as language processing and comprehension. Moreover, perception and action are postulated as separate domains (e.g., Pylyshyn, 1999), excluding a possible mutual and bidirectional influence of these two spheres, since perceptual processes take place independently from the motor response involved. Thus, according to these amodal approaches high-level processes such as language use and comprehension are relatively independent of low-level sensorimotor processes, and the linguistic context is not relevant for understanding the cognitive processes that take place during linguistic communication.

1.1.3. Criticisms of the Traditional Perspectives

The traditional approach of social cognition sustaining that subjects only passively perceive – and do not act upon or construct -, the world, and disregarding the importance of the "other", of the physical and social context on cognition, has been largely criticized. The focus on cognitive processes detached from the context resulted in an "individualization of the social" and a "desocialization of the individual" (Graumann, 1986), leading many researchers to question "what is social about social cognition". Moreover, the traditional approach of social cognition has been increasingly criticized for not considering the relation between cognition and action, and most importantly, for neglecting the ultimate adaptive function of cognition (e.g., Smith & Semin, 2004). Furthermore, the assumption of frozen mental representations started to be challenged by evidence showing the relevance of the physical and social context on cognition (e.g., IJzerman & Semin, 2009; Norenzayan & Schwarz, 1999; Semin, de Montes, & Valencia, 2003; Williams & Bargh, 2008).

Additionally, although the symbolic approaches are still commonly acknowledged as accounts of human intelligence, and also as the engine for artificial intelligence, they have been criticized for not being sufficiently statistical, which have led to the development of neural net approaches to fill this gap (e.g., O'Reilly & Munakata, 2000; Rumelhart & McClelland, 1986). Most importantly, traditional symbolic approaches have been criticized for not considering the grounding of cognition on perception, action, and introspection, but on amodal symbols. First, although amodal symbols provide a simple way to explain complex processes, there is still no direct empirical evidence for the redescription process that produces amodal symbols in the brain (Niedenthal et al., 2005). Secondly, current empirical evidence has shown the undeniable role of the body and more specifically, of the brain's modal systems, on cognition (e.g., Barsalou, 1999a; Barsalou, Niedenthal, Barbey, & Ruppert, 2003; Damásio, 1994; Glenberg, 1997; Gallese, 2003), and language (Barsalou, 2008; Barsalou, Santos, Kyle, Simmons, & Wilson, 2008; Glenberg & Robertson, 2000; Zwaan & Pecher, 2012).

Currently, evidence from research on situated, embodied, and grounded cognition, support that most processes are best understood by jointly considering neural, psychological, and situational constraints to cognition (e.g., Semin et al., 2012, 2013; Semin & Garrido, 2015; Smith & Semin, 2004), as it will be described in the next section.

1.2. Socially Situated Cognition

Considering the assumptions supported by traditional theories on social cognition and their critiques, it becomes evident that the unobservable "black box" mind feared by the behaviorists has evolved to an investigable non-social and disembodied one. This classical perspective of the study of mind narrowed to the individual *cranial vault* (Semin et al., 2012, 2013) and to abstract amodal approaches prevails even today, and characterizes an important and representative share of what is investigated in social psychology.

However, developments on several different fields had a preponderant role in opening the door to the growth of a new perspective - s*ocially situated cognition* (*SSC*; e.g., Garrido et al., 2011; Semin et al., 2012, 2013; Semin & Garrido, 2015; Semin & Smith, 2002, 2013; Smith & Semin, 2004, 2007). Social psychologists started to broaden their focus of investigation emphasizing the relevance of studying other psychological processes - such as motivation, affect, personal relations, group membership and cultural differences – and the power of the situation, for a more global understanding of the human mind.

Simultaneously, in robotics, the embodied aspects of cognition were considered, as well as the role of social interaction on the construction of an upper-torso humanoid robot (Brooks, Breazeal, Marjanović, Scassellati, & Williamson, 1999). In cognitive anthropology, Hutchins (1995) declined the peripheral role attributed to culture, proposing an integrated approach where culture is a cognitive process, and cognition is *per se* a cultural process. Additionally, Thelen and Smith (1994) showed how multimodal experiences form the foundations for self-organizing perception-action categories, and emphasized the notions of dynamic representations and processes of change on psychological human development. And even cognitive psychology was stage of new developments such as Perceptual Symbol Systems Theory (*PSS*; Barsalou, 1999a) integrating a symbolic approach to cognition with a grounded modal one.

The contributions of all of these fields endowed the Situated Cognition movement with a multidisciplinary strength that aimed to refute the ontological Cartesian division between subject and object, ego and other, mind and body, which is pervaded by excessively individualistic conceptions of knowledge (e.g., Farr, 1996; Graumann, 1986). With the rejection of the individualistic paradigm of the traditional theories, SSC attempts to provide a systemic approach that links all the elements (goals, emotions, body, and environment) that influence and are influenced by cognition.

Framed in this perspective, social cognition should be analyzed not as cognitive processes isolated from the world, but as resulting from the joint impact of the social context, physical environment, brain structures, and bodily constraints. Based on this assumption, SSC is grounded on five pillars: 1) cognition is an emergent phenomenon; 2) cognition is for adaptive action and mental representations are action-oriented; 3) cognition is distributed and extended across the environment and other people; 4) cognition is socially situated, being biologically grounded; 5) cognition is embodied, being grounded on sensorimotor experiences (e.g., Semin & Smith, 2002, 2013; Semin et al., 2012, 2013; Semin & Garrido, 2015; Smith & Semin, 2004, 2007).

Below we describe these assumptions, from a cognition and communication point of view, emphasizing the important role of language. Thus, we are going to argue that: 1) linguistic communication is an emergent phenomenon; 2) language is a tool for adaptive action and co-regulation; 3) language is a tool to distribute and extend cognition, allowing to offload cognition into the environment, individuals and groups; 4) language is a tool for social coupling, and communication is biologically grounded; 5) language comprehension is embodied, being grounded on sensorimotor experiences.

1.2.1. Linguistic communication is an emergent phenomenon

The ideas of SSC are not new since they are embedded in previous studies of social and cognitive psychology. However, the assumptions underlying the cognition-action relation completely changed the level of analysis from micro to macro, once one considers the joint impact of body, mind, physical and social context on cognition (e.g., Barsalou, et al., 2003; Niedenthal, et al., 2005; Smith & Semin, 2004). Hence, cognition taken as an *emergent* phenomenon is a result of adaptive sensorimotor interactions with specific physical and social contexts, which are shaped by bodily and environmental constraints. The SSC sustains that the emergent phenomenon is driven by the higher level of organization, namely a situated context, and that it is this broad complex context that shapes the way the parts (i.e., individual functioning) work and are interlinked. Consequently, cognition can only be apprehended if one adopts a *macroscopic* level of analysis, promoting insights about the whole as a guiding perspective to understand the parts (see Semin, at al., 2012, 2013; Semin & Garrido, 2015).

Consider the case of language. If one attends only to its constituent set of basic components (i.e., phonemes, morphemes, phrase structure), then utterances cannot be understood. The combinations of these components generate something that cannot be

comprehended only by taking into consideration the individual components in isolation. Thus, "situated meaning" is only apprehended through utterances that create something that is not present in the discrete components of language (Glenberg & Robertson, 2000; Semin, 2000). Therefore, the meaning of words in sentences is emergent. It emerges "from the mesh of affordances, learning history, and goals" (Glenberg & Robertson, 2000, pp. 388). More globally, only a macroscopic level of analysis can account for processes considered essential to communication such as *common ground* (e.g., H. Clark, & Schober, 1992), *shared reality* (Hardin & Higgins, 1996), *interchangeability of perspectives* (Schutz, 1962), or *conversational conventions* (Grice, 1975). All of these processes make it clear that a microscopic - individual-centered - analysis of communication is not sufficient (Semin, 2000).

Therefore, SSC represents a shift from a traditional view of social cognition sustaining an elementary, microscopic, individual, and symbolic approach, to a perspective that emphasizes the emergent nature of cognition, and the need to analyze the boundaries of cognition, language and action, from a macroscopic point of view.

1.2.2. Language is a tool for adaptive action

The traditional perspective on social cognition based on the information processing paradigm involves the construction and manipulation of inner representations, which are locked in the cranial vault. This perspective, detached from the physical and social context, cannot explain how individuals achieve sociality (intersubjectivity) since an individual-centered perspective does not account for the active reciprocal and co-regulative nature of social behavior (Semin & Garrido, 2015). The socially situated cognition approach thus represents a change from the traditional question "What is cognition?" to the question "What is cognition for?" with the answer being "It is for action" (e.g., Semin et al., 2012; Semin & Garrido, 2015).

The first assumption of SCC suggests that cognition did not evolve for its own sake, but for the adaptive co-regulation (e.g., the regulation of social interaction; Semin & Cacioppo, 2008, 2009) and adaptive action in a continuously changing physical and social world (e.g., Semin et al., 2012, 2013; Semin & Garrido, 2015). The notion of the adaptive function of cognition had a major impact on the shift from the computer metaphor, illustrative of the traditional theories, to the *biological* metaphor. It suggests that cognition serves a self-regulatory purpose of an organism searching for the fulfilling of its survival

needs, which demands adaptive action in a specific social context (Caporael, 1997; Fiske, 1992). Accordingly, since humans are social beings their adaptation to the social environment (and thus their survival) requires an adaptive regulation of theirs and others' behavior. Therefore, socially situated cognition should explain the processes by which the adaptive regulation of others' behavior and the co-regulation of social interaction are achieved (e.g., Semin & Garrido, 2015).

The capacity to adapt is intrinsically connected to the capacity to communicate. Species' survival depends highly on their capacity to communicate (Krauss, 2002), since communication, particularly though language, allows humans to adapt to continuously changing physical and social contexts. Language does not serve merely representational purposes, but it evolved as a tool to implement cognition in communication by conveying meaning (Semin, 2000). Namely, as it is a tool by which one can convey meaning it is the mean by which people can ultimately affect each other's behavior (e.g., Holtgraves & Kashima, 2008). Hence, language can be considered as a transformational device by which changes in one's social world can be implemented (Semin, 2000).

Consequently, language is the means by which action is brought about and thus it is a device to implement practical activity (e.g., Higgins, 1981; Krauss & Fussell, 1996). Even when language use does not regard a current situation, it may still be a tool for the preparation of situated action (Barsalou, 1999b). Therefore, according to the SSC, if cognition is for adaptive action, language purpose is to facilitate adaptive action and co-regulation, by being a tool designed to promote changes in the physical and social environment.

In the last years, studies have revealed the adaptive nature of cognition by highlighting the context sensitivity of mental processes. For instance, specific physical features of the environment, such as warmth, close distance, and pleasant smells, have been shown to impact social cognitive processes (e.g., IJzerman & Semin, 2009; Williams & Bargh, 2008). Evidence has also revealed that attitudes are highly sensitive to a multitude of contextual effects (for review see Schwarz & Sudman, 1992). Moreover, variables such as the communicative context (Norenzayan & Schwarz, 1999), social context (e.g., Wittenbrink, Judd, & Park, 2001), context stability (Garcia-Marques, Santos, & Mackie, 2006), social or professional roles (e.g., Barden, Maddux, Petty, & Brewer, 2004) and social status activated by the context (e.g., Richeson & Ambady, 2001), the target's appearance (Livingston &

Brewer, 2002), and typicality (e.g., Bodenhausen, Schwarz, Bless, & Wänke, 1995; Macrae, Mitchell, & Pendry, 2002) can modulate cognition.

Importantly, research has also shown that communication and language are context sensitive. Take the following examples. The linguistic intergroup bias effect is described as the tendency of people to use more abstract language (e.g., adjectives) to describe positive in-group's behaviors and more concrete language to describe positive out-group's behaviors (Maass, 1999). Semin and colleagues (2003) found that this effect was shown only when participants expected their descriptions to have a communicative function. Moreover, Norenzayan and Schwarz (1999) showed that when asked to provide causal explanations for a mass murder reported in a newspaper, participants responding to a questionnaire with a letterhead "Institute for Social Research" produced more situational explanations, whereas participants responding to a questionnaire for the "Institute of Personality Research" produced more dispositional explanations. These results show that there is not only an adaptive response of cognition and language to the situated properties of a situation, but also that the language used in communication constitutes *per se* a contextual constraint to cognition. .

The considerations that language and cognition are for situated action, serving survival needs deeply contrasts with the representational view. The latter maintains a focus on frozen mental representations detached from the world, characterized by its automaticity, invariance, stability over time, and immunity to contextual constraints. Instead, according to the SSC, language and cognition should be understood as dynamic processes of an agent that is surrounded by and integrated in a continuously changing physical and social context.

1.2.3. Language is a tool to distribute and extend cognition

As referred in the previous section, cognition is for adaptive action. People adapt to complex contexts, promoting "good enough" responses, performed in "fast enough" times. However, if acquired knowledge would not be shared across time, space and people, complex goal-oriented action would hardly be achieved, if achieved at all. Thus, knowledge relies heavily on information embedded in the environment, other people and groups. The underlying idea is that the human mind is not wholly in our head/brain, but it is rather distributed in our brains, body and external devices (Clark & Chalmers, 1998), which extends human cognition beyond individual cognitive capabilities (see Borghi, Scorolli, Caligiore, Baldassarre, & Tummolini, 2013).

Imagine the following situation. Vasco da Gama discovered the maritime route to India, where he arrived in 1498. Now imagine he would have tried to do this travel with no astrolabes or compasses, and that he would not have taken advantage of the accumulated knowledge about navigation available at the time. Maybe he would have arrived to his destination, maybe he would have not, but he would surely have taken much more time. The journey would also have been longer (or it would have been impossible) if he, as an expert, did not communicate his intentions, did not share his knowledge and did not cooperate with his crewmembers to achieve his goals. Imagine that after this travel, there would be no record of the facts, adventures or incidents along the way. Imagine that nobody had done a map with all of the necessary information to arrive to India. The maritime route to India would probably be lost after many years, and everybody who participated in that journey was dead (see for a similar analogy Hutchins, 1995).

To adapt to continuously changing and dynamic contexts one needs to structure the physical and social environment in ways that allow reducing complexity and releasing cognitive resources. This can be achieved by resorting to physical tools (e.g., compasses, maps, hammers, saws, drills) and other aspects of our environment that provide *scaffolds* for cognitive activity (A. Clark, 1997). There are several classical examples of tool use that provide scaffolds, such as solving difficult arithmetic operations (e.g., multiplying two three-digit numbers) by using pencil and paper (A. Clark, 1999); leaving an empty milk bottle near the front door to remember buying milk the next day (Kirsh, 1995); or the way expert bartenders line up differently shaped glasses when confronted with several drink orders, reducing the cognitive effort of thinking about the order or type of drinks to be prepared and served (Beach, 1998). The last example consists of *epistemic actions* (Kirsh & Maglio, 1994) that, contrary to mere physical actions, release cognitive effort in such a way that makes computation easier, faster, and more reliable.

In our example, when attempting to arrive to India, Vasco da Gama and his crew made use of physical *tools* that provide scaffolds for cognitive activity. Back in those days, they made use of tools such as compasses, astrolabes, log lines, and astronomical charts to find their way across the oceans. Moreover, they registered new information in log books that further would allow sharing this information with more people, and to come back to India using the same route (Wiesner-Hanks, 2006). Nowadays, they would probably recur to a GPS or to Google maps to make their journey faster and avoid getting lost, they would post their journey adventures on Facebook, and they would probably take notes in their iPads, and send

them by email to King Manuel I. These examples show how people use tools and the environment to download information and therefore cue, prioritize, and structure cognition (see for review Semin et al., 2012, 2013: Semin & Garrido, 2015).

Besides being offloaded into the environment, cognition is also distributed across other individuals or groups. Language has particular relevant role in this process as a device that extends cognitive processes beyond the individual. In our example, each of the crewmembers had a particular and specialized knowledge about the activity to be performed. This specialized knowledge was transferred to the execution of discrete roles (identification of the navigational stars' positions, identifying a landmark, etc.), which in turn integrate the use of specific tools (astrolabe, astronomical charts, compasses, etc.) (see for similar example Hutchins, 1995). In this team of experts, the knowledge of each individual is crucial for the performance of the task at hand. The success of the task is achieved in a series of coordinated activities among a number of different individuals who draw on each other's expertise being scaffolded by the others in the team without having to know the details of the other member's expertise (e.g., Semin et al., 2012).

Language has a preponderant role as a tool allowing for the coordination and synchronization of communication (Semin, 1998) in this team of experts, and thus as a tool for the construction of this socially distributed knowledge (see Hutchins, 1995). This type of knowledge, which is collectively constituted, supersedes a single individual's capabilities (see Hutchins, 1995) because the entire process is not a single person's production but a collectively coordinated "cognition as action" (Semin et al., 2012). Therefore, extending cognitive processes beyond the individual, through the use of distributed knowledge, and the collective construction of shared mental representations, extends cognition (Semin et al., 2013). If language use allows for the coordination and synchronization of social interactions, and the constitution of uniquely shared knowledge, then language constitutes a vital tool for the extension of cognition, in ways that would be not possible without such a device (Clark & Chalmers, 1997).

In sum, cognition can be scaffolded, distributed across and extended by physical tools (charts, compasses, pen and paper), socially created tools (language), the environment, people and groups. Language has a central role to play as a device to offload information, and that ultimately extends cognition. Only the interpersonal, interdependent, collaborative, and synchronized nature of communication can allow for two way interactions connecting individuals with external entities, which creates *coupled systems* (Clark & Chalmers, 1997).

However, it is the social nature of these interactions, and the fact that they are biologically grounded, that makes these coupled systems unique, as described in the next section.

1.2.4. Language is a tool for social coupling

The forth pillar of SCC highlights the idea that social knowledge is ontologically different from general knowledge about the world, contrary to what traditional theories advocated. The SSC approach argues that social knowledge is not only socially, but also biologically grounded and distributed (e.g., Semin et al., 2012, 2013; Semin & Garrido, 2015). Firstly, this approach rejects the activation of static concepts detached from the world during interpersonal interaction and communication. On the contrary, it sustains that "social" is about two or more individuals in interdependence, establishing *social coupling* trough communication (Clark & Chalmers, 1997; Semin & Garrido, 2015). Secondly, it exposes the biological bases of sociality, referring to recent research on mirror neurons systems (e.g., Iacoboni, 2009; Rizzolatti & Craighero, 2004).

Should we analyze and interpret the interaction between two social agents in the same way as we analyze and interpret the interaction between an agent and an object? The answer is no. What makes the link between two agents unique is its sociality, and the agents' capacity of mapping each other's movements upon themselves. Through communication - gestures, movements, facial expressions and language, individuals express, apprehend and adapt to others' intentions and actions. This link between two or more individuals through communication, particularly through language, establishes *social coupling* (e.g., Clark & Chalmers, 1997). Thus, the social nature of interaction between individuals, and the social coupling that is created, makes this type of interactions intrinsically different from non-social ones.

For example, although differing in terms of sensory channel, message, and richness of content, talking, laughing and smiling are among the most common social signals, and all have preponderant roles in social communication and interaction. For instance, when someone laughs, a laughter/smile is automatically triggered in the audience. This implicates the reproduction in the perceiver of the pattern of movements originally generated in the sender. This unconscious reproduction of movements is a powerful social coupling process (Provine, 1992).

Indeed, according to recent research (e.g., Iacoboni, 2009; Rizzolatti & Craighero, 2004) there is evidence that the architecture of the human perceptuomotor system is specially

configured for the reproduction of movements of conspecifics in a privileged way (Semin & Cacioppo, 2008). Synchronization processes lead to this isomorphism in mapping movements, which allows for a correspondence between an executed and a perceived action. This correspondence gives human beings the capacity to access others' states, movements, and actions. The mapping of others' movements provides information that, not only allows for the interaction with them, but that is also part of meaningful interpersonal communication (Semin et al., 2012, 2013; Semin & Garrido, 2015).

Thus, social cognition is different from "pure" cognition because it is grounded on the brain's architecture that is specialized for a particular class of stimuli – social agents in interaction – rather than non-social stimuli (Semin & Cacioppo, 2008). Therefore, cognitive processes cannot happen in a cognitive vacuum, and interpersonal communication (particularly through language) cannot be understood as individuals separately producing and comprehending, but should be considered instead as a result of joint ventures between processes with social essence that are biologically grounded. This notion is intrinsically related with the next section.

1.2.5. Language is grounded on sensorimotor systems

The last assumption of SSC sustains that cognition is embodied, being grounded on our body architecture, especially on our sensorimotor systems. The embodied perspective contrasts with symbolic amodal approaches, for which representations are abstract, establishing arbitrary relations with their referents in the world (e.g., Collins & Loftus, 1975; Fodor, 1998; Newell & Simon, 1972; Pylyshyn, 1984). In contrast, embodied approaches argue that our nervous systems developed for the control of our bodies. This happens because the organisms need to adapt their behavior to fulfill the bodily requirements in a continuously changing environment. Thus, the bodily architectures provide regularities and constraints to cognition, affect, motivation and action (e.g., Smith & Semin, 2004; Wilson, 2002).

Embodied cognition is one of the central converging issues of current interest in fields such as philosophy (e.g., A. Clark, 1997; Prinz, 2009), linguistics (e.g., Lakoff & Johnson, 1999), robotics (e.g., Brooks, 1991), neurosciences (e.g., Martin, 2001, 2007), and psychology (e.g., Barsalou, 1999aa; Glenberg, 1997; Glenberg & Robertson, 2000). More specifically, the relation between the body, cognition and action was emphasized in the earlier works in social psychology (see for reviews Barsalou, et al., 2003; Niedenthal, et al., 2005; Smith & Semin, 2004). Evidence for the embodied nature of cognition has been shown,

for example, in studies reporting that cognitive processes underlying attitudes (Cacioppo, Priester, & Berntson, 1993; Neumann & Strack, 2000; Wells & Petty, 1980) and memory (Förster & Strack, 1996; Palma, Garrido & Semin, 2011) are constrained by our bodies. Moreover, bodily activity can induce emotional states. Perceiving an emotional expression induces mimicry of that expression (e.g., Dimberg, Thunberg, & Elmehed, 2000; Niedenthal, 2007), and adopting specific emotional expressions (e.g., Strack, Martin & Stepper, 1988), postures (e.g., Duclos, et al., 1989; Stepper & Strack, 1993), head movements (Wells & Petty, 1980), or arm movements (Cacioppo, et al., 1993) induces the correspondent emotional states, which further influences attitudes and judgments.

These findings were extended to the language field, where several behavioral and neuroscience studies have provided evidence that concepts and language comprehension are grounded on perception, emotion and action systems (see for review Barsalou, 2008; Borghi & Pecher, 2011; Fischer & Zwaan, 2008; Gallese, 2008; Gallese & Lakoff, 2005; Meteyard et al, 2012; Winkielman, et al., 2008). Depending on the relevance attributed to the sensorimotor systems in the activation of semantic representations, the approaches to language processing might be differently categorized: from the *disembodied* theories referred earlier, for which semantic information is exclusively symbolic (e.g., LSA, Landauer & Dumais, 1997); to *secondary embodiment* theories, for which the relation between representations and sensorimotor content is not arbitrary, but representations are still amodal (e.g., Mahon & Caramazza, 2008); to *weak-embodiment* and *strong embodiment* theories. The two later ones propose a preponderant role of the sensorimotor systems on the activation of semantic representations. However, whereas weak embodiment theories propose that sensorimotor information is only *partially* simulated (e.g., Barsalou, 1999a; Simmons & Barsalou, 2003), strong embodiment approaches (e.g., Glenberg, 2010; Glenberg & Robertson, 2000; Zwaan & Ross, 2004) stand for "full simulation" of the original modal states (see for review Meteyard et al., 2012).

The embodied approach applied to the representation of language is particularly evident in the so-called Grounded Theories, like Perceptual Symbol Systems (*PSS*; Barsalou, 1999aa; 2008), arguing that meaning is activated through simulations of original experiences with a member of a category. Let´s take the previous example about experiencing a *chair*. According to PSS, when originally experiencing a chair modal states are activated in relevant brain systems – perceptual, motor, somatosensory and introspective systems – and then integrated in a multimodal representation stored in memory. More specifically, these

modality-specific states are partially captured in local association areas, creating a multimodal representation of knowledge. This multimodal representation corresponds to all the relevant sensorimotor information about the category: how the chair looks like, how it feels like, the actions one can perform with it (e.g., sitting on it), introspective states such as comfort and relaxation, among others. Then, when the category is activated upon hearing or reading the word *chair,* there are multimodal *re-enactments* aiming to partially simulate the original experience with the category (e.g., Barsalou, 1999aa, 2008; Barsalou, Simmons, Barbey, & Wilson, 2003).

According to this modal view simulations are situated since they are limited by the bodily, physical, and social context of a goal-directed agent (e.g., Barsalou, 1999a; Yeh & Barsalou, 2006), and they are for adaptive action once they attempt to simulate states that are likely to occur when contacting with the category member (Barsalou, 1999a; 2008; Barsalou et al., 2008; Glenberg, 1997; Rizzolatti & Craighero, 2004). Moreover, the relationship between semantic representations and sensorimotor content is non-arbitrary, with the representations having a direct connection with the original modal states that have created them (e.g., Barsalou, 1999a; 2008). Furthermore, according to the embodied approach, there is a connection between lower-cognitive processes, such as perception and action, and higher-cognitive processes, such as language and thought (e.g., Glenberg & Kaschak, 2002; Zwaan & Yaxley, 2003).

The described simulation process occurs *online* and also *offline* (Wilson, 2002); it is assumed to occur when processing a word (e.g., Foroni & Semin, 2009; Zwaan & Yaxley, 2003), and also when comprehending full sentences (e.g., Glenberg & Kaschak, 2002); and occurs when processing both concrete and abstract words (Boroditsky & Ramscar, 2002; Glenberg et al., 2008; Lakoff & Johnson, 1980; 1999). The simulation of abstract concepts is, actually, one of the main challenges to embodied theories. Whereas the notion of simulation applied to the processing of concrete concepts is largely accepted, the fact that representational processes highly depend on perceptual processes (Barsalou, 1999aa) presents a challenge to the embodied theories explaining the simulation f abstract concepts.

The most influential theory that has been adopted to deal with abstract concepts is probably the Conceptual Metaphor Theory advanced by Lakoff and Johnson (1980, 1999). According to this theory, human beings depend largely on their primary sensorimotor experiences to derive meaning, and use concrete domains to think and communicate about abstract concepts that they cannot experience physically. We talk about sad events that *put us*

down, a happy day that makes us *feel high*, we feel *close* to friends and family, and refer to people we know as *warm* or *cold* (see Azevedo, Garrido, Prada, & Santos, 2013).

Thus, the use of *conceptual metaphors* allows for communication and understand of concepts we cannot access through our sensorimotor systems - we cannot touch, smell, or see – by grounding them in concepts that are based on primary sensorimotor experiences such as space, temperature, brightness, physical size, weight or distance (e.g., Lakoff & Johnson, 1980). Metaphors are thus treated as mental associations between basic *source* concepts that are derived from interactions with the physical world and *target* concepts that represent relatively more abstract referents (e.g., Landau, Meier, & Keefer, 2010). Currently it is accepted that metaphors' use does not entail exclusively a communication purpose, but that they reflect and structure cognition. Therefore, they have a preponderant role on the conceptual system serving representational goals (see Crawford, 2009; Landau, et al., 2010).

For example, affect is grounded on temperature (e.g., someone who is appreciated is warm; e.g., IJzerman & Semin, 2009, 2010; Williams & Bargh, 2008); and time is grounded on space (i.e., the future is represented forward and to the right, the past behind or to the left), which can influence temporal judgments (see Boroditsky, 2000, 2001; Boroditsky & Ramscar, 2002; Casasanto, & Boroditsky, 2008), or the categorization of words with temporal connotation (e.g., Lakens, Semin, & Garrido, 2010; Torralbo, Santiago, & Lupiáñez, 2006). Moreover, vertical space grounds valence (i.e., good is up, bad is down; Meier & Robinson, 2004; see for discussion Azevedo et al., 2013), divine figures (God is up, Devil is down; Meier, Hauser, Robinson, Friesen, & Schjeldahl, 2007) and power (i.e., powerful is up, powerless is down; Schubert, 2005), which impacts judgments, categorization processes and memory.

Further embodied theories identify differences between concrete and abstract concepts, namely in content. Barsalou and Wiemer-Hastings (2005) argue that whereas abstract concepts (e.g., "freedom") activate more frequently situations, events and introspective states (e.g., 'running on the grass', 'exiting from prison', etc.), when processing concrete concepts (e.g., "bottle") people tend to focus generally in their perceptual characteristics, such as color, size, shape, matter, parts (e.g., 'green', 'plastic', 'neck'). In a consistent way, Vigliocco and colleagues (Kousta, Vigliocco, Vinson, Andrews, & Del Campo, 2011; Vigliocco et al., 2013) advanced a proposal sustaining that abstract and concrete concepts differ in content. Kousta and colleagues (2011) have shown that when keeping the imageability and context availability constant, emotional valence is a predictor of

concreteness ratings. Although concrete and abstract concepts entail similar emotional processing, concrete concepts are grounded mainly on the experience with the physical environment, whereas abstract concepts' processing is grounded primarily on internal affective states. Recent brain imaging evidence (Vigliocco et al., 2013) has supported this proposal.

Hence, recent evidence has shown that, although differing in terms of grounding content (c.f. Glenberg et al., 2008; Glenberg & Kaschak, 2002; Fischer & Brugger, 2011), the understanding of both concrete and abstract concepts entails simulation. We will briefly describe in the next section some evidence regarding the simulation of perception, action and affective states during language processing and comprehension.

1.2.5.1. Perceptual Simulation

A considerable amount of research has shown the relation between perceptual information and language comprehension, namely that when thinking about a concept's meaning the perceptual information becomes available.

Pecher, Zeelenberg and Barsalou (2003) have shown that switching attention from one modality to another incurs costs. For example, when verifying a property in the auditory modality (e.g., BLENDER-loud) participants were slower when doing so after verifying a property in a different modality (e.g., CRANBERRIES-tart) than after verifying a property in the same modality (e.g., LEAVES-rustling). These results show that simulating a concept in a specific modality during the verification of the property hinders subsequent processing of the concept in another modality. Thus, the authors have demonstrated that modality specific perceptual simulation is activated during feature processing.

Moreover, Zwaan and Yaxley (2003) observed that judgments about semantic relatedness were faster when the words presented followed an iconic relation with their referents. For instance, when the word "attic" appeared above the word "basement", cognitive judgments were faster than when "basement" appeared below "attic". Furthermore, Borghi, Glenberg and Kaschak (2004) have shown that language comprehension activates perceptual information, by leading people to adopt a spatial perspective. Participants adopted either an inside ("You are driving a car"), an outside ("You are washing a car"), or a mixed spatial perspective ("You are walking toward and entering a car"). Then, they had to verify if a subsequent probe word was or not part of the object. Judgments were faster when the parts of the object corresponded to the perspective the participants had just adopted – identifying

steering wheels faster when adopting an inside perspective, or tires when adopting an outside perspective (see also Stanfield & Zwaan, 2001; Yaxley & Zwaan, 2007; Zwaan, Stanfield & Yaxley, 2002). Similar results were observed regarding the activation of perceptual simulation when comprehending language depicting motion (Kaschak et al., 2005; Kaschak, Zwaan, Aveyard, & Yaxley, 2006).

This evidence was supported by neuroimaging data. For example, when processing words for which visual properties are a defining feature (e.g., animals or fruits), an activation of visual brain regions was observed (Martin, Wiggs, Ungerleider, & Haxby, 1996). Moreover, Martin and colleagues used a property production task to probe knowledge of object-associated colors (and also actions). They verified that when generating color words, regions associated with color perception and object perception were activated (Martin, Haxby, Lalonde, Wiggs, & Ungerleider, 1995). There is a large amount of evidence for this pattern of results in fMRI studies, namely when participants are asked to verify object sensorial properties, such as color, shape, size, taste or touch, neural activity is revealed in cortical areas related with the processing of those properties (see for review Binder, Desai, Graves, & Conant, 2009; Martin, 2007).

Together these findings suggest that language comprehension is grounded on perceptual and imaginal states, activating the same neural areas as perception.

1.2.5.2. Motor Simulation

Taking a perspective, grasping an explanation, giving an example, showing evidence – language is full of actions, making the investigation of the relation between language and movement of considerable importance. An embodied approach to this relation stresses that during language comprehension the same neural substrates activated during motor activities are recruited and activated.

For example, Glenberg and Kaschak (2002) asked participants to make sensibility judgments of sentences describing actions away from the body (e.g., 'You give Art the pencil'), toward the body (e.g., 'Art gives you the pencil') or nonsense sentences (e.g., 'You give the pencil Art'). To indicate the sentence sensibility, half of the participants moved the hand to a response button away from the body and half moved the hand toward the body. Judgments were faster when the direction implied by the sentence matched the direction of the participants' movement (toward/toward or away/away from the body). This *action–sentence compatibility effect* (ACE) (see also Glenberg et al., 2008, Exp. 1; Zwaan & Taylor,

2006) is consistent with *the indexical hypothesis,* which suggests that meaning is grounded in action (Glenberg & Robertson, 1999).

Recently, in a study recording event-related potentials (ERP's), Aravena and colleagues (2010) provided evidence for a neural signature of ACE effects. Participants listened to sentences implying an open (e.g., "The show was praiseworthy, so Rocio *applauded*") or closed hand shape (e.g., "He needed to drive the nail correctly, so Joseph *hammered it*") and indicated their understanding by pressing a button with either an open or closed hand shape. In incongruent trials, where the hand-shape implied by the sentence did not match the hand-shape required by the response, an N400 effect was observed (associated with difficulty integrating stimuli into a given semantic context; Kutas & Federmeier, 2000).

Moreover, the motor activation during language processing was also shown using fMRI. Hauk, Johnsrude, and Pulvermüller (2004) demonstrated that when participants silently read action verbs, such as *kick*, *pick*, and *lick*, the motor and pre-motor cortex were activated in a somatotopic way. Besides activating the language areas, understanding the word *kick* activated areas that control the leg, whereas comprehending the word *pick* activated areas that control the hand, and so forth (see also Pulvermüller, 2005). This specificity in the activation of brain areas was also found in other studies where participants, instead of reading, listened to action-related sentences (Buccino et al., 2005; Tettamanti et al., 2005). Importantly, the motor system modulation during language processing was shown both for concrete and abstract concepts. Using TMS, Glenberg and colleagues (2008, Exp. 2) verified that processing concrete (e.g., "Marco gives you the papers") and abstract (e.g., "Anna delegates the responsibilities to you") transfer sentences similarly modulates the activity in the hand muscles.

Together these behavioral, neuroimaging and neuropsychological data suggest that language comprehension involves, at least in part, the same neural activity as planning and performing action (see for review Pulvermüller, 1999), and that motor simulation during meaning comprehension happens for both concrete and abstract language processing (Glenberg et al., 2008).

1.2.5.3. Affective Simulation

When we listen to a story, watch a movie or read a book, we feel emotions. Although perceptual and motor simulation during language comprehension has received the most attention, some studies have shown that emotional simulation also occurs during language

processing. Overall, observing and imitating emotional facial expressions activates neural areas of emotion and action related with the mirror neuron system (Rizzolatti, Fogassi, & Gallese, 2001). This is documented in studies showing that when observing emotional facial expressions, such as happy or angry faces (e.g., Dimberg, 1982; Dimberg, Thunberg, & Elmehed, 2000), or reading words related to those facial expressions or emotional states (Foroni & Semin, 2009) the facial muscles corresponding to expressions of happiness or frowning (i.e. *zygomatic major* and *corrugator supercilii*, respectively) are automatically activated in the observer.

The embodied approach applied to language stresses that the comprehension of emotional language depends on the at least partial simulation of emotional states, recruiting the same neural and bodily mechanisms as during emotional experiences (Niedenthal, 2007). Evidence for this argument comes from studies showing that language about emotional states is better understood when those states are active during comprehension (Glenberg, Havas, Becker, & Rinck, 2005) and classification (Niedenthal, Halberstadt, & Innes-Ker, 1999).

For example, reading emotion words activates the correspondent facial muscles in the perceiver, which impacts judgments when muscle activation is not blocked (Foroni & Semin, 2009). Moreover, affective states also shape language processing. Processing words that name emotions (e.g., happy, angry) can be affected by emotional states (Niedenthal, Halberstadt, & Setterlund, 1997). But, most importantly, evidence suggests a congruent activation of the somatic systems during language comprehension, even when language does not explicitly describe emotions. In several studies, Havas, Glenberg, and Rinck (2007) have used the pen-in-mouth procedure (Strack, Martin, & Stepper, 1988) to induce positive or negative affect in their participants while they processed sentences with emotional content (e.g., describing a happy or sad situation). They verified a *mood congruence effect*: participants were faster to process sentences when their valence matched the valence of their induced mood. Moreover, Havas, Glenberg, Gutowski, Lucarelli, and Davidson (2010) blocked the activity in the *corrugator superciili* muscle, responsible for frowning, and showed impairment on the comprehension of sad and angry sentences (and not of happy sentences). Furthermore, Kousta and colleagues (2011) have shown that emotional content of language plays a role in automatic lexical processing of single words, as indicated by the effects of emotional valence in a lexical decision task (distinguishing words from non-words).

In a neuroimaging study (fMRI), Wallentin and colleagues (2011) identified brain activity in both language and emotion areas (temporal cortices, left inferior frontal gyrus - IFG), amygdala and motor cortices) while participants listened to a story. Moreover, Jiménez-Ortega and colleagues (2012) investigated how a paragraph of positive, negative, or neutral emotional valence affects the processing of a subsequent emotionally neutral sentence. They verified that the left anterior negativity (LAN), elicited by syntactic violations, was present in the negative and positive conditions, and was not visible in the neutral condition.

Taken together, these behavioral, psychophysiological and neuropsychological data suggest a close relation between language and emotion, namely that language comprehension, both of concrete and abstract concepts, seems to be at least partially grounded on emotion simulation (e.g., Havas et al., 2007; Kousta et al., 2011). Firstly, the comprehension of emotional language activates the same somatic patterns as perceiving an emotional facial expression, and affects further judgments (e.g., Foroni & Semin, 2009). Secondly, impeding emotional simulation results an in impairment of language comprehension (Glenberg et al., 2010). Furthermore, a correspondence between emotional states and language content facilitates language understanding (i.e., mood congruency effect) (e.g., Havas et al., 2007). Finally, results suggest a modulatory effect of emotions on both lexical and syntactic processing of current and subsequent tasks (Jiménez-Ortega et al., 2012; Kousta et al., 2011).

1.3. Summary and Conclusions of the Chapter

Recently, research in psychology has changed its focus from an individual-centered and symbolic analysis of cognitive processes - detached from the physical and social context, and locked in the cranial vault - to an emphasis on the influence of the social and physical context, including the body, on the construction of knowledge about the world.

This shift on the approach to human cognition had obvious implications for the way language is considered – from its final purpose of adaptive action; to its function as a tool to distribute and extend cognition; as a device that allows for sociality and confers uniqueness to social interactions; and as a tool that impacts and ultimately depends on our bodies and brains. Only the joint consideration of all these factors, and the conception of language comprehension as an emergent process, can allow the examination and, consequently, the understanding of meaning construction and representation.

Importantly, understanding how a native language is grounded may inform the investigation of how the acquisition and use of a second-learned language unfolds. Are first-native (L1) and second-learned (L2) languages grounded in the same way? Is the simulation process the same? Does the linguistic context impact the way one perceives, processes and recalls information? Does it impact how one makes judgments and decisions, and the way one evaluates and experiences emotional information? The following chapter tries to address all of these questions.

CHAPTER TWO:

EMBODYNG DIFFERENT LANGUAGES

2.1. Different languages, different thought?

A substantial amount of accumulated evidence indicates that language processing activates the simulation of perception, emotion and action. But do different languages equally shape the way we experience the world, and thus the way we think, feel, and behave?

A question that was raised almost 70 years ago is still object of interest and debate: "Are our own concepts of 'time,' 'space,' and 'matter' given in substantially the same form by experience to all men, or are they in part conditioned by the structure of particular languages?" (Whorf, 1939/2000, p. 138). The Linguistic Relativity perspective, expressed in the writings of Benjamin Lee Whorf, suggests that two different languages present structural differences, which are reflected in non-linguistic cognitive processes that are different for the native speakers of two different languages. The strong Whorfian hypothesis considers that thought and action are *entirely* determined by language, and that people speaking different languages should perceive, think and act differently in objectively similar situations (see Boroditsky, 2003; Casasanto, 2008).

This extreme view was highly criticized and eventually abandoned in the field (see Casasanto, 2008; Pinker, 1994). However, a less extreme approach of Linguistic Relativity has been feeding an ongoing debate about whether the language available to describe experience influences the experience itself (e.g., Boroditsky, 2001; Casasanto, 2010; Gentner & Goldin-Meadow, 2003). Recent evidence has contributed to this discussion of whether language influences cognition, in domains such as color (e.g., Drivonikou et al., 2007); number (e.g., Spaepen, Coppola, Spelke, Carey, & Goldin-Meadow, 2011); shape (e.g., Roberson, Davidoff, & Shapiro, 2002); gender (e.g., Sera et al., 2002); space (e.g., Bowerman & Choi, 2001); and time (Boroditsky, 2001; Casasanto & Boroditsky, 2008) and the results suggest that that is the case.

The study of these different domains has an implicit but important difference: while, for example, color, shape and space are concrete attributes that can be experienced through people's direct experience with the physical world, abstract concepts, such as time, cannot be apprehended through our senses. However, according to recent embodiment perspectives, conceptual thought is implicitly grounded on physical experiences, and our capacity to represent abstract experiences (e.g., affect, time) relies largely on our ability to represent perceptual experiences (e.g., brightness, temperature, space, distance). Thus, the use of *conceptual metaphors* (e.g., "a *long* time ago") allows talking about and understanding

concepts that cannot be accessed through the sensorimotor systems. The use of these metaphors does not entail exclusively a communication purpose, but also reflect and structure cognition (e.g., Lakoff & Johnson, 1999).

The extent to which conceptual metaphors vary for native speakers of different languages has been examined. For example, several studies have shown that people recur to spatial metaphors to think and communicate about time (Boroditsky, 2000, 2001; Boroditsky & Ramscar, 2002; Casasanto et al., 2004; Casasanto & Boroditsky, 2008; Lakens, Semin, & Garrido, 2011). However, people describe time differently depending on the language they speak. Whereas in English people typically describe time as horizontal, in Mandarin people recur to vertical spatial metaphors to talk about time (see for review Casasanto, 2010). Specifically, Boroditsky (2001) observed that English speakers were faster to confirm that March comes earlier than April when they were presented with a horizontal (vs. vertical) prime, and the same was true for the Mandarin native speakers when they had just seen a vertical (vs. horizontal) prime. Importantly, when taught to talk about time using vertical spatial terms, English speakers presented the same vertical bias as native Chinese speakers.

However, judgments about sentences containing spatial or temporal language only reflect the impact of language on linguistic cognition. If time is differently grounded as a function of the language one speaks, this pattern of results should be expressed also in non-linguistic tasks. Casasanto and his colleagues (2004) explored this assumption comparing speakers of four languages: English and Indonesian who use *distance* terms to talk about time (e.g., English people say "long time"), and Spanish and Greek who use *quantity* related terms (e.g., in Spanish people say "mucho tiempo", which translates to "much time"). In one experiment, participants made either distance estimates (i.e., how far lines in the computer screen would grow), or time estimates (i.e., how much time the lines would remain in the computer screen), whereas in the other one, they made either quantity estimates (i.e., the amount of water in a container), or time estimates (i.e., the amount of time the container would take to be filled). The estimates were made by clicking the mouse to indicate the beginning and the end of the spatial, quantity, or temporal intervals making these tasks non-linguistic. Results revealed that "distance languages" speakers (English and Indonesian) showed a strong effect of distance on time estimation, whereas "quantity languages" speakers (Spanish and Greek) presented effects of quantity on time estimates.

These and other studies suggest the important role of a native language in structuring both low-level and high-level thought, in both linguistic and non-linguistic tasks. These

results have revealed that not only speakers of different native languages talk about abstract domains differently, but also that they think about them in a different way.

However, despite the great surge of interest in studying the relationship between language and cognition, and language and affect, research has been focused in monolingual populations in fields such as cognitive linguistics (e.g., Kövecses, 2000; Lakoff & Johnson, 1999), linguistic anthropology (e.g., Kulick & Schieffelin, 2004), pragmatics (e.g., Gilbert, 2001; Zhang & Patel, 2006), communication sciences (e.g., Krauss & Fussell, 1996), and in psychology, particularly in the embodied cognition domain (Foroni & Semin, 2009; Niedenthal, Winkielman, Mondillon, & Vermeulen, 2009). Most importantly, the association of each language one speaks - native (L1) and second language (L2) - to different sensorimotor experiences, and its impact on cognition and emotion, has been relatively left aside. Thus, the question is whether different languages represent different groundings for cognition and emotion from an embodied point of view. Are native and second languages embodied in the same way? A few studies with bilingual participants have already been trying to provide some answers to this question, as it will be described in the following sections.

2.2. Bilingualism

Imagine the following example of a current everyday life situation: You are at your parents' home, talking with them in your native language. At the same time, you receive a WhatsApp message in English from a Dutch friend. Your French aunt calls your mother on Skype. A Spanish friend you met during *Erasmus* sends you a message in Italian on Facebook. This apparently chaotic scenario - using many communication channels and language(s) rather than one's native - is a common everyday life situation for many people.

Whether in family life, social interactions, or business negotiations, the use of a second language to communicate is an increasingly common phenomenon (e.g., European Commission Special Eurobarometer, 2006, 2012; U.S. Census Bureau, 2010, 2013). In fact, bilingualism is present in almost all countries in the world, in all classes of society, and in all age groups (Grosjean, 1994). There are many ways to become a bilingual: migrations of various kinds (economic, educational, political, religious), nationalism and federalism, education and culture, trade and commerce, or intermarriage, amongst others (e.g., Grosjean, 1996). One can learn and use a second language at a younger age or later in life; at school or at home; one can use it with close relationships or only in a formal professional context; it

can be used frequently or only sometimes; one can be highly proficient or to have only a medium level of proficiency; one can master one, two, three, or more languages. Despite different why's, how's, and when's, acquiring and using more than one language during the life span is an increasingly common phenomenon.

Hence, the study of bilingualism has recently started to be considered as a necessary component to clarify the relation between language, cognition and emotion, namely to investigate if different languages are embodied in the same way. But who is bilingual?

Generally speaking, the term "bilingual" is used to refer to someone who speaks two languages, whereas the word "multilingual" is employed to someone who speaks more than two languages (Pavlenko, 2005). Nevertheless, few areas are characterized by as many misconceptions as bilingualism (Grosjean, 1994). Common sense posits that bilinguals are people who are similarly proficient in two languages, typically learned from birth. However, the majority of bilinguals acquired their languages at different points in their lives, and they are rarely equally fluent in both languages (e.g., Baetens-Beardsmore, 1982; Grosjean, 1994). Thus, and in contrast with common sense, in academia and for research purposes, different terms and classifications are used to describe the complex phenomenon of bilingualism.

Despite the variety of aspects inherent in a linguistic history, research has been emphasizing six variables to classify bilinguals: a) *Order of acquisition* (OoA) or the order in which the languages were learned; b) *Language dominance*, an increasingly relevant factor, since L1 is not necessarily the dominant language; c) *Level of proficiency*, or the level of competence reached in the second language; d) *Frequency of use*, or how often a person uses the second language; e) *Context of acquisition* (CoA), according to which bilinguals can be classified as having learned their second language in a naturalistic environment, in an instructional or classroom setting, or to have a mixed context of acquisition; f) *Age of acquisition* (AoA) or how early in life the acquisition of the second language has started (see Chin & Wigglesworth, 2007; Pavlenko 2012).

Commonly accepted are the terms and abbreviations aiming to define the Order of Acquisition (OoA) of the several languages that bilinguals and multilinguals are able to master, such as *first language* (L1), *second language* (L2), and *third language* (L3). The term *LX* is used to refer to any language other than L1 (e.g., Pavlenko, 2006). However, LX and L2 are often employed interchangeably: L2 designates, not only the language learned chronologically after the first one, but also any language learned after the native language

(e.g., Pavlenko, 2006, 2012). Although L1 is often the dominant language, language dominance might shift towards L2 in some situations (for example, when language of schooling is L2). Importantly, language dominance is not necessarily the same as proficiency, but it reflects instead a perception of greater ease of use and lexical access, which results from daily use and higher levels of activation of the language (see Pavlenko, 2012).

Level of proficiency and frequency of use have been employed not only to classify different types of bilinguals but also to define the term bilingualism itself. Actually, defining this term has been harder than it may appear, since there seem to exist as many definitions of the concept as researchers who have studied the topic.

Although some researchers have defined bilinguals as individuals who have native-like control in two or more languages (e.g., Bloomfield, 1933), this proficiency-based notion is not widely accepted because it would exclude the vast majority of people using regularly more than one language, but who do not have native-like proficiency in L2. Critiques to maximalist definitions have led researchers to propose other (minimalist) definitions of bilingualism such as: the ability of using two languages (Mackey, 1962); the ability to produce complete meaningful utterances in two (or more) languages (Haugen, 1953); a minimal proficiency in at least one of the four language skills - understanding, speaking, reading and writing – in a second language (Macnamara, 1969). Thus, language proficiency might refer to the overall level of achievement in a particular language, or to the achievement in discrete language skills, and it is commonly accessed through standardized language tests or self-reports (Pavlenko, 2012).

As different languages are usually learned in different contexts, with different people, and for different purposes, bilinguals rarely present the same degree of achievement in both languages in all areas (i.e., *complementary principle*; Grosjean, 2008). Taking this perspective, Grosjean (1989, 1994) argues that bilingualism is not a matter of proficiency in two languages, but rather a question of frequency in using a second language. The author contends that the majority of bilinguals are those people using a L2 in their everyday lives, and not necessarily someone who has perfectly equivalent proficiency skills in two languages. Thus, this definition applies and ranges from an immigrant worker who speaks the host country's language with some difficulty (and cannot write or read it), to a scientist who reads and writes articles in L2 (but rarely speaks it), to a professional interpreter who is totally proficient in two languages. Therefore, a bilingual is more than the sum of two monolinguals – he/she finds himself/herself, instead, at a specific point of a situational

continuum, which ranges from one end (i.e., monolingual speech mode) to the other (i.e., bilingual speech mode) (Grosjean, 1989).

Furthermore, the language Context of Acquisition (CoA) might be *naturalistic*, *instructed,* or *mixed* (i.e., both). In the former, language acquisition results from natural input in the environment, without (necessarily) structured instruction and is usually learned from caregivers (parents or siblings). Individuals may also acquire a language in a structured setting, through formal instruction and usually the learning process occurs at school (see Chin & Wigglesworth, 2007; Pavlenko, 2005). Finally, people may acquire a language both at naturalistic and instructed settings, which is defined as a mixed context of acquisition.

Finally, L2 age of acquisition (AoA) is also a key consideration when classifying bilinguals. Usually people are grouped in two categories: Early (EB's) or Late (LB's) bilinguals. The boundaries between the two groups are malleable because the age cut-off point is still not well established. There is comprehensive research on the relationship between AoA and proficiency (e.g., Johnson & Newport, 1989; Long 1990). This relationship is expressed in the *critical period hypothesis* (CPH)[1], an approach that has been object of a long-standing debate, supporting that the younger the learner, the easier and the better the learning process of a second language is, and the consequent outcomes are (see Bialystok & Hakuta, 1999; Birdsong 1999; Lenneberg, 1967; Long, 1990; Singleton, 1995; Scovel, 2000)[2].

It is generally accepted the onset of puberty as the end of the critical period for native-like language acquisition (e.g., Lenneberg, 1967), and also as the cut-off point differentiating between EBs and LBs. However, the exact cut-off point at which the critical period ends, and after which native-like proficiency is hardly attained is controversial (Birdsong, 2005), ranging from 5 years (Krashen, 1973, 1975), to 6 years (Long, 1993), to 7 years (Johnson & Newport, 1989), to 9 years (Penfield & Robertson, 1959), to 12 years (e.g., Lenneberg, 1967; Scovel, 1988), or 15 years old (e.g., DeKeyser, 2000; Patkowski, 1990)[3]. Importantly, some

[1] There is much counter evidence against CPH: late learners can achieve native-like proficiency (Birdsong & Molis, 2001; Bongaerts, 1999); late learners can have advantages in L2 over younger learners (e.g., Cenoz, 2003; Munoz, 2000); there are no changes in learning outcomes at the end of the critical period (Bialystok & Hakuta, 1999; Bialystok & Miller, 1999; Flege, 1999).

[2] The explanations for CPH vary, ranging from the perspective of brain plasticity (Penfield & Roberts, 1959), the timing of lateralization of the brain (Lenneberg, 1967), and myelination (Pujol et al., 2003), to linguistic theories (Chomsky, 1986).

[3] Usually critical periods are suggested for phonology and syntax, with authors claiming that there is no critical period for learning L2 vocabulary (e.g., Singleton, 1995; Slabakova, 2006).

authors suggest that there is no sudden drop-off in ability, but a gradual decline starting from early childhood and extending throughout life (Birdsong & Molis 2001; Hakuta, Bialystok & Wiley, 2003).

Notably, linguistic, affective and socialization histories are considered fundamental modulators of the emotional experience in each language one communicates. Language is experienced as emotional because it is learned and used in emotional contexts (Harris, Gleason, & Ayçiçegi, 2006). Usually the contexts of early childhood are more emotional than the contexts of later childhood/adulthood, including an individual's earliest encounters with the gamut of human emotions (Schrauf, 2000) and the bonding with caregivers (Harris, et al., 2006). At an early age, linguistic development overlaps with the development of conceptual and emotional regulation systems, which is inseparable from the process of affective socialization. L1 is usually learned in the context of family life, which generally includes intense emotional experiences, and integrates information received from all sensory modalities, including kinesthetic and visceral (Pavlenko, 2008). For example, the smells and touch of the mother, the intense affection and fear that small children feel are usually experienced and simulated in native language or in native language contexts. On the other hand, L2 is frequently mastered in more emotionally neutral formal settings (e.g., school, work), that do not offer many opportunities for affective socialization, and takes place without significant involvement of the majority of sensory modalities (Pavlenko, 2008; Perani & Abutalebi, 2005). Thus, whereas L1 acquires affective and autobiographic dimensions, the latter acquisition of L2 does not necessarily offer the same opportunities for affective linguistic conditioning.

Moreover, it is also during early childhood that language meaning is closely related to the body, because body processes play a large role in the life of a child. Within the four stages of cognitive development described by Jean Piaget, in the sensorimotor stage (birth-2 years old) infants gain knowledge of the world from the physical actions they perform within it, whereas in the preoperational stage (2 to 7 years old) the child learns to speak while her motor skills are acquired and developed. Consequently, during the first few years of life thought is centered on a sensorimotor way of thinking and communicating. Hence, besides being a particularly emotional phase, childhood is also the moment in which an association between language and the body is established, and thus languages learned during this period are supposed to be strongly grounded in the sensorimotor system.

In sum, L1 and L2 have different linguistic, affective, and socialization histories, associated with different emotionality and sensorimotor experiences (e.g., LBs learning L1 in early childhood and L2 later in life; someone using L1 every day and L2 with less frequency; someone using L1 in mix contexts and L2 in formal contexts). Therefore it makes sense to argue that sensorimotor grounding and thus emotional resonance may differ across these two languages.

Although there is no exact definition of bilingualism or agreement in the classification of bilinguals, there is considerable research investigating the impact of using different languages on cognition and emotion. We review some of this research in the following sections.

2.3. Bilinguals' Emotions - L2 Means Reduced Emotionality

2.3.1. The distancing effect

It is commonly stated that if the first language is the language of emotional expressiveness, the second language may be the language of emotional distance (e.g., Dewaele & Pavlenko, 2002; Marcos, 1976). Evidence of the distancing effect of L2 comes essentially from clinical cases describing language code-switching and language choice for the expression of emotions (e.g., Movahedi, 1996; Santiago-Rivera, Altarriba, Poll, Gonzalez-Miller, & Cragun, 2009; see for review Santiago-Rivera & Altarriba, 2002).

The emotional detachment that bilinguals feel when using their L2 is frequently named the *detachment effect* - the second language serves an intellectual function and is relatively devoid of emotion, whereas the native language clearly expresses emotional content (e.g., Marcos, 1976). It is also contended that emotional expression tends to be more spontaneous and less inhibited in L1, whereas using a non-dominant language tends to elicit more defensive styles of behavior (Altarriba & Santiago-Rivera, 1994). Therefore, language code-switching - defined as 'changes from one language to another in the course of conversation' (Li, 2007, p. 14) - from L1 to L2, or choosing L2 over L1 to communicate, often serve a distancing function from the high emotionality triggered by the native language (e.g., Bond & Lai, 1986; Gumperz & Hernandez, 1971; Javier & Marcos, 1989).

The accounts of code-switching to L2 or LX to discuss taboo, traumatic, or anxiety-related topics are well illustrated in clinical reports (e.g., Amati-Mehler, Argentieri, & Canestri, 1993; Aragno & Schlachet, 1996; Gonzalez-Reigosa, 1976; Javier, 1995;

Movahedi, 1996). Freud and his disciples had already observed more than 100 years ago that their bilingual and multilingual patients favored their L2 or LX when using obscene words and discussing anxiety-inducing topics, such as sex (Freud, 1893). Consistently, Gonzalez-Reigosa (1976) described bilingual patients who employed L2 when talking about anxiety-arousing subjects, and when they wanted to convey a self-confident, calm and emotionally reserved impression. Moreover, the same author observed that Spanish-English patients reported more anxiety after reading a list of 10 Spanish taboo words compared to reading a list of 10 English taboo words.

More recently, Santiago-Rivera and colleagues (2009) observed that during therapy sessions patients often changed between languages, depending on the distance they wanted to have from the topic under discussion. Spanish-English patients often switched from their L2 to their L1 when they wanted to emphasize and discuss in greater detail a certain negative emotional event. If the negative impact of those events were too high, patients would switch to their L2 to have the opportunity to discuss those events without experiencing the strong arousal triggered by the native language. Thus, emotional distancing associated to later learned languages is well illustrated by the fact that bilinguals often feel it is easier to discuss embarrassing or emotionally charged topics in their second language, rather than in their native language, distancing themselves from the current situation.

Moreover, it has also been observed that bi-multilinguals might change to or choose different languages depending on the type of emotion they wanted to express. In general, speakers switched into L1 to convey intimacy, we-ness, and to express their emotions, and to L2 to mark distance, out-group attitude, or to express emotions in a detached way (Grosjean, 1982; Gumperz, 1982; Schecter & Bayley, 1997; Zentella, 1997). However, the same language may have different affective meanings in different contexts (see Pavlenko, 2005). For example, Movahedi (1996) observed that his patients would change to L2 or LX to gain distance from emotion speech acts that were too negative or too positive. Specifically, his patients preferred to express anger toward him in L2, rather than in the shared L1, as it felt safer and more polite. The same was observed when they wanted to express anger towards their family members, as if using L2 English would keep these revelations as secrets. On the other hand, bilinguals may prefer to use their native language when asked to talk about positive events in their lives (Javier, Barroso, & Muñoz, 1993), but may change to L2 when they want to gain some distance in the expression of intimate positive emotions (Movahedi, 1996).

The conclusions of these clinical studies were supported by qualitative analyses from an online questionnaire about the experiences of multilingual patients. Results showed that bi- or multilingual patients reported to adjust the emotional tone of therapy sessions by choosing the language that provided either emotional distance or proximity (Dewaele & Costa, 2013).

Finally, Bond and Lai (1986) provided the only experimental study, to the best of our knowledge, arguing for the distancing function of L2. Female Chinese participants talked about embarrassing topics (i.e., sexual attitudes of Chinese and Westerners, and a description of a recently experienced personally embarrassing event) during a longer time when speaking in English (L2) than in Cantonese (L1), suggesting that using L2 can serve a distancing function.

Overall, the described results suggest that L2 can be used with distancing purposes. However, the assumption that L2 leads to psychological distance and L1 to proximity was never tested and controlled experimentally, and relies mainly in a few case studies that essentially express the therapists' perceptions rather than the patients' perceptions and experiences. Self-reports, questionnaires, psychophysiological instruments, recall and priming tasks were thus used to fill in this gap, and to assess more precisely the true emotional experience induced by L1 and L2.

2.3.2. Self-reports

Many studies account for the *emotional advantage* of L1 over L2, as bilingual speakers often report that swearing, praying, and lying feel stronger when using their native rather than their second language (see for review Dewaele, 2010; Pavlenko, 2005).The Bilingualism and Emotions Questionnaire (BEQ; Dewaele & Pavlenko, 2001-2003) was probably the largest questionnaire-based study administered online that generated a rich database covering many aspects of multilingual communication.

Based on these data, Dewaele (2004) found that bi-multilinguals reported higher perceived emotional intensity of taboo and swearwords in L1, which was gradually lower in languages learned subsequently. Importantly, participants who learned L2 in a naturalistic or mixed instructed setting (vs. instructed), who started learning L2 at a younger age, who were more proficient in speaking that language, or who used it more frequently had higher scores in perception of emotional strength of taboo and swearwords in L2. Furthermore, in another study using data from BEQ, it was observed that the perceived emotional intensity of positive

phrases like 'I love you' was stronger in L1 than in other languages (e.g., Dewaele, 2008). This perception of intensity was associated with language dominance, L2's context and age of acquisition, degree of socialization, nature of the network of interlocutors, and self-perceived oral proficiency.

Although many bilinguals report *being* different or *feeling* different in each of their languages (Wierzbicka, 2004) relatively little research has been conducted on the subject (see e.g., Ożańska-Ponikwia, 2011, 2012; Pavlenko, 2006; Veltkamp, Recio, Jacobs, & Conrad, 2012). Dewaele (2010) examined the perceptions that pentalinguals have of their five languages (extracted from BEQ), regarding their perceived usefulness, colorfulness, richness, poetic character and emotionality. The results of this research indicated that L1 scored highest in all dimensions, and that there was a gradual decline in the ratings from L1 to L5. Participants who had acquired the language before puberty, the early bilinguals, tended to have higher scores in all dimension in L2. Frequency of use was also positively linked with the scores on various dimensions. Additionally, Dewaele and Nakano (2012) described in a recent study that multilinguals reported feeling gradually less logical, serious, and emotional and increasingly fake when using their L2, L3 and L4. This gradual decline mirrors the perceptions that pentalinguals had of their languages (Dewaele, 2010). Thus, the authors suggested that perceptions of the languages might be transferred to the perception of the *self* when using that language.

This pattern of results has been also documented in more applied settings. For example, advertising slogans were judged to be more emotional when the messages were written in the native language rather than in the respondents' L2 (Puntoni, De Langhe, & Van Osselar, 2009). Importantly, the authors confirmed that this effect was not due to lack of comprehension in L2, but rather depends on the frequency with which words have been experienced in native versus second language contexts.

Overall, studies based on self-reports have shown an *emotional advantage* of L1 over L2. However, conclusions drawn exclusively from self-report data might be distorted or biased, and might be considered only indirect evidence of emotional strength. Therefore, there have been attempts to conduct controlled experiments to reveal the different arousal associated to native and second language, namely by measuring psychophysiological responses to, and recall of different types of words presented in L1 and L2.

2.3.3. Psychophysiological responses

Evidence for the differences in emotional strength triggered by native and second languages was provided by studies using psychophysiological indicators, such as skin conductance. Skin conductance is determined by the activity in the sympathetically innervated sweat glands, and increases monotonically with intensifying stimulation, namely with the arousal triggered by a stimulus or situation (Bernstein, 1969; Boucsein, 1992; Dawson, Schell, & Filion, 2000). Studies investigating emotional differences between native and second language suggested that, due to the lack of emotional connotation of L2, this language would trigger less arousal than L1, which would be manifested in lower skin conductance.

For example, Harris, Ayçiçeği and Gleason (2003) asked Turkish native speakers that moved to the USA after the age of 18 (Late Bilinguals - LBs) to hear and read a variety of words in L1 and L2. The items included taboo (curse words, body parts, and sexual terms), aversive (cancer, kill, death), positive (bride, joy, kind), and neutral words (column, table), as well as childhood reprimands ('Don't do that!'). Participants were asked to rate each item for pleasantness, while skin conductance activity was being measured. Taboo words were the ones eliciting higher skin conductance responses (SCRs) yet both for L1 and L2. Contrary to what was expected, the only differences in SCRs between languages occurred for reprimands that triggered higher autonomic activity in L1 (vs. L2), both in the auditory and visual modalities. Moreover, words presented in the auditory modality elicited stronger SCRs than the ones presented in the visual modality, but only in L1. The authors suggested that modality effects might reflect distinct learning environments: the acquisition of language early in life occurs essentially via the auditory modality and thus richer language experiences might be associated with this modality. On the contrary, L2 words in the auditory and visual modalities might be more similar because a greater amount of experiences may take place with print, due to the learning context (e.g., school, work).

Similar findings were reported by Harris (2004) for Spanish-English bilinguals. The author also reported that the only observed difference in SCRs between L1 and L2 was for childhood reprimands. Additionally, the results have shown that this effect occurred only for the LBs group, with no differences between languages registered for Early Bilinguals (EBs). Consistently, only LBs rated reprimands in L1 Spanish as more unpleasant than in L2 English.

However, in another study using similar materials and procedures, the results reported by Harris (2004) were not replicated (Caldwell-Harris, Tong, Lung, & Poo, 2011). A sample

of Mandarin-English bilinguals rated L1 reprimands as more unpleasant than L2 reprimands, but no difference in the SCRs for reprimands between L1 and L2 was observed. Moreover, neither age of acquisition, nor level of proficiency influenced the SCR's elicited by emotional language. Furthermore, Caldwell-Harris and Ayçiçeği-Dinn (2009, Exp. 2) tested whether lying in different languages would elicit different emotional responses for Turkish-English bilinguals. Overall, reading out loud lies elicited larger SCRs compared to true statements, but contrary to what was expected, L2 English stimuli elicited larger SCRs than L1 Turkish. In contrast, ratings of how strongly participants felt they were lying revealed the inverse pattern of results: L1 lies were felt more strongly than L2 lies. The authors tried to explain the contradictory results by suggesting that lying in L2 elicited higher autonomic activity due to anxiety triggered by speaking a non-native language, whereas the results of self-reports suggested a higher arousal associated with lying in L1. Also in this study no correlation was observed between self-reports and SCRs.

Finally, in a recent study, Greek-English bilinguals and English native speakers performed emotional and taboo Stroop tasks while skin conductance level (SCL) was being measured (Eilola & Havelka, 2011). No differences in the magnitude of the interference effect between languages were observed. However, as hypothesized, reading English negative words and taboo words was associated with higher skin conductance levels than reading positive and neutral words only for native English speakers (and not for Greek-English bilinguals).

Overall these findings supported the notion that some categories of words (i.e. taboo and reprimands) are less emotional in L2 than in L1 (e.g., Harris et al., 2003; Harris, 2004; see Caldwell-Harris & Ayçiçeği-Dinn, 2009, Exp. 1, for similar findings). Importantly, age of acquisition seems to play an important role in shaping the emotional resonance triggered by native and second languages (e.g., Harris, 2004; Harris et al. 2003).

However, although bilingualism studies using skin conductance as an indicator of arousal represent a step forward regarding the establishment of controlled experimental methods, the results reported so far have been very inconsistent.

2.3.4. Recall in L1 and L2

The relation between recall and arousal has been widely investigated in the literature. Neuroimaging studies have consistently reported a correlation between long-term memory of arousing stimuli and the degree to which the amygdala is activated during encoding (Cahill et

al., 1996; Hamann, Ely, Grafton, & Kilts, 1999), as well as an amygdala activation enhancement during the retrieval of arousing items (Dolan, Lane, Chua, & Fletcher, 2000). Consistently, it was found that memory is generally better for pictures (Bradley, Greenwald, Petry, & Lang, 1992) and sounds (Bradley & Lang, 2000) rated highly in the arousal dimension, than for pictures and sounds rated low in arousal, regardless of stimulus valence. Likewise, studies have shown that emotion words (e.g., Altarriba & Bauer, 2004; Rubin & Friendly, 1986) and emotion-laden words (Talmi & Moscovitch, 2004) were better recalled than neutral words, a phenomenon commonly called *emotion-memory effect*.

Similar effects were observed in bilinguals' performance, with some differences across languages (e.g., Anooshian & Hertel, 1994; Ayçiçeği & Harris, 2004; Ayçiçeği & Harris, 2009; Ferré, García, Fraga, Sánchez-Casas, & Molero, 2010). For example, Anooshian and Hertel (1994) hypothesized that since emotion words in a second language lack the emotional connotations, their recall should not be superior to the recall of neutral words. The authors confirmed their hypothesis by showing that both emotion and emotion-laden words were better recalled than neutral words, but only in the participants' native language (and not in the L2 learned after the age 8), regardless of whether it was Spanish or English.

Ayçiçeği and Harris (2004) reasoned that emotion and emotion-laden words used in Anooshian and Hertel's (1994) study were mainly positive, and that the valence of the words might have different effects on recall. Thus, the authors tested the emotion-memory effect in L1 and L2 using auditory and visual word presentation, and added additional word categories to their study: positive words (joy, mother), negative words (anger, pain), neutral (table, column), childhood reprimands (Shame on you!) and taboo words (sexual and socially stigmatizing terms). They also introduced a recognition task. Contrary to previous findings, Turkish-English late bilinguals revealed stronger emotion-memory effects in L2 than in L1, in both recall and recognition tasks. More specifically, in the recall task only L1 taboo words showed an emotion advantage over neutral words, whereas in L2 all categories (except negative words) showed a recall advantage over the neutral words. Moreover, in L2, positive, negative and taboo words produced a recognition advantage over neutral words, whereas in L1, emotion-memory advantage was only observed for taboo words.

This pattern of inconsistent findings was also reported by Ayçiçeği and Harris (2009) who found higher recall of reprimands in English (L2) than Turkish (L1). This result is particularly difficult to interpret since the authors used the same stimuli as Ayçiçeği and

Harris (2004) and Harris and colleagues' (2003) skin conductance study. Finally, Ferré and her colleagues found the emotion-memory effect but for both L1 and L2, regardless of language dominance, the age and context of second language acquisition, or the similarity between languages (Ferré et al., 2010).

In sum, recall studies have been failing to replicate the results initially reported by Anooshian and Hertel (1994) on the recall advantage for L1 words, and like studies measuring skin conductance have been presenting inconsistent results.

2.4. Bilingual's Word Processing: L2 Means Reduced Automaticity

The emotional intensity associated to L1 and L2 has also been examined using implicit measures assessing low-level congruency and interference effects. The use of tasks such as the Priming task (Fazio, Sanbonmatsu, Powell, & Kardes, 1986), the Simon task (Simon, 1969), and the Stroop Task (Stroop, 1935) has permitted the experimental examination of the link between cognition and emotion for bilingual populations, overcoming some of the limitations associated with skin conductance and recall studies.

In bilingualism studies congruency and interference effects have been extensively investigated to explore cognitive and linguistic processes, such as the structure of bilinguals' lexicon (e.g., Tzelgov, Henik, & Leiser, 1990); between-language and within-language interference (e.g., Goldfarb & Tzelgov, 2007; MacLeod, 1991; Preston & Lambert, 1969; Sumiya & Healy, 2004); bilingual advantage in executive control (e.g., Bialystok & Craik, 2010; Bialystok, Craik, Klein, & Viswanathan, 2004; Blumenfeld & Marian, 2014); and shared semantic concepts in L1 and L2 (see Altarriba & Basnight-Brown, 2007). Nevertheless, congruency and interference effects have also been used to examine the degree of automaticity in processing emotional content in L1 and L2 for bilingual populations.

Many studies using bilingual populations have explored the reduced emotionality associated to L2 by showing less automaticity in processing emotionally charged words in this language. For example, Segalowitz, Trofimovich, Gatbonton and Sokolovskaya (2008), using an Implicit Affect Association Test (IAAT), asked English–French bilinguals to provide evaluative responses to pictures of facial expressions (happy or sad), pictures of objects (whole or broken), and neutral pictures (tools or food), followed by valenced phrases (e.g., positive or negative) in L1 and L2. As expected, in L1 the response times were slower in the incongruent condition (e.g., pressing the same panel for happy faces (or whole objects) and negative phrases) and faster in the congruent condition (e.g., pressing the same panel for

happy faces (or whole objects) and positive phrases) as compared to the neutral condition (e.g., pressing the same panel for pictures of tools and positive phrases). Notably, the interference effect observed in L2 was significantly smaller, and it was not correlated with the general efficiency of L2 lexical access (as measured by an Animacy Judgment Task).

Furthermore, Colbeck and Bowers (2012) examined interference effects using a Rapid Search Visual Presentation task, where words are presented rapidly and sequentially: first a neutral or taboo word, and then a color word. In this task the accuracy in reporting the color word is reduced after the presentation of taboo words, due to interference or attentional blink. In this study, native English speakers made significantly more errors in the taboo condition than did Chinese-English bilinguals performing the task in L2 English.

However, incongruent results have also been reported in the literature. For example, Sutton and colleagues (Sutton, Altarriba, Gianico, & Basnight-Brown, 2007) and Eilola and colleagues (Eilola, Havelka, & Sharma, 2007) explored the emotional Stroop effect in L1 and L2, for early Spanish-English bilinguals, and late Finnish-English bilinguals, respectively. In Sutton and colleagues' (2007) participants saw negative and neutral colored words in L1 and L2, whereas Eilola and colleagues (2007) used negative, positive, neutral and taboo words in L1 and L2. Participants were asked to identify whether the print color of the words was either blue or green. Results revealed emotional Stroop effects, namely that participants' responses were slower when processing emotionally charged words (i.e. negative words in Sutton's study; negative and taboo in Eilola's study) than neutral words. However, in both studies, and thus for early and late bilinguals, these effects did not differ across L1 and L2 (see Eilola & Havelka, 2011 for the same pattern of behavioral results). It was suggested that proficiency could be the key factor explaining this pattern of results since both early and late bilinguals were highly proficient in their L1 and L2.

Furthermore, in Altarriba and Basnight-Brown (2011) studies, English monolinguals and Spanish-English bilinguals performed an Affective Simon Task, in order to assess the extent to which valence and emotionality were automatically processed when reading a word. Participants were asked to classify emotion words (e.g., happy; anger) and emotion-laden words (e.g., dream; shark) for valence (positive or negative) or color (blue or green). Bilinguals were presented with words both in English and Spanish. While emotion-laden words produced congruency effects in all languages and valence conditions, emotion words did not. Contrary to what was expected, congruency effects of emotion words were found for bilinguals in English (L2) for both negative and positive conditions, whereas these effects

were found only in the negative condition in the bilinguals' L1 and for monolinguals. The authors tried to explain these results by stressing that bilinguals' L2 was their dominant language instead of L1.

Nevertheless, some studies have shown that the extent to which bilinguals process affective content less automatically in L2 than in L1 depends on the task at hand, and thus on the type of processing required. Namely, Degner, Doycheva, and Wentura (2012) tried to disentangle semantic priming and affective priming effects for bilinguals in L1 and L2. They asked proficient German-French and French-German bilinguals to perform both tasks in L1 and L2. The authors observed semantic priming effects both in L1 and L2, with no differences across languages. However, affective priming effects were found only in L1. Importantly, affective priming effects in L2 were only observed for participants with a frequent everyday usage of L2, regardless of whether they were French or German native speakers. These results suggest that L2 is processed semantically but not affectively.

Finally, in Winskel's (2013) study a group of late Thai-English bilinguals and a group of English native bilinguals (explicitly differing in L2 AoA and proficiency level) were asked to perform two tasks: an emotional Stroop task (using negative, positive and neutral words) and an emotionality-rating task. Results showed that the emotional Stroop effect was observed for the native English group, and also in the bilinguals' L1 but not in their L2. However, this pattern of results was not observed in the emotionality-ratings task, with similar results presented in both languages spoken by the bilinguals. Thus, while differences between L1 and L2 are shown when the task requires the affective content to be processed automatically (i.e., emotional Stroop task) by bilinguals, these differences are absent when the task involves a more in-depth conscious level of processing (i.e., emotionality-rating task).

Taken together, the presented results of Segalowitz and colleagues (2008) and Colbeck and Bowers (2012) are consistent with bilinguals' typical reports that despite knowing the meaning of L2 words, they do not *feel* it (Pavlenko, 2005). In these studies results seem to suggest that the automaticity in processing the affective content of words is higher in L1 than in L2. However, these results were inconsistent with some studies presenting no differences in the affective processing of L1 and L2 (see Altarriba & Basnight-Brown, 2011; Eilola et al., 2007; Sutton, et al., 2007). Importantly, linguistic histories of L1 and L2 (e.g., dominant language, proficiency) seem to play a determinant role in explaining some of the inconsistent observed results. Notably, the type of processing (i.e., semantic or

affective; automatic or in-depth) seems to be a key factor when analyzing these results. Namely, studies suggest that bilinguals process automatically the semantic content but not the affective content of L2 (e.g., Degner et al., 2012), and that a more in-depth type of processing overcomes the lack of emotionality associated to L2 (e.g., Winskel, 2013).

2.5. Bilinguals' Behavior: L2 Means More Rational Choices

The extent to which behavior and decision-making are affected by the language in which a situation is presented was also explored in bilingualism literature.

Evidence has shown that people make different choices regarding the same outcome depending on whether it is presented as a gain or a loss. Loss aversion bias refers to the fact that when a situation is framed in terms of losses, people are more willing to choose risky options in order to avoid negative outcomes. When the situation is framed in terms of gains people become much more conservative and opt for the safest choices (see for a review Kahneman & Frederick, 2006). Keysar, Hayakawa, and An (2012) investigated whether the effect of intuitive biases on decision-making may be minimized when the emotionality of a given situation is reduced. The authors reasoned that, as emotional resonance elicited by a foreign language seems to be lower than that elicited by a native language emotionally driven biases may be inferior in the former case. The authors found that when presenting the Asian disease problem (Kahneman & Tversky, 1979) in a foreign language, to relatively low-proficient speakers, participants' choices were no longer affected by the way the problem was described.

Furthermore, Costa, Foucart, Arnon, Aparici, and Apesteguia (2014) explored whether the foreign language effect, reported by Keysar and colleagues, was present in other types of framing problems that involve psychological accounting biases and not so much gain/loss dichotomies. In the first study they replicated Keysar and colleague's results regarding the effect of a foreign language on loss aversion. Second, they have assessed the effects of a foreign language in *psychological accounting* – that is, the way people categorize economic outcomes and the extent to which this categorization impacts economic decision-making. Usually, when accounting for the consequences of an act people tend to adopt minimal rather than global accounts (see the *Ticket/Money Lost Problem* and the *Discount Problem*; Tversky & Kahneman, 1981). The authors found that framing effects were reduced when the Ticket/Money Lost and the Discount problems were set in a foreign language, rather than in the native language. Moreover, they found that using a foreign language (vs. a

native language) to set problems reduced *risk aversion bias*, and promoted consistent choices by decreasing *ambiguity aversion*.

In another study (Costa, Foucart, Hayakawa et al., 2014) participants were presented with moral dilemmas: a ‘‘footbridge’’ version of the trolley dilemma and a less emotional version of the trolley dilemma, the “switch” dilemma, either in their native or in their foreign language. In the trolley dilemma, when faced with the decision of whether to push a man in front of a train, killing him, but saving five people (i.e., utilitarian choice), participants chose differently depending on the language in which the problem was presented. Namely, significantly more participants chose the utilitarian option when L2 was used than when L1 was used. In the switch dilemma, the situation was the same but participants had to decide whether to switch the train tracks killing one man, and saving five lives. In this less emotional task, participants selected the utilitarian choice equally, regardless of language of presentation. Notably, the results were influenced by level of proficiency, with higher levels of proficiency decreasing the difference in responses between L1 and L2.

The presented results consistently suggest that the lack of emotional connotation of L2 may constitute an advantage under certain situations. Namely, when making decisions, certain psychological biases may be overcome in L2 (Keysar et al., 2012; Costa, Foucart, Arnon et al., 2014) since in this language choices are less influenced by emotionality than in L1 (Costa, Foucart, Hayakawa et al., 2014).

2.6. Bilinguals’ Embodiment of L1 and L2

Taking the previous findings together, literature seems to suggest that emotional resonance is hindered in a L2 context. However, only recently this question has been addressed within an embodied/grounded cognition framework. Behavioral and neuroscience studies have been providing evidence suggesting that language is embodied - language is grounded on perception, emotion and action systems and language comprehension requires, at least partially, simulation of previous experience (see for review Barsalou, 2008; Borghi & Pecher, 2011; Fischer & Zwaan, 2008; Gallese, 2008; Gallese & Lakoff, 2005; Meteyard, Cuadrado, Bahrami, & Vigliocco, 2012). However, embodied cognition studies have been mainly focused on monolingual populations, and on the impact of first language on thought and behavior (e.g., Barsalou, 2008; Foroni & Semin, 2009, 2013; Lakoff & Johnson, 1999).

Only recently, it has been argued that the reported differences between L1 and L2 express different groundings of these languages leading to different simulations of

experience. Although L2 seems to be acquired through the same neural devices responsible for L1 acquisition (Perani & Abutalebi, 2005) and to share the same brain language systems (e.g., Frenck-Mestre, Anton, Roth, Vaid, & Viallet, 2005; Kovelman, Baker, & Petitto, 2008) the linguistic and socialization histories of these languages are different. Since L2 acquisition usually occurs in emotionally neutral context and takes place without significant involvement of the majority of sensory modalities (Pavlenko, 2008; Perani & Abutalebi, 2005), it seems plausible to argue that this language should not be grounded on the sensorimotor systems, at least to the same extent as L1.

A few studies have acknowledged that L2 comprehension also requires experience simulation. In an fMRI experiment (De Grauwe, Willems, Rueschemeyer, Lemhöfer, & Schriefers, 2014) German-Dutch bilinguals and Dutch native speakers were asked to make lexical decisions about motor and non-motor verbs presented in Dutch (their L2 and L1, respectively). Results showed a significantly increased activation in the region-of-interest for motor compared to non-motor verbs both in L1 and L2. Moreover, in Dudschig, de la Vega and Kaup's (2014) study, participants saw L1 or L2 words referring to entities with up or down spatial locations (Experiment 1 & 2), or to positive or negative emotions (Experiment 3). Participants should respond to the words' ink color with an upward or downward arm movement. The authors found that words with an up spatial position (e.g., star) or referring to positive emotions (e.g., happy) facilitated upward movements, while words with a down spatial position (e.g., root) or referring to negative emotions (e.g., sad) facilitated downward movements. This pattern of results was found both in L1 and L2, even when L2 was learned late in life (age >11).

However, some studies have suggested different groundings of L1 and L2. In a very recent study, Li, Liu and Ma (2015) explored the impact of L1 and L2 on the relation between sensorimotor information and thought. They investigated the vertical spatial metaphor of affect ("good" is represented "up"; "bad" is represented "down"; e.g., Meier & Robinson, 2004), and the impact of using a non-native language on this conceptual metaphor. Participants were presented with target affective words (positive or negative) in the upper or the lower part of a computer screen, in native or non-native languages. Prime and target valence was congruent, and participants were asked to judge the target's valence. Results showed that participants' reaction times were shorter for positive words presented at the upper (vs. lower) part of the screen, and for negative words presented at the lower (vs. upper)

part (Study 2). Importantly, this pattern of results was only observed in the participants' L1, and not in their L2[4].

The proposal of partial disembodiment in L2 was recently, and to our knowledge for the first time, examined by Foroni (2015) in an EMG study. Indeed, the author questioned whether the processing of L2 has any somatic bases (i.e., muscle simulation) and whether they were similar or different from the ones observed for L1 (e.g., Foroni & Semin, 2013). Dutch native speakers, late learners of English (L2), read sentences that were either in the affirmative ('I am laughing') or negative form ('I am not grinning), and that were either relevant ('I am smiling') or irrelevant ('I am frowning') for the activation of the zygomatic muscle. Results have shown that processing L2 affirmative emotion sentences involved simulation to the same extent as L1, but processing L2 negation sentences did not activate a significant relaxation of the relevant muscle, contrary to what was observed for L1 (Foroni & Semin, 2013). The author concluded that whereas the processing of emotional language in L1 relies on simulations, in L2 simulations are only partial because they are not activated for more complex and abstract forms of thought (i.e., negation).

Overall, these results seem to suggest that L2 is not grounded to the same extent as L1 on the sensorimotor systems. Particularly, although both languages activate the same patterns of brain activation for simulation during language comprehension (De Grauwe et al., 2014), some categories of words seem to be more difficult to simulate in L2. Namely, the grounding of abstract concepts – such as affect (Li et al., 2015) and negation (Foroni, 2015) - in concrete physical experiences seems to be hindered in L2 (cf. Dudschig et al., 2014), suggesting that at least abstract thought is less influenced by contextual bodily states in this language. However, like in the other described fields, evidence is characterized by inconsistencies.

2.7. Summary, Discussion, and Future Directions

The diverse evidence presented in the previous sections suggests an overall emotional advantage of L1 over L2 and that these languages may not be grounded to the same extent. However, not all findings are consistent and the degree to which they can be generalized is limited.

The described clinical cases, self-reports, and experimental results suggest that L2 can be used with distancing purposes. However, the assumption that L2 leads to psychological

[4] Although this pattern of results suggests different groundings for L1 and L2 the methodological problems of this study, namely the sample size, advise some caution in further interpretations.

distance and L1 to proximity can be mere speculation and was never experimentally tested. This assumption relies essentially on a few case studies, on therapists' perceptions rather than on speakers' perceptions, on qualitative data, or on indirect evidence that suggests a relation between emotional intensity, language code-switching or choice, and distance/proximity. Moreover, these studies approached bilingualism as a ''generic'' condition (Pavlenko, 2012), leaving aside relevant variables related with the patients' language learning histories – such as dominance, order of acquisition, proficiency, frequency of use, age (AoA) and context (CoA) of acquisition - not allowing for meaningful comparisons and analysis between different groups of bilinguals.

Hence, before assuming that choosing L2 or code-switching to this language serves a distancing function, it is important to examine experimentally whether a second language induces psychological distance to a greater extent than a native language. Notably, it is still unclear what type of psychological distance are these reports referring to. An event is psychologically distant whenever it is not part of one's direct experience – when it takes place farther into the future or the past; as it occurs in more remote locations; as it happens to people less and less like oneself; and as it is less likely to occur (e.g., Trope & Liberman, 2003). According to Construal Level Theory, these four types of psychological distance (temporal, spatial, social, and hypotheticality) are interrelated (Bar-Anan, Liberman, Trope, & Algom, 2007) and are anchored on the directly experienced reality of the *self*, *here* and *now* (e.g., Liberman & Trope, 2008). Thus, it would be important to clarify which type(s) of psychological distance is(are) affected by the use of different languages (L1; L2). Furthermore, it would be relevant to explore the psychological mechanism responsible for these effects.

In the second set of reviewed studies, we presented evidence based on self-reports. The results of these studies suggest that more emotionality is attributed to L1, and that there are some modulators of the affective experience during language comprehension, such as age of acquisition, frequency of use and proficiency. However, self-reports are limited in what concerns the full comprehension of the individual emotional experience. Conclusions drawn exclusively from self-report data might be distorted or biased, namely participants' answers might be affected by social desirability or self-deception (e.g., Dörnyei, 2003). Moreover, self-reports might be considered only indirect evidence of language emotional strength. Consequently, there have been attempts to conduct controlled experiments to reveal the

arousal induced by L1 and L2, namely by measuring psychophysiological responses and recall of different types of words presented in L1 and L2.

The research that has been investigating the arousal triggered by L1 and L2, either measured directly via autonomic responses (i.e. SCRs), or measured indirectly through recall and recognition tasks, also argues for a L1 advantage over L2. Importantly, in these studies the variables associated with the languages' learning and use histories (i.e., age of acquisition, context, proficiency, and language dominance) have been identified as fundamental modulators of the effect of language on emotional experience. However, the results presented in these experiments are far from being consistent or conclusive. In studies using SCRs the conclusions drawn from the observed results are often no more than hyperboles of the real effects. There is no consistent evidence for a general superiority in autonomic activity of L1 over L2, but instead a consistent effect of specific word categories (i.e., taboo words; childhood reprimands) that should not be generalized to all the other word categories. Moreover, the presented recall studies replicated the emotion-memory effect but most of the times for both L1 and L2, or presented even stronger effects in L2.

Although psychophysiological measures may be considered more objective than self-reports, they also have inherent limitations that might explain some of the results. On the one hand, skin conductance reflects autonomic arousal, but its psychological meaning varies with the context. Arousing, task-relevant, familiar stimuli can trigger SCRs (Tranel & Damásio, 1985; Morris, Cleary, & Still, 2008) but sometimes novel or surprising stimuli, or stimuli that require higher internal cognitive effort, do too (Bernstein, 1969; Boucsein, 1992; Dawson, et al., 2000). Similarly, recall is also better for semantically (Hunt & Mitchell, 1982) and orthographically (Hunt & Elliot, 1980) unusual stimuli rather than usual stimuli, and for atypical rather than typical information (Davidson, 1994). Therefore, it might be argued that results showing equal arousal in L1 and L2 or higher arousal in L2 might reflect the lack of familiarity or novelty of the stimuli in L2, or the additional cognitive effort associated with L2 processing, especially for low proficient bilinguals. It is thus important to control, in addition to valence and arousal, for the familiarity of the stimuli, not only by running careful pilots but also by assessing familiarity during the study. It is also important to choose late bilinguals with at least a medium level of L2 proficiency, to avoid effects triggered by cognitive effort.

Moreover, the failure in replicating results makes clear the lack of experimental rigor in some of these experiments. First, one of the difficulties of studying bilingual speakers is

that language learning histories are highly variable across people. These experiments are characterized by highly different samples of bilinguals. Experiments have been conducted with different populations, associated with different cultures and linguistic norms (e.g., Turkish, Spanish, Chinese, and Greek bilinguals, and English native speakers). Furthermore, across studies (e.g., Harris et al., 2003; Harris, 2004; Caldwell-Harris et al., 2011), late learners differed in several factors that are related to arousal - age of first exposure to L2, age of arrival in an English-speaking country, and self-rated proficiency in L2 – which complicates comparisons across studies and constrain the replication of results.

Second, although it was hypothesized a difference in *arousal* between L1 and L2, the choice of stimulus materials and the judgments participants had to make did not always reflect arousal. According to the literature, emotional reactions to external cues are modulated by two dimensionally organized stimulus features: valence and arousal (e.g., Bradley & Lang, 2000; Lang, Greenwald, Bradley, Hamm, 1993). Judgments of valence range from highly positive to highly negative (i.e., pleasure or displeasure), whereas the dimension of arousal ranges from calming or soothing to exciting or agitating. Notably, while some measures are better to discriminate the valence of emotional stimuli or experiences (e.g., self-reported valence; EMG - measuring corrugator and zygomatic muscles activation; startle blink magnitude; and heart rate), others are better to discriminate how arousing (i.e., self-reported arousal and skin conductance) the stimulus or experiences are (e.g., Bradley & Lang, 2000; Lang, Bradley & Cuthbert, 1998; Lang et al., 1993). For instance, in studies using a range of affective stimuli, skin conductance and recall increases directly with reports of arousal, independently of whether the experience is reported as pleasant or unpleasant (Bradley at al., 1992; Bradley, Codispoti, Cuthbert, & Lang, 2001; Bradley, Codispoti, Sabatinelli, & Lang, 2001; Bradley, Cuthbert, & Lang, 1990; Bradley & Lang, 2000; Greenwald, Cook, & Lang, 1989; Lang, et al., 1998).

Besides all of this evidence suggesting that valence and arousal should be assessed using different and specific measures, and that skin conductance and recall are indicator of arousal, the stimulus materials of the reported studies were chosen based on ratings of pleasantness (i.e., valence). This fact might explain why only taboo words (characterized by their high arousal), and not negative and positive words, triggered stronger arousal than neutral words in several studies. Furthermore, it might also explain why, using the same stimuli (Handbook of semantic word norms; Toglia & Battig, 1978), the results reported by Harris and colleagues (2003) using skin conductance, and those reported by Ayçiçeği and

Harris (2004) and Ayçiçeği and Harris (2009) using recall tasks, were so inconsistent when these measures are supposed to be correlated.

Additionally, the self-reports requested to the participants differed from experiment to experiment. For example, in Harris and colleagues (2003) and Harris (2004) participants were asked to rate the word or phrase for pleasantness; in Caldwell-Harris and Ayçiçeği-Dinn (2009) for emotional intensity; and in Caldwell-Harris and colleagues (2011) to think of a situation when the phrase was used, and to rate the emotional intensity of the situation. This might explain incongruent results and the lack of correlations between psychophysiological (SCRs) and behavioral (self-reports) indicators of arousal, between and within studies.

Regarding affective processing studies, some evidence indicates that affective processing in L1 is more automatic than in L2, leading to less congruency and/or interference effects in L2. Importantly, this seems to be the case when the task requires an affective but not semantic processing (e.g., Degner et al., 2012), and when affective content is processed automatically but not in-depth (e.g., Winskel, 2013). Although L2 age of acquisition (AoA) was suggested as the main factor explaining the L1 and L2 congruency and interference effects, language dominance, L2 level of proficiency, and frequency of use were identified as relevant variables that might explain some of the inconsistent results. For example, interference effects were found both in L1 and L2 for both early (Sutton et al., 2007) and late (Eilola et al., 2007) bilinguals. The authors have suggested that bilinguals' proficiency could explain these results since both early and late bilinguals of these studies were highly proficient both in L1 and L2. Consistently, Altarriba and Basnight-Brown (2011) tried to explain their unexpected results contending that participants' L2 was their dominant language and not L1.

Evidence in the field of decision-making has shown that decisions are shaped by the language in which the situation is framed: L2 leads to more rational and utilitarian choices than the emotional native language, and decision-making biases are reduced in this linguistic context. Overall the results observed in this domain are consistent within and between studies, which leaves some room to address new scientific questions. In most of these studies "better" choices were made in L2 because the best outcome possible in the situations implied more rational choices. However, would it be the case when the better outcome of a decision relies on emotion?

In Costa, Foucart, Hayakawa et al. (2014) study, emotionality is reduced in L2, and thus people are more willing to cause harm to someone to have a better outcome in this language. Would the same pattern of results be expected when the focus of the decision would be helping someone (i.e., prosocial behavior) and not be willing to cause harm? In extreme emergency situations, bystanders may become upset and distressed (Piliavin, Dovidio, Gaertner, & Clark, 1981), whereas in less critical situations, observers may feel sad (Cialdini, et al., 1987), tense (Hornstein, 1982), or concerned and compassionate (Batson, 1991). This empathic arousal is fundamental to prosocial behavior since it motivates people to help others (Davis, 1994). Since affect is a fundamental element of many potential helping situations, would people be willing to help others to the same extent when the situation is framed in L2? Would the reduced emotionality associated with L2 impair prosocial behavior?

Finally, only recently the differences in emotional resonance of L1 and L2 have been addressed within an embodiment framework. It has been argued that these differences reflect different groundings of these languages, which is expressed in different simulations of experience. Results in this field have been inconsistent but overall sustain the argument that L1 and L2 are not embodied in the same way. Particularly, although L1 and L2 evoke the same patterns of brain activation during language comprehension (De Grauwe et al., 2014), the grounding of abstract thought (affect - Li et al., 2015; negation - Foroni, 2015) on concrete physical experiences seems to be hindered in L2 (see Dudschig et al., 2014 for counter-evidence). This is particularly evident in Foroni's studies using EMG (e.g., Foroni & Semin, 2013), which for the first time compared the emotional resonance induced by L1 and L2 (Foroni, 2015).

However, the lack of studies addressing the affective grounding of L1 and L2 from an embodied perspective, and the inconsistencies obtained across studies, constrain the generalization of these findings. More studies are needed in this domain, and measuring emotional resonance of L1 and L2 through the use of facial EMG seems to be a good methodological option. First, because it is a measure that is not sensitive to the novelty and familiarity of the presented stimuli (like SCR, SCL and recall), which is perfect when using L2 stimuli with which participants are not always familiarized. Second, because it is a more objective measure of emotional experience and it is less biased by personal expectations, social desirability or self-deception. Finally, because it is a more direct measure of emotional resonance than affective priming tasks, since the latter only reflect the emotional resonance elicited by the stimuli, but do not measure the emotional resonance *per se*.

In this brief review, we tried to put together the most important studies suggesting differences in the emotionality triggered by L1 and L2. More specifically, we described studies based on clinical cases, self-reports, psychophysiological indicators, recall and recognition tasks, and using affective priming and decision-making paradigms. Finally we addressed the results of the presented literature within an embodied/grounding framework, describing recent evidence suggesting different affective groundings of L1 and L2.

However, only a critical review and analysis of these topics might improve research practices, inform theoretical accounts and contribute with new perspectives to future research. To overcome methodological problems and to explore new research avenues is exactly the purpose of this thesis. In the next empirical chapters we will argue that since L1 and L2 are not likely to be affectively grounded to the same extent, intra-individual (i.e., how one processes affective information; chapter 3), inter-individual (i.e., how one perceives and evaluates others in terms of social distance; chapter 4), and intergroup (i.e., how emotional information about social groups is simulated and evaluated; chapter 5) processes should be shaped differently by L1 and L2.

CHAPTER THREE:

AFFECTIVE PRIMING IN NATIVE (L1) AND IN LEARNED (2) LANGUAGES

The current reality of multicultural societies requires participation in two or more linguistic communities. Experiencing, processing and comprehending information in multiple linguistic "realities" present a number of challenges, for example, emotional communication in a first-native (L1) and second-learned language (L2). The significance of differences between L1 and L2 becomes particularly apparent in situations with affect-laden exchanges, which may involve managing relationships that are positive (e.g., bonding), negative (e.g., conflict) as well as calibrating an affective relationship (e.g., negotiation, consensus seeking, decision-making).

The present research was designed to investigate differences in the use of affective or emotional language across L1 and L2 and is based on two central assumptions. First, emotional experiences are communicated predominantly by the use of affective language and, under certain conditions, their expression and comprehension may be hindered in L2. The second assumption regards the grounding mechanisms of affective language namely that they are not identical in L1 and L2. As we shall argue, L2 is assumed not to have the same embodied intensity as L1.

The argument driving the first assumption rests on the socialization histories of both languages to explain why the intensity of emotional language may differ between L1 and L2 (for reviews see Caldwell-Harris, 2014; Pavlenko, 2012). In L1, emotional language (e.g., words or sentences that denote emotional states) is usually learned and used in contexts that are affectively laden (e.g., Harris, Gleason, & Ayçiçeği, 2006), such as in family life or interaction with peers. In contrast, L2 is frequently mastered in emotionally more neutral settings (e.g., school, work; Bond & Lai, 1986). The mechanisms involved in the affective grounding of language are not yet fully known. Nonetheless, there is ample evidence showing the affectively laden quality of language in L1 relative to L2.

Indeed, there is considerable research on bilingualism showing that there is stronger emotional intensity in L1 than L2 (e.g., Altarriba & Santiago-Rivera, 1994; Gonzalez-Reigosa, 1976; Javier, 1989, for reviews see Caldwell-Harris, 2014; 2015). Bilinguals typically report that despite knowing the meaning of words in L2, they do not necessarily feel it (Pavlenko, 2005) and they switch to L2 to distance themselves from what they are saying (e.g., Bond & Lai, 1986). Moreover, bilinguals perceive the emotional intensity of both positive (e.g., the sentence "I love you", Dewaele, 2008) and negative information (e.g., taboo words such as ethnic slurs - Gawinkowska, Paradowski, & Bilewicz, 2013; swearwords - Dewaele, 2004; 2010) as stronger in L1 than in L2. This difference in emotional intensity

between L1 and L2 is further supported by research measuring autonomic arousal. For instance, larger skin conductance responses (SCRs) were observed for taboo words (e.g., "asshole") and childhood reprimands (e.g., "Go to your room!") in L1 relative to L2 (Caldwell-Harris & Ayçiçeği-Dinn, 2009; Harris, Ayçiçeği & Gleason, 2003; Harris et al., 2006).

These language differences have significant implications for applied domains such as marketing, forensic or health contexts (for a review see Caldwell-Harris, 2015). For example, Puntoni, de Langhe, and van Osselaer (2009, Experiment 1) have shown that marketing slogans presented in L1 (vs. L2) were perceived as more emotional. Importantly, since language did not influence other complex appraisals (originality of the slogan), the L1 advantage seems to be specific to emotionality. Other studies have shown that scenarios describing moral transgressions (e.g., eating a dead dog) presented in L2 were judged less harshly (Geipel, Hadjichristidis, & Surian, 2015a). Also, Caldwell-Harris and Ayçiçeği-Dinn (2009) showed that when lying, participants reported more affective discomfort in L1 than L2. The authors argued that suspects interrogated in L2 may feel less emotional, which can promote false confessions and lying. On the other hand, in some situations, lowering the emotionality level may be desirable (e.g., description of a traumatic event), with language switching emerging as a therapeutic technique (for a review, see Altarriba & Santiago-Rivera, 2002). Moreover, Keysar, Hayakawa and An (2012) have also shown that decision-making biases are fewer in L2, an effect interpreted as evidence that a foreign language promotes greater cognitive and emotional distance than L1.

Our second assumption is that L2 does not carry the same embodied intensity as L1. The argument driving this assumption relates to differences between L1 and L2 with respect to the sensorimotor processes that ground emotional language. The dominant perspective on embodiment emphasizes that knowledge representation is grounded by simulations of previous experiences acquired through primary sensorimotor systems (e.g., Barsalou, 1999a; 2008; Glenberg, 2008; Semin & Smith, 2008). Accordingly, language comprehension involves simulation of action (e.g., Glenberg & Kaschak, 2002), perception (e.g., Stanfield & Zwaan, 2001), and emotion (Foroni & Semin, 2009) through recruiting the same neural systems activated in the original experience. This argument is supported by recent research showing that people simulate bodily states, which permit the understanding of their own and others' emotional states (e.g., Niedenthal, 2007). For instance, perceiving the facial expression of a target (e.g., smile/frown) activates the corresponding facial muscles in the

perceiver (e.g., Dimberg & Petterson, 2000). Furthermore, the same somatic responses are also activated by linguistic representations of these emotions, as indicated by electromyographic (EMG) measurement of facial muscles (Foroni & Semin, 2009; Niedenthal, Winkielman, Mondillon, & Vermeulen, 2009). The centrality of somatic activity to comprehension and judgment was further supported by Foroni and Semin's demonstrations that blocking the activation of somatic responses (muscle activity) neutralized the affective bases activated by visual (i.e., happy and angry facial expressions, Foroni & Semin, 2011) or verbal stimuli (i.e., words referring to emotional expression, Foroni & Semin, 2009) on judgments.

A crucial empirical question is whether the processing of L1 and L2 are grounded to the same extent. Indeed, L2 learning and use does not seem to offer the same sensorimotor grounding opportunities as L1. Foroni and Semin (2013) have shown that reading sentences related with the activity of a specific muscle (zygomatic major) in L1, influenced facial muscle activity (measured by EMG). Specifically, when the sentences were affirmative ("I am smiling") the zygomatic muscle was activated, whereas when they were negated ("I am not smiling") the muscle was inhibited. Recently, Foroni (2015) has extended this research by investigating the effects of the same sentences presented in L2. Results showed that while affirmative sentences replicated the pattern found in L1, sentences involving negation did not. These findings suggest that processing emotional language in L1 relies on simulations of the affective meaning described by the words, whereas such simulation is considerably reduced in L2.

There is already some research suggesting that processing affective information in L1 differs from processing it in L2. However, most studies have been using self-report (e.g., word ratings) or physiological indicators (e.g., SCRs) and the results have not been always consistent and were often limited to particular types of stimuli (e.g., taboo words). Moreover, as argued by Degner, Doycheva and Wentura (2012), it is possible that previous differences found between L1 and L2 may derive from the intervention of confounding variables (e.g., language stereotypes, migration backgrounds). Thus, evidence for the assumption that emotional content is actually processed differently in L1 and L2, namely regarding the somatic processes resulting from the stimulus affective content, is still scarce.

Recent studies using experimental paradigms (e.g., Stroop, priming) that rely on more implicit measures (e.g., RT) are particularly informative. For example, Colbeck and Bowers (2012) used a serial visual paradigm that included L1 and L2 taboo words and neutral words

as distracters and compared their impact on target word identification performance. When taboo words were presented in L1 performance was more impaired. Other studies used the Emotional Stroop task, in which participants are typically slower to name the color of emotionally laden words in comparison to neutral words. Results from studies comparing performance on this task across languages were not as clear-cut with both late (Eilola & Havelka, 2010; Eilola, Havelka, & Sharma, 2007) and early (Sutton, Altarriba, Gianico, & Basnight-Brown, 2007) bilinguals showing equal levels of interference in both languages. Altarriba and Basnight-Brown (2011) used an Affective Simon Task and also found similar patterns of response interference for monolingual and bilingual participants. Likewise, Ponari and colleagues (2015) showed that both native and highly proficient English speakers showed the same facilitation effect in processing emotionally valenced words (vs. neutral) in a lexical decision task.

The affective priming paradigm constitutes an interesting tool to investigate automatic affective processing. Priming studies typically examine the impact of one stimulus (i.e., the prime) on the subsequent processing of another stimulus (i.e., the target). As a paradigm, priming is very flexible because it allows the manipulation of different types of relationships between primes and targets. In the semantic priming task (for a review see Neely, 1991) the prime-target relationship is semantic - when the stimuli are semantically associated (e.g., "bread" and "butter"), performance is facilitated (e.g., faster and/or more accurate responses to the target). When prime-target are unrelated (e.g., "nurse" and "butter") performance is inhibited. In the affective priming task (Fazio, Sanbonmatsu, Powell, & Kardes, 1986; for a review see Herring et al., 2013) what is manipulated is the affective relation between prime and target and not their semantic relationship. Performance facilitation is observed when the prime-target relationship is affectively congruent (e.g., "happy" and "sunshine") and performance inhibition is observed in incongruent trials (e.g., "happy" and "death"). Affective priming effects are assumed to be: (a) general, being observed across a wide variety of stimuli (e.g., words, images, odors, sounds, etc.) and tasks (e.g., evaluative categorization, lexical decision, pronunciation, etc.), and (b) automatic, given that they have a quick onset, do not dependent on explicit evaluative goals or ample cognitive resources, and can even be prompted by stimuli presented without participant's awareness (for a review see, Hermans, De Houwer, & Eelen, 2001).

Recent studies suggest that affective priming effects are driven by somatic processes. For example Foroni & Semin (2012) observed muscular activation in response to valenced

visual prime stimulus and that this activation facilitated response to congruent targets (Foroni & Semin, 2012). Notably, the same muscle activity was observed in response to verbal stimuli shaping subsequent judgments (Foroni & Semin, 2009). Importantly, in both studies, when facial muscle activity was blocked (inhibiting the muscular resonance to affective stimuli) processing time of affective stimuli was slower. This slow down was explained as resulting from the lack of differential somatic information (see for review Winkielman, Niedenthal, & Oberman, 2008). Moreover, when the somatic activity of facial muscles was inhibited affective priming effects were not observed (Foroni & Semin, 2012).

Studies using the affective priming task with verbal materials have typically included stimuli presented in L1. A few exceptions (see also Li, Liu, & Ma, 2015) can be found in the work by Segalowitz, Trofimovich, Gatbonton and Sokolovskaya (2008) using a task conceptually related to the affective priming paradigm (Implicit Affect Association Task - IAAT). The authors obtained the typical stimulus-pair congruency effect on RT in L1: in comparison with neutral trials, participants were faster (vs. slower) in congruent (vs. incongruent) trials. This interference effect was significantly smaller in L2 suggesting that the processing of valenced words in this condition is less automatic. Recently, Degner, Doycheva, and Wentura (2012) conducted a study with bilinguals aiming to assess automatic affective word processing that is central to the present work. Using both a semantic priming task and an affective priming task the authors found that semantic priming effects were independent of language. However, while affective priming effects were always found in L1, they only emerged in L2 for participants with high levels of language immersion and frequency of L2 use.

3.1. Overview

The current research is based on the assumption that L2 does not carry the same embodied intensity as L1. This assumption can be tested in an affective priming paradigm, comparing differences in performance across stimuli in L1 and L2. Thus, in two experiments, we examined whether the processing of affective prime-target combinations presented in L2 (i.e., English for Portuguese native speakers) influences subsequent processing to the same extent as affective prime-target combinations presented in L1. Response time to target stimuli was the main dependent variable (e.g., Fazio et al., 1986). L1 and L2 was the within-participants' variable (language order counterbalanced). Experiment 1, used words as primes and targets, whereas Experiment 2 included both words and images (pictures of facial

expressions). In the latter, in half of the blocks words were used as primes and images as targets and in the other half the type of prime-target combination was reversed (see Figure 1).

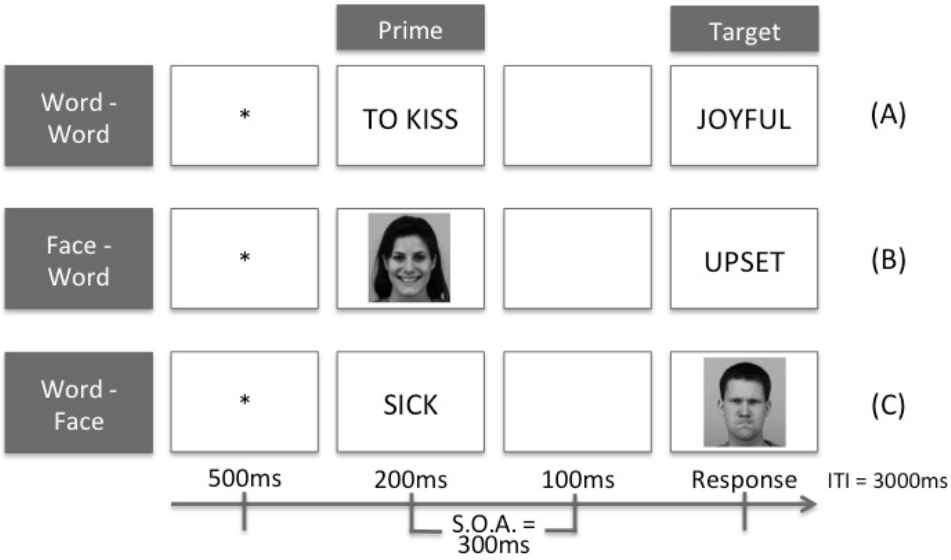

Figure 1. Word-Word task used in Experiment 1.

Note: Face-Word and Word-Face task were used in Experiment 2. (A) and (C) are examples of congruent trials; (B) is an example of an incongruent trial. S.O.A. = Stimulus Onset Asynchrony. I.T.I = Inter Trial Interval.

3.2. Experiment 1

In Experiment 1, using verbal stimuli only, we expected to detect affective priming effect (i.e., facilitation for congruent stimulus-pairs and inhibition for incongruent stimulus-pairs) when the prime-target combinations were presented in L1, but not (or to a lesser extent) in L2.

3.2.1. Method

Participants and Design

A sample of 114 university students (77.2% Females, M_{age} = 21.06, SD = 3.85) from ISCTE-IUL volunteered to participate in a laboratory study for partial course credit. All participants were native Portuguese speakers (L1), with good fluency in the English language as assessed through self-report (e.g., Foroni, 2015; Pavlenko, 2005).

All participants reported starting learning L2 on a school setting, most of them when they were 10 years old (Mo_{ageL2} = 10, M_{ageL2} = 8.41, SD = 2.14). The design included the

following factors: 3 (Prime valence: negative; neutral; positive) x 2 (Target valence: negative; positive) x 2 (Language: L1; L2). All factors were manipulated within-participants.

Materials

The prime stimulus set included 18 verbs (see Appendix A). Six verbs were negative ("to enrage, to cry, to hate, to despise, to annoy and to terrify"), six were neutral ("to hammer, to seat, to answer, to hide, to cook and to swim") and six were positive ("to kiss, to smile, to entertain, to laugh, to love, to enjoy"). Most words were selected and adapted from the Affective Norms for English Words (ANEW, Bradley & Lang, 1999) adaptation for European Portuguese (Soares, Comesaña, Pinheiro, Simões, & Frade, 2012). The norms include the original English word and the Portuguese translation, so L1 and L2 words sets were alike.

The target stimulus set included 12 adjectives. Half were negative ("upset, sad, selfish, sick, lonely, and unhappy") and the other half positive ("beautiful, kind, joyful, friendly, nice and happy"). These words were selected from the same normative set (Soares et al., 2012).

Procedure

Participants were invited to come to the laboratory to collaborate in a study aiming to "explore how people perceive and evaluate words". All the procedures were conducted in line with the ethical guidelines of the host institution. After providing written consent, the instructions were presented using the E-Prime 2.0 software (Psychology Software Tools, 2012). Each participant completed two blocks of trials - one in L1 and one in L2 - counterbalanced between participants.

Standard affective priming instructions stated that pairs of words would be presented on screen, and that sometimes the words would be in Portuguese (L1) and other times in English (L2). Participants were then instructed to evaluate as quickly and accurately as possible the second word presented by pressing the corresponding key (S = *Bad;* L = *Good*; key assignment counterbalanced between-participants). The first task was a training phase that included four trials (one congruent and one incongruent trial per language). None of the stimulus used in the training phase were used in the experimental trials. Feedback was provided about response accuracy and response time. After the training phase, instructions stated that although feedback would not be provided in the subsequent tasks, participants should continue to answer as quickly and as accurately as possible. The affective priming

task was then introduced in two blocks (one L1 and one L2) of 36 trials each. A typical trial (see Figure 1) started with a fixation point ("*", with a duration of 500 ms or 1500 ms, randomly defined). Next, the prime was presented (200 ms). After a blank screen (100 ms), the target was presented (S.O.A. = 300 ms). The target remained visible until a response was registered. The inter-trial interval was 3000 ms. The pairings between prime and target stimulus were randomized. The experiment lasted approximately 15 minutes. In the end of the experiment, participants were thanked for their participation and fully debriefed.

3.2.2. Results

Preliminary analysis

Outliers were defined as below 300 ms and over 2500 ms (e.g., Bargh, Chaiken, Govender, & Pratto, 1992) and were excluded. This meant that 1.99 % of the data were removed. Then we calculated the proportion of overall hits per participant and per language. Whenever this proportion was below chance level (i.e., .50), we considered that the participant did not understand the tasks and thus was excluded from all analyses. This led to the exclusion of eight participants (seven of those obtained hit rates below chance in both L1 and L2, final sample = 106).

Response Accuracy

The overall hit proportion was .92 (*SE* = .01) suggesting good performance on the task. In order to ascertain that the task was equally difficult in both languages a 2 (prime-target congruency) x 2 (language) analysis of variance was performed on the overall hit proportion. As expected, we did not observe a main effect of language on hit proportion, $F(1,105) = 1.34$, $MSE = .01$, $p = .250$, $\eta_p^2 = .013$, that was above .90 both for L1 ($M = .92$, $SE = 0.01$) and L2 trials ($M = .91$, $SE = 0.01$). The impact of congruency on hit proportion was only marginally significant, $F(1,105) = 3.81$, $MSE = .05$, $p = .054$, $\eta_p^2 = .035$. Still, the pattern of means was in the expected direction with higher hit proportion when the stimulus pair was congruent ($M = .93$, $SE = .01$) versus incongruent ($M = .91$, $SE = .01$). The interaction between prime-target congruency and language was not significant, $F < 1$.

In sum, the equivalent levels of accuracy observed in L1 and L2 indicated similar levels of comprehension (and task performance) across the two languages.

Response Times (RT)

Overall RT was 741 ms (*SE* = 17). Considering only the correct responses to the

target stimuli, a 2 (prime-target congruency) x 2 (language) analysis of variance was performed on RT. As expected, a main effect of Congruency was observed, $F(1,105) = 5.97$, $MSE = 73777$, $p = .016$, $\eta_p^2 = .054$. Participants were faster to respond when the stimulus pair was congruent ($M = 727$, $SE = 18$) versus incongruent ($M = 754$, $SE = 19$). As expected, we also found a main effect of Language, with faster responses observed in L1 ($M = 722$, $SE = 20$) versus L2 trials ($M = 759$, $SE = 18$), $F(1,105) = 5.57$, $MSE = 147902$, $p = .020$, $\eta_p^2 = .050$. Importantly, the interaction between Congruency and Language was also significant, $F(1,105) = 5.40$, $MSE = 45598$, $p = .022$, $\eta^2 = .049$ (see Figure 2). Specifically, and as predicted, the response to stimulus presented in L1 was faster in congruent trials ($M = 698$, $SE = 19$) than in incongruent ones ($M = 745$, $SE = 23$), $t(105) = 3.06$, $p = .003$. In contrast, RT to stimulus presented in L2 were similar in both congruent ($M = 756$, $SE = 19$) and incongruent trials ($M = 762$, $SE = 20$), $t < 1$.

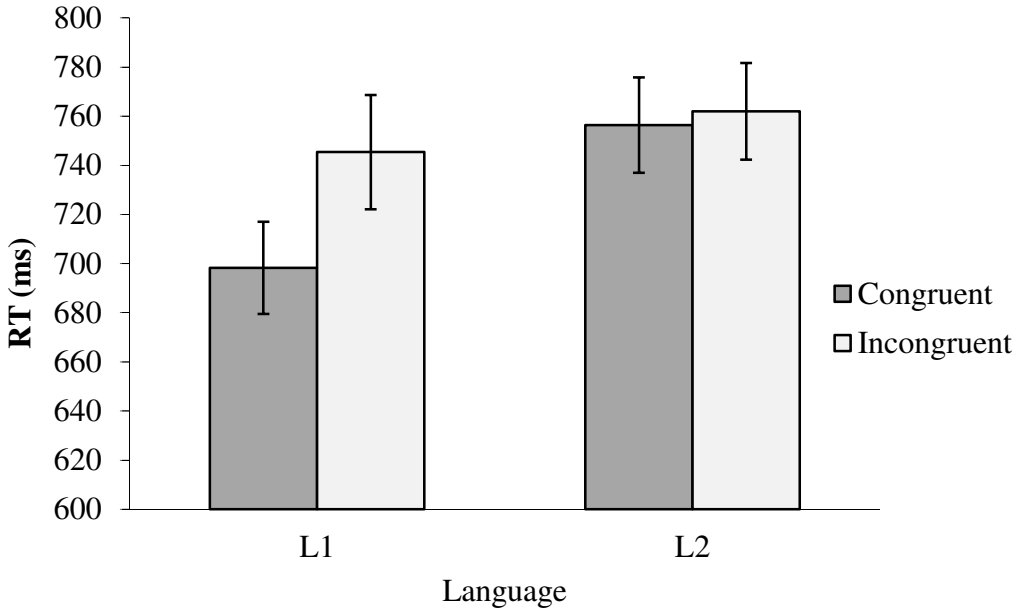

Figure 2. Response times (ms) and standard errors as a function of prime-target congruency and stimulus language.

We hypothesized that stronger affective priming effects would be observed in L1 conditions (vs. L2). Data from Experiment 1 supports this prediction - when prime-target combinations were presented in L1, participants were faster to evaluate a target-word preceded by a congruent prime-word in comparison with incongruent trials. Prime-target

affective congruency did not have an impact on response times to prime-target combinations presented in L2.

3.3. Experiment 2

In Experiment 2, we explored further the differences in automatic processing of affective stimuli in L1 and L2 by using words and photos as either prime or target stimuli. Previous studies have already shown that emotional facial stimuli induce facial muscle activation (e.g., Foroni & Semin, 2009; 2012) and that when this simulation processes is inhibited affective priming effects do not emerge. In this paper we argue that L2 does not offer the same sensorimotor opportunities as L1. As shown in Experiment 1, affective priming did not emerge in L2, suggesting that L2 is not affectively grounded to the same extent as L1 is.

In Experiment 2, when emotional facial expressions are presented either as primes or targets, the effects of simulating valenced facial expressions may override the constraints imposed by the weak grounding of a second language. Both words (e.g., Bargh et al., 1992; Fazio et al., 1986) and images (e.g., Hermans, Spruyt, De Houwer, & Eelen, 2003; Hermans, De Houwer, &, Eelen, 1994) are commonly used as both prime and target stimulus. Yet, in some studies primes and targets differ regarding presentation format: images used as primes and words as targets (e.g., Hermans et al., 2003; Foroni & Semin, 2012, Carroll & Young, 2005) or vice-versa (e.g., Klauer, Eder, Greenwald, & Abrams, 2007). However photos of facial expressions are known to: (a) constitute strong affective cues; (b) recruit perceivers' somatic activity, thus producing the same emotional expression in them (e.g., Dimberg, Thunberg, & Elmehed, 2000), and (c) are processed very fast (De Houwer & Hermans, 1994). Therefore, in Experiment 2, we expected the typical affective priming effects for L1 since both types of prime-target combinations (L1 words as primes and facial expression photos as targets and vice-versa) are affectively grounded. For L2, two distinct patterns may emerge. On the one hand, in line with the predictions for Experiment 1, it is possible that when prime-target combinations are presented in L2, the impaired simulation process for L2 may impede affective priming effects. However, the images of facial expressions (either as targets or primes) can nevertheless lead to affective priming effects regardless of language. This would indeed corroborate the strength and ease of processing of facial stimuli and the simulation processes they activate. In our view, and in line with an embodiment approach, the latter prediction is more likely.

3.3.1. Method

Participants and Design

A sample of 88 students (77.3% Females, M_{age} = 20.38, SD = 3.91) volunteered to participate in a laboratory study for monetary compensation. All participants were native Portuguese speakers (L1), with good fluency in the English language as assessed through self-report (e.g., Foroni, 2015; Pavlenko, 2005). All participants reported starting learning L2 on a school setting, most of them when they were 11 years old (Mo_{ageL2} = 11, M_{ageL2} = 9.81, SD = 2.22). The design included the following factors: 3 (Prime valence: negative; neutral; positive) x 2 (Target valence: negative; positive) x 2 (Language: L1; L2) x 2 (Priming task: words-faces; faces-words). All factors were manipulated within-participants.

Materials

The word stimulus set comprised the 12 valenced stimuli used as targets in Experiment 1, as well as six neutral ("shy, odd, moody, smooth, quick and astonished") words in Portuguese and in English (see Soares et al., 2012).

The image stimulus set included 18 pictures selected from the Karolinska Directed Emotional Faces (Goeleven, De Raedt, Leyman, & Verschuere, 2008; Lundqvist, Flykt, & Öhman, 1998). Twelve images presented models displaying either a frowning expression (negative) or a smiling expression (positive). Six images portrayed models with a neutral facial expression. Half of the models were female. Images were presented in grey scale (232 x 314 pixels). These image and word stimuli sets were used as primes or targets according to the specific affective priming task (see Appendix A).

Procedure

The procedure was similar to Experiment 1 with slight modifications. Participants were invited to come to the laboratory to collaborate in a study aiming to "explore how people perceive and evaluate different types of stimuli". All the procedures were conducted in line with ethical guidelines of the host institution. After providing written consent, each participant completed two affective priming tasks (i.e., words-faces and faces-words, order counterbalanced between participants). Each of the tasks included two blocks: one block in which verbal stimuli was presented in L1 and the other in L2 (blocks were assigned in a random order).

Instructions stated that pairs of faces and words would be presented on the screen, and that sometimes the words would be in Portuguese (L1) and other times in English (L2). Participants were then instructed to evaluate as quickly and accurately as possible either the face presented after each word (words-faces task) or the word presented after each face (faces-words task). In order to respond participants were to press the corresponding key (S = *Bad;* L = *Good*; keys counterbalanced between-participants).

Each task began with a training phase (eight trials, two congruent and two incongruent per language). None of the stimuli used in this phase appeared in the experimental tasks. As in Experiment 1, feedback about response time and accuracy was only provided during the training trials. Each affective priming block included 36 trials (trial features were also identical, see Figure 1). All the pairings between prime and target stimulus were randomized. Participants could rest between blocks of trials. The average duration of each session was 20 minutes. In the end of the session, participants were thanked for their collaboration and fully debriefed.

3.3.2. Results

As in Experiment 1, we excluded responses below 300 ms and over 2500 ms (removing 0.81% of the data) and calculated the overall hits proportion by participant, by language and by task. We also excluded all participants with hits proportion equal or below chance level. This led to the exclusion of six participants (two of those obtained hit rates below chance in both L1 and L2, final sample = 82).

Response Accuracy

The overall hit proportion was .93 (*SE* = .01) suggesting a good performance on the task. In order to verify that task performance in both languages was equally difficult, a 2 (prime-target congruency) x 2 (language) x 2 (task) analysis of variance was performed on hits proportion. As expected, a higher proportion of hits was observed when the stimulus pair was congruent (*M* = .95, *SE* = .01) versus incongruent (*M* = .92, *SE* = .01), $F(1,78) = 15.76$, *MSE* = .10, $p < .001$, $\eta_p^2 = .168$. Congruency interacted with task, $F(1,78) = 13.72$, *MSE* = .08, $p < .001$, $\eta_p^2 = .150$. Specifically, when the task was to evaluate Faces, a higher hits proportion was observed when the stimulus pair was congruent (*M* = .96, *SE* = .01) versus incongruent (*M* = .91, *SE* = .01). In contrast, when the task was to evaluate Words, the hit proportion observed with congruent stimulus pairs (*M* = .94, *SE* = .01) was identical to the hit proportion observed in incongruent pairs (*M* = .94, *SE* = .01). No other effect reached

significance, F <1. Again, the absence of accuracy differences due to stimulus presentation language indicated that participants were equally efficient in performing both tasks in L1 and L2.

Response Times

Overall RT was 604 ms (SE = 12). Considering only correct responses to the target stimuli, a 2 (prime-target congruency) x 2 (language) x 2 (task) analysis of variance was performed on RT. Similarly to Experiment 1, a main effect of language emerged with faster RT observed with stimuli presented in L1 (M = 590, SE = 12) versus L2 (M = 620, SE = 13), $F(1,78) = 22.55$, $MSE = 137118$, $p < .001$, $\eta_p^2 = .224$. Also, there was an interaction between language and task, $F(1,78) = 8.43$, $MSE = 59220$, $p = .005$, $\eta_p^2 = .097$ (see Figure 3).

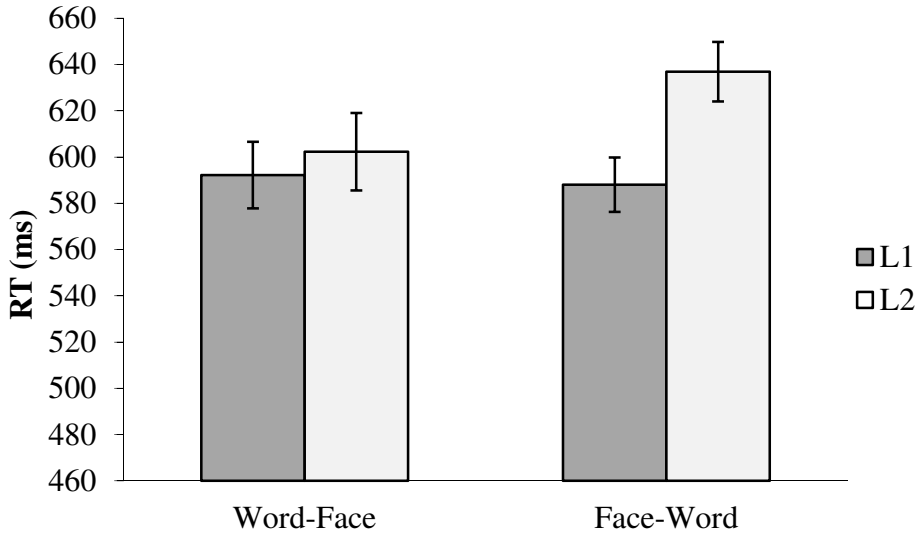

Figure 3. Response times (ms) and standard errors according to affective priming task and stimulus language.

When the task was to evaluate Words, participants were faster in L1 (M = 588, SE = 12) than in L2 (M = 637, SE = 13), $t(78) = 5.33$, $p < .001$, $d = 1.21$. When the task was to evaluate Faces, participants were equally fast irrespective of whether the prime was in L1 (M = 592, SE = 14) or in L2 (M = 602, SE = 17), $t(78) = 1.11$, $p = .268$, $d = 0.25$. Therefore, when participants' task was to evaluate target words, L2 represented a disadvantage that was not observed when the task was to evaluate target faces, $t(78) = 2.48$, $p = .015$, $d = 0.56$.

As expected, we found a congruence main effect of on response times, with faster responses observed when the stimulus pair was congruent (M = 589, SE = 11) versus

incongruent (M = 621, SE = 14), $F(1,78) = 52.31$, MSE = 162076, $p < .001$, $\eta_p^2 = .401$. Congruency interacted with task, $F(1,78) = 5.51$, MSE = 20435, $p = .021$, $\eta_p^2 = .066$ (see Figure 4), revealing that affective priming seems to be stronger when the task was to evaluate faces. Participants were faster in evaluating faces in congruent (M = 576, SE = 12.82) than incongruent trials (M = 619, SE = 17.69), $t(78) = 5.50$, $p < .001$, $d = 1.25$. When evaluating words, the difference between response times in congruent (M = 602, SE = 12) and incongruent trials (M = 623, SE = 12), was smaller but still significant, $t(78) = 4.22$, $p < .001$, $d = 0.96$.

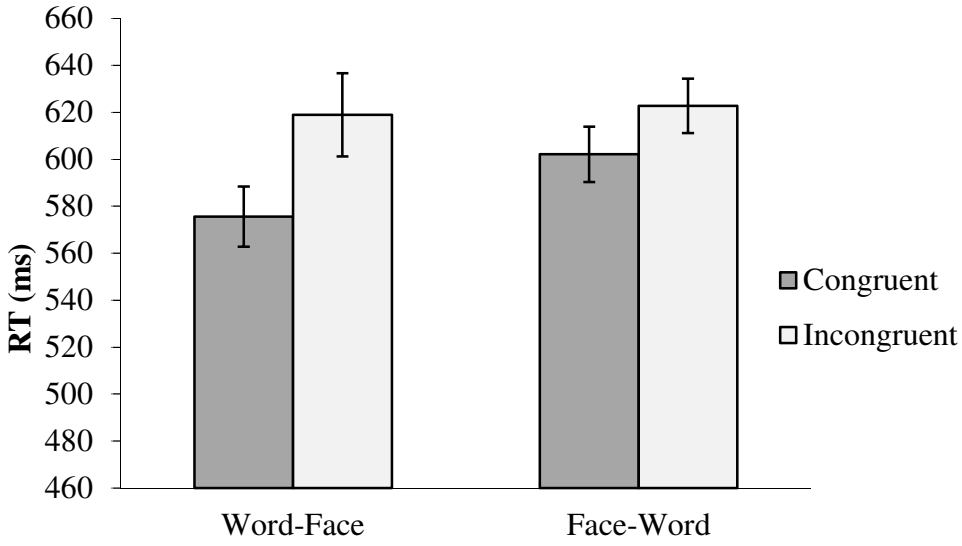

Figure 4. Response times (ms) and standard errors of the interaction between task and prime-target congruency.

The three-way interaction was not significant, $F(1,78) = 1.63$, MSE = 4267, $p = .205$, $\eta_p^2 = .020$, and neither were the other effects ($F < 1$).

3.4. General Discussion

In the present work, we systematically examined the differences in automatic affective processing between L1 and L2 using the affective priming paradigm. Experiment 1 included verbal stimuli, and each participant classified a target word presented either in L1 or L2 in terms of its valence. The typical affective priming effect was found for L1: faster responses to the target in congruent trials in comparison to incongruent trials. As predicted these effects were not observed in L2. Importantly, we observed the same accuracy levels in both languages. Thus, it is highly unlikely that our results are due to differences in stimuli

comprehension. Moreover, we also found an overall advantage of processing affective information in L1. The fact that participants were slower to evaluate stimuli in L2 suggests that simulation is more difficult in this case (see Foroni, 2015; Foroni & Semin, 2012).

In Experiment 2 we included two types of stimuli (valenced words and faces) both as primes or targets. Affective priming was observed in both L1 and L2 suggesting that the simulation of valenced facial expressions reduced the constraints imposed by a second language. As in the Experiment 1, accuracy levels were independent of language and overall response times were slower in L2.

Although comparisons between studies are to be made with caution, overall response times were faster when images of facial expressions were included. Indeed, despite having the same simple dichotomous evaluation task, in Experiment 2 participants were about 130 ms faster than in Experiment 1 (see De Houwer & Hermans, 1994). This also corroborates the idea that, in comparison with words, images of faces are powerful in conveying affective cues and facilitate simulation. It should be noted that in a comparison of the two tasks in Experiment 2, overall classification was faster when the targets were photos than when the words. Moreover, congruent responses were faster to photo targets than to word targets were.

Our findings are potentially relevant for several research domains. First, they are relevant for the bilingualism research by confirming an advantage in the processing of affective verbal information in L1 compared to L2. Second, experimental studies in L2 are still scarce, particularly in an embodiment framework. Our results are consistent with a simulation account suggesting that whereas L1 is predominantly embodied L2 is more representational, that is, less grounded by sensory motor processes. Third, our findings are also informative for the affective priming domain by demonstrating the robustness of the effect with different types of stimulus formats (i.e., photos and words).

In an increasingly globalized world, distances and differences between people can be reduced by means of a powerful tool – a common language. Such a shared tool promotes the effectiveness of communication as well as the acquisition and sharing of knowledge. Nonetheless, past research has suggested that communicating emotion in a native language differs from doing so in a foreign language. There is considerable evidence suggesting that processing information in L1 differs from processing language in L2. In line with previous research, our view is that such differences emerge because L2 does not carry the same embodied intensity as L1.

CHAPTER FOUR:

SECOND-LANGUAGE LEADS TO HIGHER SOCIAL DISTANCE: THE MEDIATING ROLE OF CONSTRUAL LEVEL

It is virtually impossible to imagine human life without communication. Importantly, communication takes place nowadays in a multicultural world, where distances and differences are shortened trough the utilization of a powerful tool – a common language. The increasing need of using a common language has led many to become bilingual. Indeed, more than half of the world's population knows at least two, and often more, languages (Grosjean, 2010).

Behavioral and neuroscience studies have been providing evidence that language is embodied - language is grounded on sensorimotor systems and language comprehension requires, at least partially, experience simulation (see Barsalou, 1999a, 2008; Fischer & Zwaan, 2008; Glenberg & Gallese, 2012, Meteyard, Cuadrado, Bahrami, & Vigliocco, 2012). For example, studies have shown that sensibility judgments were faster when the direction implied by the sentence matched the direction of the participants' hand movement (Glenberg & Kaschak, 2002); that reading emotion words (e.g., angry; happy) automatically activates the correspondent facial muscles (i.e. corrugator supercilii and zygomatic major, respectively) in the perceiver, with impact on his/her judgments (Foroni & Semin, 2009); and that language comprehension activates perceptual information, by leading people to adopt spatial perspectives that were consistent with the sentences content (Borghi, Glenberg, & Kaschak, 2004).

However, studies in language embodiment have been mainly focused on monolingual populations, and on the impact of first-native language (L1) on thought and behavior (e.g., Barsalou, 2008; Foroni & Semin, 2009; 2013; Lakoff & Johnson, 1999). On the contrary, the implications of experiencing, processing and comprehending a second-learned language (L2) have been hardly investigated. Only recently, a few studies have acknowledge that L2 comprehension also requires experience simulation (e.g., De Grauwe, Willems, Rueschemeyer, Lemhöfer, & Schriefers, 2014; Dudschig, de la Vega, & Kaup, 2014), although not to the same extent as L1 comprehension (e.g., Foroni, 2015; Vukovic & Shtyrov, 2014).

Importantly, simulations are situated, since they are limited by the bodily, physical, and social context of a goal-directed agent (e.g., Barsalou, 1999a; Yeh & Barsalou, 2006). The level of construal at which an event is represented (Maglio & Trope, 2012), and the linguistic context (i.e. L1 or L2; Foroni, 2015; Li, Liu, & Ma, 2015) are some of the identified contextual constraints to simulation, constituting boundaries for the impact of bodily information on thought.

In this article we will examine whether different linguistic contexts – L1 and L2 - provide distinct groundings for cognition and action, by arguing that they are embodied in different ways. More specifically, we will investigate whether the lack of association between L2 and concrete sensorimotor experiences will induce a more abstract higher level mindset, relative to L1, which in turn will result in higher perceived psychological distance from social targets. This argument relies essentially on evidence from bilingualism, Construal Level Theory (CLT) and embodied cognition frameworks, which will be briefly described in the following sections.

Second Language and Psychological Distance

It is commonly stated that if the first-native language is the language of emotional intensity, the second language may be the language of emotional distance (e.g., Dewaele & Pavlenko, 2002). Bilinguals are often described as presenting a detachment effect – with L2 serving an intellectual function relatively devoid of emotion, and L1 clearly expressing emotional content (e.g., Marcos, 1976). Therefore, language code-switching - defined as "changes from one language to another in the course of conversation" (Li, 2007, p. 14) - from L1 to L2 often serves a distancing function from the high emotionality triggered by the native language (e.g., Bond & Lai, 1986; Gumperz & Hernandez, 1971; Javier & Marcos, 1989).

More than 100 years ago Freud and his disciples had already observed that their bi-multilingual patients favored their L2 or LX (i.e., a language that is not L1) when using obscene words and discussing anxiety-inducing topics (e.g., Freud, 1893). Studies of code-switching describe how using a second-language often serves a distancing function (Gumperz & Hernandez, 1971; Javier & Marcos, 1989). Moreover, patients code-switched to L2 when they wanted to convey a self-confident, calm and emotionally reserved impression (e.g., Gonzalez-Reigosa, 1976), and when they wanted to discuss negative emotional events without experiencing the strong arousal triggered by L1 (e.g., Santiago-Rivera, Altarriba, Poll, Gonzalez-Miller, & Cragun, 2009).

Bond and Lai (1986) also observed that when interviewing one another in Cantonese (L1) and English (L2) female participants spoke longer about embarrassing topics (e.g., sexual attitudes of Chinese and Westerners) in L2 than in L1. Overall, speakers switch into L1 to convey intimacy, we-ness, and to express their emotions, and to L2 to express emotions in a detached way, outgroup attitudes, and to mark distance from what they are saying (see Pavlenko, 2012).

The described results suggest that L2 can be used to distance oneself from the high emotionality triggered by L1. Indeed, research on bilingualism not only confirms the greater emotional resonance of L1 over L2 (e.g., Dewaele, 2004, 2008; Harris, Ayçiçegi, & Gleason, 2003), but also specifies when this difference between languages is expected (see Perani & Abutalebi, 2005).

The reported differences between L1 and L2 have been explained in terms of their learning and usage histories (i.e. language dominance, frequency of use, proficiency, context and age of acquisition). Language is experienced as emotional because it is learned and used in emotional contexts (Harris, Gleason, & Ayçiçegi, 2006). L1 is usually learned in the context of family life, which generally includes intense emotional experiences, and integrates information received from all sensory modalities, including kinesthetic and visceral (Pavlenko, 2008). In contrast, L2 is frequently mastered in more emotionally neutral formal settings (e.g., school, work) (Bond & Lai, 1986), and its acquisition takes place without significant involvement of the majority of sensory modalities (Perani & Abutalebi, 2005).

Furthermore, the contexts of early childhood are usually more emotional than the contexts of later childhood/adulthood (e.g., Harris et al., 2006), and it is during this phase that language meaning is closely related to the body. In the sensorimotor stage (birth-2 years old) infants gain knowledge of the world from the physical actions they perform within it, while in the preoperational stage (2-7 years old) the child learns to speak while motor skills are acquired and developed. Furthermore, in the concrete operational stage (7-11 years old) children can apply logic but only to physical concrete objects (Piaget's theory of cognitive development; see Fischer, 1980). Therefore, besides being a particularly emotional phase, during childhood, thought is centered on a sensorimotor way of thinking and communicating.

Although L2 seems to be acquired through the same neural devices responsible for L1 acquisition (Perani & Abutalebi, 2005) and to share the same brain language systems (e.g., Frenck-Mestre, Anton, Roth, Vaid, & Viallet, 2005; Kovelman, Baker, & Petitto, 2008), the patterns of brain activation associated with linguistic processing in those languages are modulated by several factors, such as the amount of language exposure, and particularly, proficiency and age of acquisition (e.g., Park, Badzakova-Trajkov, & Waldie, 2012; Perani & Abutalebi, 2005; Wartenburger et al., 2003). Brain imaging studies typically report that in subjects with comparable levels of proficiency, late bilinguals (LBs) present a higher amount of activation in L2 than in L1 (e.g., Kovelman et al., 2008; Perani et al., 2003; Vingerhoets et al., 2003; Wartenburger et al., 2003). Moreover, subjects learning their L2 later in life (LBs)

activate distinct regions of the brain for L1 and L2, while for early bilinguals (EBs) an overlapping activation for L1 and L2 was observed (see Hagen, 2008).

Thus, from an embodied perspective different physical, social and cognitive effects may arise from L1 and L2, for people learning L1 during childhood and L2 later in life (LBs), because the two languages have different sensorimotor groundings. On the contrary, for people acquiring L1 and L2 in the context of childhood (EBs) these differences are at least subtler, because the two languages are associated with similar sensorimotor experiences.

Recent studies have shown that subjective reports of the perceived emotional intensity of phrases like 'I love you' or of taboo words were perceived as stronger in L1 than in L2 (e.g., Dewaele, 2004; 2008), and that L2 perceptions of emotional strength decreased with higher age of acquisition (AoA), lower proficiency and frequency of use, among others.

The argument of lower emotional resonance of L2 was further supported by psychophysiological indicators, namely by weaker skin conductance responses (SCRs) triggered by childhood reprimands in L2 relative to L1 (Harris et al., 2003). Importantly, this difference was only observed for LBs who have also rated L1 reprimands as more unpleasant than L2 ones (Harris, 2004). However, the inconsistent findings reported in this domain (see (Caldwell-Harris & Ayçiçeği-Dinn, 2009; Caldwell-Harris, Tong, Lung, & Poo, 2011), and their limitation to childhood reprimands, required further examination of whether emotional resonance occurs to a less extent for L2 than for L1.

Other studies have shown a reduced effect of biases on decision-making in L2, relative to L1, suggesting an impaired emotionality in this linguistic context (Costa, Foucart, Arnon, Aparici, & Apesteguia, 2014; Keysar, Hayakawa, & An, 2012). Consistently, when facing a moral dilemma, more utilitarian and less emotional choices were made in a L2 than in a L1 linguistic context (e.g., Costa, Foucart, Hayakawa et al., 2014; Geipel, Hadjichristidis, & Surian, 2015b). Moreover, moral violations (e.g., consensual incest) were judged less harshly in L2 than in L1 by LBs (Geipel, Hadjichristidis, & Surian, 2015a).

Other findings seem to suggest that processing affective valence is less automatic in L2 than in L1, which reduces interference effects in this language (Segalowitz, Trofimovich, Gatbonton, & Sokolovskaya, 2008). In another study, it was shown that while semantic priming effects were observed both in L1 and L2, affective priming effects were found only in L1. Importantly, affective priming effects in L2 were only observed for participants with a frequent everyday usage of L2 (Degner, Doycheva, & Wentura, 2012).Taking these findings

together, literature suggests that emotional resonance is hindered in a L2 context. However, only recently this question has been addressed within an embodied/grounded cognition framework. It has been argued that the reported differences between L1 and L2 express different embodiments of these languages, which lead to different simulations of experience.

In a very recent study, Li and colleagues (2015) explored the impact of the communicative context on the relation between sensorimotor information and thought, namely on the vertical spatial metaphor of affect ("good is up"; e.g., Meier & Robinson, 2004). LBs participants were faster to judge congruent pairs of words (e.g., positive word presented up) when the words were presented in L1 but not in L2. These results indicate that the grounding of abstract domains in concrete physical experiences is hindered in L2.

The proposal of partial disembodiment in L2 was recently, and to our knowledge for the first time, examined by Foroni (2015) who investigated whether the somatic bases (i.e., facial muscle simulation) of L2 were similar or different from the ones observed for L1 (e.g., Foroni & Semin, 2013). Dutch native speakers, who were English LBs, read emotion sentences that were either in the affirmative ('I am laughing') or negative form ('I am not laughing), and were either relevant ('I am smiling') or irrelevant ('I am frowning') for the activation of the zygomatic major muscle. Results indicated that reading affirmative sentences involved simulation in both L1 and L2, but reading L2 sentences in the negative form did not activate a significant relaxation of the relevant muscle, contrary to what was observed for L1 (see Foroni & Semin, 2013). Thus, whereas processing emotional language in L1 relies on simulations, in L2 simulations are only partial because they are not activated for more complex and abstract forms of thought (i.e., negation).

The results of Li and colleagues (2015) and Foroni (2015) indicate that L2 seems to lack, to a certain extent, previous relevant sensorimotor experiences to be encoded in the multimodal system to be fully simulated, which attenuated the influence of contextual bodily states on cognition in L2.

Construal-Level and Psychological Distance

According to CLT, any given person, object, or event can be represented at different levels of construal, on a continuum of concreteness-abstractness (Liberman & Trope, 2008; Liberman, Trope, & Stephan, 2007; Trope & Liberman, 2010; Trope, Liberman, & Wakslak, 2007). Whereas low-level construals are concrete, contextualized, situated representations, including subordinate and incidental features of events, high-level construals are abstract, de-

contextualized, coherent, and prototypical representations that emphasize superordinate, core features of events (Liberman & Trope, 2008). Thus, moving from a low to a high-level representation requires the retention of central features and the omission of incidental characteristics of an object or event (Trope & Liberman, 2010).

Vallacher and Wegner's (1987) action identification theory suggests that actions may be represented in terms of superordinate ("why") or subordinate ("how") goals, being the former related with more abstract and the later with more concrete aspects of an action. For instance, the action "attending a class" may be construed in relatively concrete terms by thinking in "sitting in a classroom" and "listening to a professor", or more abstractly, as "gaining knowledge" and "learning about psychology". Whereas the concrete representations of an action make the *place* and *with whom* – contextual features – available, the abstract representation can take place in many contexts and with different people. Notably, concrete representations focus one's attention on the actions that can be performed with one's body, such as sitting and listening, while this information is absent in a more abstract frame of mind. Hence, sensorimotor information responsible for grounding cognition constitutes *per se* an incidental, and thus concrete low-level feature of a situation.

For example, Maglio and Trope (2012) investigated whether different mindsets might hinder or facilitate the influence of bodily states on cognition. Participants in the low-level mindset made longer length estimates when wearing, rather than not wearing a backpack (Study 1; see Proffitt, Stefanucci, Banton, & Epstein, 2003) and higher importance estimates when holding a heavy, rather than a lighter clipboard (Study 2; see Jostmann, Lakens, & Schubert, 2009), with no differences in estimates found in the high-level condition. These results indicate that the effects arising from concrete sensorimotor cues are stronger in a concrete frame of mind. When thinking abstractly, mental representation and judgment are less influenced by bodily states, suggesting that an abstract frame of mind is associated with disembodied cognition.

Hence, from a socially situated cognition point of view (e.g., Semin & Garrido, 2015; (Semin, Garrido, & Palma, 2012, 2013; Semin & Smith, 2002, 2013; Smith & Semin, 2004), our construal of events is flexible and adaptive to the demands of a continuously changing social and physical environment. Therefore, the analysis of how people construe events must consider the communication context in which events take place (Jiga-Boy, Clark, & Semin, 2013). If the communication context impacts the level at which an object or event is represented, it should also affect the perceived psychological distance from that object or

event, since construal-level and psychological distance are inherently related to each other (e.g., Trope & Liberman, 2010).

An event is psychologically distant whenever it is not part of one's direct experience – for example, when it happens to people less and less like oneself, people from whom one perceives a high *social distance* (e.g., Stephan, Liberman, & Trope, 2011). Social distance, as one dimension of psychological distance, is affected by the level at which an event is construed. For example, dimensions reflecting social distance (i.e., politeness) increased when the addressees were construed abstractly (Stephan, Liberman, & Trope, 2010). Moreover, a concrete mindset, rather than an abstract mindset, produced an increase in perceived social closeness between the self and a target. This pattern of results was found when social distance was measured both as perceived familiarity, similarity to the self, and resources allocation (Stephan et al., 2011).

Overall, the revised literature shows that construal level is sensible to the context, and that changes in construal level affect judgments of perceived social distance. It is, therefore, possible that different linguistic contexts, such as using L1 or L2, may activate different levels of construal and, consequently, induce differences in perceived social distance.

4.1. Overview

In the following studies we aim to experimentally test whether L2 leads to higher perceived social distance than L1. We will also investigate what is the psychological *mechanism* explaining this relation. The results outlined in the previous section suggest that the linguistic context may affect perception of psychological distance, namely that L2 may lead to higher psychological distance than L1. If that is the case, the language in use should influence the judgments of a specific dimension of psychological distance – social distance – in a consistent way. Moreover, in an abstract mindset, concrete sensorimotor cues are omitted, as they seem to be in L2. We argue that as sensorimotor information is considered a concrete cue (Maglio & Trope, 2012), and processing L2 (but not L1) seems to lack the integration and the opportunity for simulating these concrete physical experiences at least for LBs (Foroni, 2015; Li, et al., 2015), the level at which L2 is processed should be more abstract than L1 for LBs. Finally, we argue that as level of construal affects social distance judgments (e.g., Stephan et al., 2010, 2011), for LBs level of construal should be the mechanism underlying the relation between linguistic context and social distance.

In three studies we will experimentally test whether L2 (vs. L1) leads to higher perceived social distance, measuring social distance as perceived familiarity, similarity to the self (Study 1) and amount of resources allocation (Study 3). Moreover, we will investigate whether L2 triggers higher-level conceptual (Study 2) and perceptual (Study 3) construal than L1, for LBs. Finally, we will test the complete model, that is, whether for LBs the linguistic context (L1 vs. L2) affects social distance judgments through level of construal (Study 3).

Previous studies found that positive mood broadens people's information processing, whereas negative mood leads to more local information processing (e.g., Gasper & Clore, 2002; Isen & Daubman, 1984). Thus, participants' mood was also assessed to rule out the possibility that level of construal, and consequently social distance, are affected by this variable.

Before taking part in the experiment, potential participants were asked to complete the Cambridge English Questionnaire online[5] to assess their English level. Participants scoring at least 13 in this 25 multiple-choice questionnaire (medium level of English), identifying Portuguese as their native language (L1) and nationality, and English as a non-native learned language (L2) were selected to participate in the experiments. In contrast with previous studies that approached bilingualism as a ''generic'' condition (Pavlenko, 2012), we will include L2 Age of Acquisition (AoA) in our analyses, in line with previous findings showing that this is one of the most important modulators of linguistic effects (e.g., Harris, 2004; Park, et al., 2012; Perani & Abutalebi, 2005; Wartenburger et al., 2003). The comparison between EBs and LBs, absent from previous studies (e.g., Foroni, 2015; Li et al., 2015), will support and strengthen the claim that differences between L1 and L2 are due to different previous sensorimotor experiences with these languages.

4.2. Experiment 1

Results reported in the bilingualism literature suggest that L2 can be used with a distancing purpose. However, this assumption mainly derives from a few case studies, on therapists' perceptions, and on qualitative data and was hardly empirically tested.

Experiment 1 experimentally examines whether the linguistic context impacts perceptions of social distance, as well as the association of positive social traits (i.e. social positivity) to social targets. Participants will read about social targets actions and write small

[5] http://www.cambridgeenglish.org/in/test-your-english/adult-learners/

narratives about their behaviors in L1 or L2. Then, they will evaluate each target on measures of social distance and social positivity.

We predict that L2 induces social distance, measured as perceived familiarity and similarity to the self (see Stephan et. al, 2011), to a greater extent than L1. Moreover, as familiar and similar stimuli tend to be seen as more positive, pleasant and likable (e.g., Zajonc, 1968; see for review, Bornstein, 1989) and even induce positive mood (Garcia-Marques & Mackie, 2000) we expect that L2 will also lead to the association of less positive social traits (i.e., friendly, nice, and intelligent) to social targets than L1. As the relation between familiarity and positive affect exert a bi-directional influence (e.g., Garcia-Marques, Mackie, Claypool, & Garcia-Marques, 2010) participants' mood will be measure to assure that the effects of linguistic context on familiarity and similarity are not mediated by different affects triggered by different linguistic contexts.

Importantly, one forms impressions, makes judgments and decisions regarding people that are present in the *here* and *now*, but also regarding people that are removed from direct experience. Therefore, we will assess judgments of social distance and social positivity regarding social targets placed in the participants' here and now (the experimenter), and targets with whom participants do not have direct contact with (fictitious social targets).

4.2.1. Method

Participants and Design

One hundred twenty-five native Portuguese students (74.4% female, *Mage* = 22.3, *SDage* = 3.71) participated in this experiment in exchange for a 5€ voucher. Ten participants were excluded from the analyses[6]: Two groups of bilinguals were created based on the self-reported L2 Age of Acquisition: the EBs (AoA $\leq$ 9 years old) and the LBs (AoA $\geq$ 10 years old). Importantly, in Portugal, English formal instruction officially starts in the 5th grade when most students are 10 years old.

EBs and LBs groups reported significantly different levels of L2 general Proficiency (M = 5.77, SD = 0.68 vs. M = 5.36, SD = 0.65; $t(113) = 3.27$; $p = .001$), as assessed by averaging the proficiency self-reports (in 7 point scales) of L2 speaking, understanding, reading and writing for each participant. Moreover, both EBs and LBs, reported better

[6] Four participants were excluded because their native language was both Portuguese and English or because they had double nationality; and the remaining six because their general self-reported proficiency assessed at the end of the experiment was below the scale midpoint (below 4).

general proficiency in L1 (M = 6.80, SD = 0.46; M = 6.87, SD = 0.24, respectively) than in L2 (M = 5.77, SD = 0.68; M = 5.36, SD = 0.65, both ps = .001), being participants in both groups unbalanced bilinguals.

In our final 2 X 2 between-subjects design the L1 condition included EBs (n = 31) and LBs (n = 25), and the L2 included EBs (n = 32) and LBs (n = 27) participants.

Materials and Procedure

After signing the informed consent participants were randomly assigned either to the L1 or L2 condition, by an experimenter who was blind to the experimental conditions. In the L1 condition all the information presented as well as participants' answers were in Portuguese and in the L2 condition in English. Participants were told they were going to participate in a study about social judgments that intended to explore how people think about actions performed by others. Afterwards, they read six short descriptions about fictitious social targets (e.g., "Alice is feeding a stray cat"; "Daniel is inviting guests to a party"; "Diana is smoking in the park" adapted from Stephan et. al, 2011, Study 3), and a final description about the experimenter ("Catarina is collecting data in the laboratory") (see Appendix B). They were told they should imagine each situation and write about it as much as they could.

After writing for 1m about a behavioral description, they completed the respective social distance and the social positivity scales. Social distance was measured as perceived *Familiarity* (e.g., "How familiar does Alice seem to be?") in a scale from "1- Not at all familiar" to "7- Very Familiar"; and *Similarity to the self* (e.g., "How similar to you does Alice seem to be?") in a scale from "1-Not at all similar" to "7-Very similar". Social Positivity judgments were measured by asking how *friendly* (from "1-Not at all friendly" to "7-Very friendly"), *nice* (from "1-Not at all nice" to "7-Very nice"), and *intelligent* (from "1-Not at all intelligent" to "7-Very intelligent") a social target seemed to be (see Liviatan, Trope, & Liberman, 2008; Stephan et. al, 2011).

Subsequently, participants indicated their general mood by answering to the question "How do you feel at this moment?" in a 7-point scale (from "1- very bad" to "7-very good") (Förster, Friedman, & Liberman, 2004; Liberman & Förster, 2009a). Finally, they filled an adaptation of the Bilingualism and Emotions Questionnaire (BEQ; Dewaele & Pavlenko 2001–2003), answering to questions regarding their L1 and L2's linguistic histories:

dominant language, L1 and L2 context of acquisition, proficiency (speaking, understanding, reading and writing), frequency of use and age of acquisition (AoA).

4.2.2. Results and Discussion.

Measures of social distance and social positivity, regarding the fictitious social targets and the experimenter, were submitted to separate Univariate Analyses of Variance (ANOVAs) with Linguistic Context (L1; L2) and AoA (EBs; LBs) as between-subjects variables. None of the analyses revealed AoA main effect or Linguistic Context *AoA interaction (all $Fs < 1.97$; all $ps > .16$). Thus, the subsequent analyses include AoA in the statistic model, but only Linguistic Context main effects will be reported.

Social Distance

The two Univariate ANOVAs performed on the Familiarity and Similarity indexes concerning fictitious social targets did not reveal any effects of the Linguistic Context (both $Fs < 1$). However, these effects were observed on Familiarity and Similarity ratings about the experimenter. Participants evaluated the experimenter as significantly more familiar in the L1 ($M = 5.07$, $SD = 1.66$) than in the L2 condition ($M = 4.34$, $SD = 1.94$), $F(1,114) = 5.32$, $p = .02$, $\eta 2 = .046$. Moreover, they considered the experimenter to be more similar to the self in the L1 ($M = 4.30$, $SD = 1.82$) than in the L2 condition ($M = 3.66$, $SD = 1.87$) albeit the effect was only marginal, $F(1,114) = 3.63$, $p = .059$, $\eta 2 = .032$.

Social Positivity

The three Univariate ANOVAs performed on the Niceness, Friendliness and Intelligence indexes regarding the fictitious social targets, did not yield any Linguistic Context main effect (all $ps > .15$). Again, when evaluating the experimenter, Linguistic Context main effects were observed for both Niceness $F(1,114) = 4.63$, $p = .03$, $\eta 2 = .04$, and Friendliness ratings $F(1,114) = 6.87$, $p = .01$, $\eta 2 = .058$. Participants in the L1 condition considered the experimenter to be nicer ($M = 5.27$, $SD = 1.12$) and more friendly ($M = 5.29$, $SD = 1.17$) than in the L2 condition ($M = 4.81$, $SD = 1.12$ and $M = 4.71$, $SD = 1.11$, respectively). No Linguistic Context main effect was observed for intelligence ratings ($F < 1$).

Mood

Mood was not affected by the Linguistic Context condition or its interaction with AoA (both $ps > .17$). Although mood correlated positively with judgments of how nice ($\boldsymbol{r} = .23$, $p = .01$) and how intelligent ($r = .24$, $p = .01$) the experimenter was (the other

correlations p = n.s), the pattern of the influence of linguistic context on ratings of familiarity, similarity, niceness, friendliness (all $ps < .05$) and intelligence ($p = .91$) of the experimenter remained the same when controlling for mood, as determined by analyses of covariance (ANCOVAs).

Overall the results from Experiment 1 suggest that our predictions were partially confirmed. Judgments of perceived social distance (familiarity and similarity) as well as of social positivity (niceness and friendliness) were lower in L2 than in L1 condition. The linguistic context did not affect intelligence ratings, probably because familiarity is essentially related with pleasantness and likability (see Garcia-Marques, et al., 2010; Zajonc, 1968), which are more associated with social rather than cognitive traits. Notably, mood was ruled out as possible mediator of the relations between Linguistic Context and both Social Distance and Social Positivity. However, these findings did not generalize to fictitious social targets and AoA did not play a role in the described effects. These finding will be further discussed in the final section.

4.3. Experiment 2

Several studies have shown that the impact of sensorimotor information on thought is limited by cognitive and contextual boundaries, whether they are one's level of construal (Maglio & Trope, 2012) or the linguistic context (Foroni, 2015; Li et al., 2015). Could these two dimensions be interrelated? We suggest that probably yes.

L2 learning and use takes place in contexts that do not provide the same opportunities as L1 for the integration of sensorimotor information in conceptual thought (Pavlenko, 2008; Perani & Abutalebi, 2005). If processing L2 seems to lack the integration and simulation of concrete sensorimotor experiences for LBs (Foroni, 2015; Li, et al., 2015), and these experiences are discounted from an abstract frame of mind (Maglio & Trope, 2012), we predict that L2 will be more likely associated with higher level Conceptual Construal than L1, at least for LBs. On the other hand, as native language integrates concrete information received from all sensorimotor modalities, which is re-enacted during language comprehension (e.g., Barsalou, 2008), we predict that the processing and comprehension of the same sentences in L1 will be more likely associated with lower level Conceptual Construal than in L2, at least for LBs. For EBs, no differences in level of Conceptual Construal between languages are expected, as they are likely to be equally grounded in concrete sensorimotor experiences.

To test this hypothesis, participants were asked to write a narrative about their everyday lives either in L1 or L2. Then they were asked to complete a task measuring their level of conceptual construal.

4.3.1. Method

Participants and Design

One hundred one native Portuguese (76.2% female; *Mage* = 21.5, *SDage* = 4.42) participated in this experiment in exchange of a 5€ voucher. Six participants were excluded from the analyses[7].

As in Experiment 1, different groups of bilinguals were created. EBs (L2 AoA ≤ 9) and LBs (L2 AoA ≥ 10) who reported the same level of L2 general Proficiency (M = 3.72, *SD* = 0.49 vs. *M* = 3.65, *SD* = 0.55; $t(93) = .83$; $p > .52$), as assessed by averaging the proficiency self-reports (in 5 point scales) of L2 speaking, understanding, reading and writing for each participant. Moreover, both EBs and LBs, reported better general Proficiency in L1 (*M* = 4.70, *SD* = 0.41 and *M* = 4.72, *SD* = 0.45, respectively) than in L2 (*M* = 3.72; *SD* = 0.49 and *M* = 3.65; *SD*= 0.55, $p < .001$), being unbalanced bilinguals. L1 condition was constituted by EBs (*n* = 24) and LBs (*n* = 22), and L2 condition was composed by EBs (*n* = 20) and LBs (*n* = 29).

Materials and Procedure

Participants were informed they were going to participate in a pre-test about Construction of Narratives, which examined how people interpret different events in their lives (adapted from Liberman et al., 2007). After signing the informed consent and being randomly assigned to the L1 or L2 conditions by an experimenter who was blind to the experimental conditions, participants were informed that they should write in English (Portuguese) about an average, normal, typical weekday in their lives. A neutral task was used to avoid effects of valence on construal level (see Gasper & Clore, 2002).

After writing for seven minutes, participants' level of Conceptual Construal was assessed using the Behavior Identification Form (BIF; Vallacher & Wegner, 1989). In BIF, each of the 25 action-sentences (e.g., Pushing a door bell) is followed by a higher level (e.g., "Seeing if someone's home") or a lower level restatement (e.g., "Moving a finger"), and

[7] Two participants were excluded because their L1 was both Portuguese and English, and the remaining four because their self-reported general proficiency was below the midpoint of the 5-point scale.

participants should choose the one they think best describes the action-sentence (see Appendix B). In the L1 condition participants read and answered to the Portuguese translation of the BIF sentences. In the L2 condition the task was the same but included a third option "I do not understand the meaning of some of these behaviors" to avoid responses derived from lack of understanding. Abstract choices were coded as 1, concrete choices as 0. The total number of abstract choices was divided by the total number of items participants knew the meaning of. Thus, higher scores correspond to more abstract choices. Finally, like in Experiment 1, participants answered to the mood scale and then filled an adaptation of the BEQ, assessing their L1 and L2 linguistic histories.

4.3.2. Results and Discussion

Univariate Analysis of Variance (ANOVA) was performed on the BIF scores with Linguistic Context (L1 vs. L2) and AoA (EBs vs. LBs) as between-subjects variables. Results yielded a Linguistic Context main effect $F(1,94) = 3.92$, $p = .05$, $\eta 2 = .041$, qualified by an interaction between Linguistic Context and AoA $F(1,94) = 4.75$, $p = .03$, $\eta 2 = .05$ (see Figure 5).

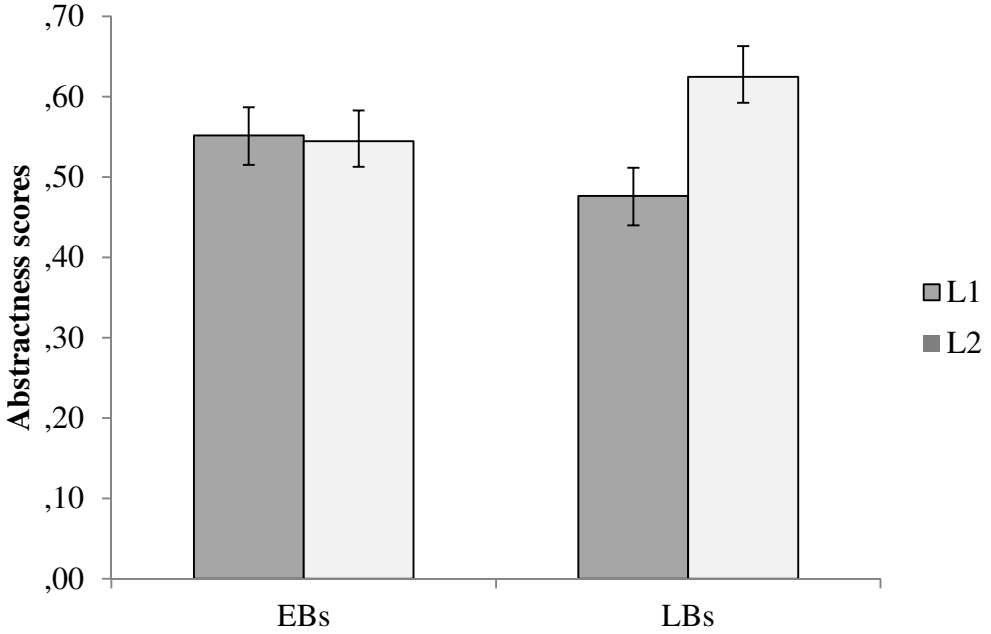

Figure 5. Mean scores and standard errors of conceptual abstractness as a function of linguistic context and AoA.

Participants' level of conceptual construal was more abstract in the L2 ($M = .59$, $SD = .18$) than in the L1 condition ($M = .52$, $SD = .17$). Importantly, Bonferroni post-hoc tests revealed that, as predicted, this pattern of results was observed only for LBs, who processed

the conceptual information more abstractly in L2 (M = .62, SD = .18) than in L1 (M = .48, SD = .13; p = .003). For EBs no significant differences were observed between L1 (M = .55, SD = .19) and L2 (M = .54, SD = .18; p = .89).

Finally, EBs reported better mood (M = 4.89, SD = 1.13) than LBs (M = 4.41, SD = 1.12) $F(1,94) = 4.73$, p = .03, $\eta 2$ = .05, but mood was not affected by the Linguistic Context or its interaction with AoA (both $ps > .26$). Importantly, the interaction between Linguistic Context and AoA remained the same after adjusting for mood in an ANCOVA $F(1,94) = 4.83$, p = .03, $\eta 2$ = .05.

As expected, conceptual processing was more abstract higher-level in L2 than L1 and this difference was only observed for LBs, and not for EBs. Importantly, mood was not a mediator of these effects. However, using data derived from strictly linguistic tasks, limits the inferences that can be made about non-linguistic cognition (see Pinker, 1994). Moreover, any experiment relying on comparing performance across translations may incur in a *confound*: differences between conditions may be confounded with differences between items (Casasanto, 2008). Thus, the results of Experiment 2 should be replicated using a non-linguistic measure.

4.4. Experiment 3

In our final study, we aimed to replicate and extend the findings observed in Experiments 1 and 2. First, we investigated the relation between level of conceptual and perceptual construal established in the embodiment literature for a native language, and extended these findings for second-learned language processing. High-level cognition derives from, and is connected to, perception (Barsalou, 1999a), which is supported by studies showing correlations between perceptual and conceptual attention tasks (Witkin, Dyk, Faterson, Goodenough, & Karp, 1962), and suggesting that perceptual simulation underlies conceptual processing (e.g., Borghi, et al., 2004; Pecher, Zeelenberg, & Barsalou, 2003). Thus, we hypothesized that, for LBs, L2 should also activate more global perceptual processing than L1. Like in Experiment 2, no differences were expected for EBs.

Moreover, we suggest that the relation between linguistic context and social distance should be mediated by construal level. Our proposal derives from the fact that global versus local processing is a mechanism through which situational factors influence how people attribute meaning to a stimulus to successfully self-regulate their behavior (see Eyal & Fishbach, 2010; Förster & Dannenberg, 2010). Thus, the linguistic context, as a situational

factor, should influence the meaning attributed to a social target (e.g., "Is he/she distant or proximal from me?"), and consequently judgments of perceived social distance, through the level of perceptual processing. Therefore, if an event framed in L2 is processed more globally, it should also lead to judgments of higher social distance, consistently with the revised literature (e.g., Stephan et al., 2011).

Furthermore, it is expected that the effect between Linguistic Context and Social Distance through Level of Perceptual Construal will be observed for LBs (and not for EBs) because only for this group L2 leads to more abstract thought than L1 (Experiment 2).

Experiment 3 examines these hypotheses using the same manipulation of Linguistic Context used in Experiment 2. Construal level was also evaluated but this time with a perceptual task. Like in Experiment 1, judgments of social distance regarding both fictitious social targets and the experimenter were obtained, but this time using Resources Allocation as measure of Social Distance.

4.4.1. Method

Participants and Design

Ninety-nine native Portuguese (73.7% female; *Mage* = 23.84, *SDage* = 4.41) participated in this study in exchange of a 5€ voucher. Again two groups were created. EBs (L2 AoA ≤ 9) and LBs (L2 AoA ≥ 10) reported the same level of L2 general Proficiency (*M* = 3.85, *SD* = 0.68 vs. *M* = 3.76, *SD* = 0.43; $t(97) = .83$; $p > .40$), on a 5 point index. Moreover, for EBs and LBs, general Proficiency reported in L1 (*M* = 4.82, *SD* = 0.35 and *M* = 4.91, *SD* = 0.23, respectively) was higher than in L2 (*M* = 3.85, *SD* = 0.68; *M* = 3.76, *SD* = 0.43, both *ps* < .001). Thus, EBs and LBs were both unbalanced bilinguals. L1 condition was constituted by EBs (*n* = 25) and LBs (*n* = 25), and L2 condition was composed by EBs (*n* = 25) and LBs (*n* = 24).

Procedure and Materials

After signing the informed consent and being randomly assigned to one of the two linguistic context conditions by an experimenter who was blind to the experimental conditions, participants were instructed about the pre-test "Construction of Narratives" (see Experiment 2). After writing for 7 minutes, they were presented with the Shape Task (Kimchi & Palmer, 1982), which assesses level of Perceptual Construal.

On each of the 24 trials, participants had to indicate which of two comparison figures (A or B) was more similar to a target figure (see Appendix B). If participants' choice was based on the overall similarity between target and comparison figure (e.g., a square of triangles goes with a square of squares) it was considered a global choice. If the choice was based on the figures' individual elements (e.g., a square of triangles goes with a triangle of triangles) it was considered a local choice. Twelve combinations were presented twice, to counterbalance whether the global (or local) match appeared on the right or the left of the computer screen. Global choices were rated as 1 and local choices as 0, and the total number of abstract choices was divided by the total number of trials. Thus, higher scores correspond to more global choices.

Afterwards, a dictator game paradigm was introduced, where participants received an amount of goods and should choose either to keep them all to themselves or to share some, or all of them, with a social target. We operationalized social distance as the amount of resources allocation since feeling close to someone promotes allocation of resources (e.g., Dovidio, et al., 1997; Nadler, 1999).

Participants were randomly presented with six scenarios about fictitious social targets, and a final one regarding the experimenter (see Appendix B). For example, they could read "Imagine that you arrive to a theatre, but the performance was cancelled. Another person who arrived to see the same play, Matilde, is looking for the information about it. Now imagine that after complaining to the directors, you (but not Matilde) were offered 8 tickets to other performances. You can either keep all the tickets to yourself or give some to Matilde" (adapted from Stephan et al., 2011, Study 4). In this case, participants should choose a number between 0 and 8 to be allocated. Each of the six choices made for fictitious targets was divided by the maximum number of resources that could be allocated in the specific situation. The six scores were averaged within-subjects. A score was also computed regarding the resources allocated to the experimenter. Lower scores of Resources Allocation correspond to higher perceived Social Distance. Finally, like in Experiments 1 and 2, participants answered to the mood scale and then filled an adaptation of the BEQ, assessing their L1 and L2 linguistic histories.

4.4.2. Results and Discussion

Level of Perceptual Construal

To test our first hypothesis, an Univariate Analysis of Variance (ANOVA) was performed on the Shape Task scores with Linguistic Context (L1 vs. L2) and AoA (EBs vs. LBs) as between-subjects variables. Results revealed an interaction between Linguistic Context and AoA F (1,98) = 5.63, p = .02, η2 = .06 (see Figure 6). Bonferroni post-hoc test indicated as expected that the L2 condition lead to significantly more global choices (M = .72, SD = .26) than the L1 condition (M = .54, SD = .25; p = .02), but only for LBs. As predicted, no differences in level of perceptual processing were found between L2 (M = .59, SD = .31) and L1 (M = .66, SD = .24; p = .33) conditions for EBs. No main or interaction effects were observed on mood (Fs < 1), and the reported effects of the interaction between Linguistic Context and AoA remained the same after adjusting for mood in an ANCOVA F (1,98) = 5.74, p = .02, η2 = .06.

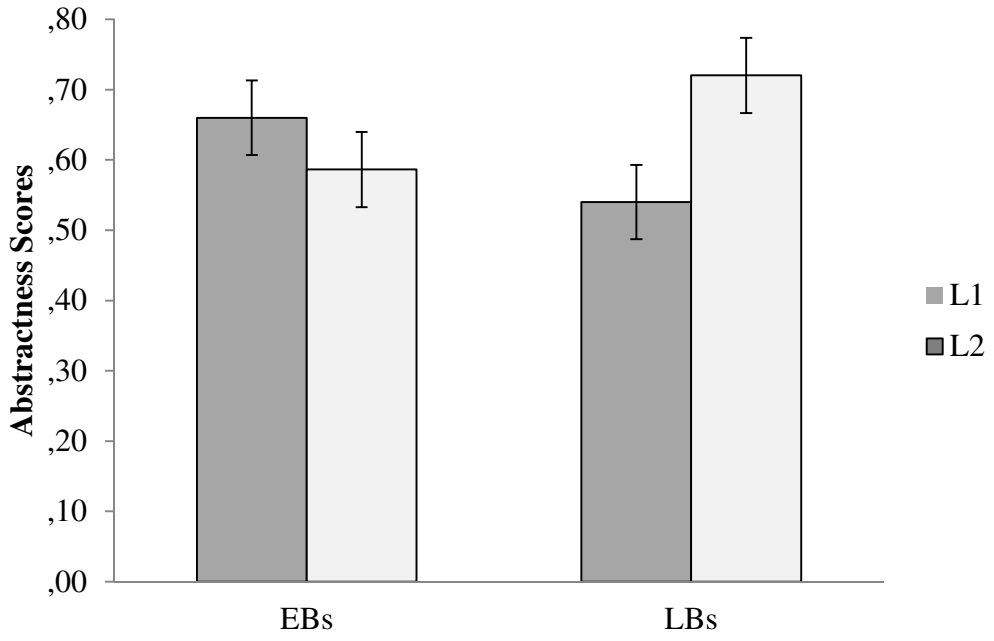

Figure 6. Mean scores and standard errors of perceptual abstractness as a function of linguistic context and AoA.

Social Distance from the Fictitious Social Targets

Subsequently we explored the relation between Linguistic Context and Social Distance (i.e., resources allocation) through level of perceptual construal. Moderated mediation analyses were performed (see Edwards & Lambert, 2007; Preacher, Rucker, and Hayes, 2007), in which the mediated effect was expected to vary across levels of the moderator variable (for EBs and LBs).

We used the Model 7 of PROCESS 2.13 macro for SPSS (Hayes, 2013), which is a computational tool to analyze "conditional process models" (see Hayes, 2013, 2015; Hayes & Preacher, 2013) that are path analysis based, and that estimate direct and conditioned effects, controlling for at least one variable. A bootstrap-based procedure (5000 samples[8]) was used and we introduced Linguistic Context (L1 coded 0; L2 coded 1) as IV, AoA (EBs coded 0, LBs coded 1) as moderator, Perceptual Construal (Shape task scores) as mediator, and the Resources Allocation scores as DV in the model. Neither the direct effect of Linguistic Context on Resources Allocation (B = .001, S.E = .32, p = 1.00; 95% CI [-.63, .63]), nor the relation between Perceptual Construal and Resources Allocation were significant (B = .23, S.E = .59, p = .70; 95% CI [-.95, 1.39]), and thus we can exclude a mediation model with these variables for fictitious social targets (see Table 1).

Table 1. *Results of Experiment 3 for Direct, Indirect, and Conditional Indirect Effects on Resources Allocation to Fictitious Social Targets.*

					95% Confidence Interval	
Predictor variable	B	*SE*	*t*	*p*	Lower Bound	Upper Bound
DV: Level of Perceptual Construal (Mediator variable model) R^2 = .06, p = .09						
Constant.	.66	.05	12.40	.000	.55	.77
Linguistic Context.	-.07	.08	-.97	.33	-.22	.08
AoA.	-.12	.08	-1.59	.11	-.27	.03
Interaction.	.25	.11	2.37	.02	.04	.47
DV: Resources Allocation to fictitious targets (outcome variable model) R^2 = .002, p = .92						
Constant.	3.34	.42	8.00	.000	2.51	4.17
Level of Perceptual Construal	.22	.59	.38	.70	-.94	1.39
Linguistic Context.	.001	.32	.004	1.00	-.63	.63
Conditional indirect effect(s) of Linguistic Context on Resources Allocation to fictitious social targets through Level of Perceptual Construal, for EBs and LBs.						
EBs.	-.02	.06	--	--	-.22	.06
LBs.	.04	.11	--	--	-.16	.29
Overall index of the moderated mediation effect						
	δ	*SE*	LLCI	ULCI		
	.06	.15	-.23	.38		

Note. DV = Dependent variable. Bootstrap = 5.000.

[8] Hayes (2015) suggests that more than 1000 samples should be used in these bootstrap-based procedures.

Social Distance from the Experimenter

We then used the same model but with the scores of Resources Allocation to the experimenter as DV[9]. Results confirmed that Linguistic Context positively interacted with AoA to affect Perceptual Construal, $B_{interaction}$ = .25, S.E = .11, $p < .05$, 95% CI [.04, .47]. Moreover, it was observed that Perceptual Construal negatively affected Resources Allocation, B = -.20, S.E = .10, $p < .05$, 95% CI [-.39, -.006], and hence, as expected, higher scores (more global choices) of perceptual construal corresponded to lower scores of Resources Allocation (higher Social Distance). No direct significant effect of Linguistic Context on Resources Allocation was observed, B = -.06, S.E = .05, $p = .23$, 95% CI [-.17, .04].

Finally, results of the conditional indirect effect were significant (δ = -.05, S.E = .04, 95% CI [-.16, -.0007]), since zero is not contained in the confidence interval. More specifically, the indirect effect of Linguistic Context on Resources Allocation through Perceptual Construal was negative and significant for LBs (B = -.04, S.E = .03, 95% CI [-.10, -.0008]) but it was not significant for EBs (B = .01, S.E = .02, 95% CI [-.009, .08]) (see Table 2).

Table 2. *Results of Experiment 3 for Direct, Indirect, and Conditional Indirect Effects on Resources Allocation to the Experimenter.*

					95% Confidence Interval	
Predictor variable	B	*SE*	*t*	*p*	Lower Bound	Upper Bound
DV: Level of Perceptual Construal (Mediator variable model) R^2 = .06, p = .09						
Constant.	.66	.05	12.40	.000	.55	.77
Linguistic Context.	-.07	.08	-.97	.33	-.22	.08
AoA.	-.12	.08	-1.59	.11	-.27	.03
Interaction.	.25	.11	2.37	.02	.04	.47
DV: Resources Allocation to the experimenter (outcome variable model) R^2 = .06, $p < .05$						
Constant.	.68	.068	9.96	.000	.54	.81
Level of Perceptual Construal	-.20	.10	-2.05	.04	-.39	-.01
Linguistic Context.	-.06	.05	-1.21	.23	-.17	.04

[9] The Linear Interpolation method was used to deal with a missing case. PROCESS macros use listwise deletion based on all variables in the model. Thus, when some case is missing on X, it will throw all those cases out of the analysis when estimating all the effects. Although leaving the missing case yielded the same pattern of significant results, we decided to use this method to have the same values resultant of the interaction between Linguistic Context*AoA for fictitious social targets and the experimenter.

Conditional indirect effect(s) of Linguistic Context on Resources Allocation to the experimenter through Level of Perceptual Construal, for EBs and LBs.						
EBs.	.01	.02	--	--	-.01	.08
LBs.	-.04	.02	--	--	-.10	-.001
Overall index of the moderated mediation effect						
	δ	*SE*	LLCI	ULCI		
	-.05	.04	-.16	-.001		

Note. DV = Dependent variable. Bootstrap = 5.000.

Results of Experiment 3 have shown that LBs processed perceptual information more globally when inserted in an L2, relative to a L1 linguistic context, and that participants' mood did not mediate this effect. Moreover, as expected, for LBs the level of Perceptual Construal mediated the relation between Linguistic Context and Social Distance from the experimenter. More specifically, LBs processed perceptual information in L2 more globally than in L1, which in turn lead to higher perceived social distance (less resources allocation) from the experimenter in L2 than in L1. As predicted, and consistently with Experiment 2, no effects were found for EBs. Like in Experiment 1, neither the linguistic context condition, nor its interaction with AoA affected directly or indirectly the perceived Social Distance from Fictitious Social Targets.

4.5. General Discussion

This article examined the impact of Linguistic Context on judgments of Social Distance. Results from Experiment 1 suggest that a L2 context, relative to a L1 one, leads to higher perceived social distance (measured as familiarity and similarity to the self) and to less positive evaluations (measured as friendliness and niceness) of social targets when these are situated in one's *here* and *now*. These results are in line with clinical observations reported in the bilingualism literature regarding the distancing function of L2 (e.g., Bond & Lai, 1986; Santiago-Rivera et al., 2009). Moreover, these results extend the CLT literature, by showing how Social Distance and Social Positivity are intrinsically interconnected, and that effects on one dimension should be expected in the other dimension (c.f., Stephan et al., 2011).

In Experiments 2 and 3 we tested the role of Construal Level as a possible mediator in the relation between Linguistic Context and Social Distance. We proposed that L2 could be associated with higher level conceptual construal than L1 for LBs, since under a low level mindset sensorimotor cues are omitted (Maglio & Trope, 2012), as they seem to be in L2

(Foroni, 2015; Li, et al., 2015). To be sure the results would be due to different embodiments of L1 and L2, another bilingual group, absent from Li and colleagues (2015) and Foroni (2015) studies, was added in these experiments– the Early Bilinguals.

Results of Experiment 2 indicated that for LBs, L2 Linguistic Context activates higher level conceptual construal than L1 Linguistic Context. These results suggest that for LBs the integration and simulation of concrete sensorimotor information is usually impaired in L2 relative to L1 (e.g., Foroni, 2015). Moreover, results indicate that as for LBs the concrete sensorimotor information is not activated to the same extent during L2 processing and comprehension, a more abstract mindset is induced by this Linguistic Context. This idea is strengthened by the fact that for EBs no differences in construal level were observed, which suggests that for this group both L1 and L2 are associated with concrete physical experiences which are re-enacted during language comprehension.

In Experiment 3 we have replicated and extended these finding using a non-linguistic task. Results from Experiment 3 showed that LBs process perceptual information more globally in L2 compared with L1, with no differences observed for EBs. Thus, not only does language in use affect the level of Conceptual Construal but also the level at which Perceptual information is processed. These findings are in line with embodied approaches to cognition, suggesting that cognition derives from, and is connected to, perception and that conceptual and perceptual systems are both re-enacted during language comprehension (e.g., Barsalou, 1999a, 2008; Borghi et al., 2004). Furthermore, in Experiment 3, we tested the complete proposed model. Results indicated that the relation between Linguistic Context and Social Distance (measured as Resources Allocation) was explained by a conditional indirect effect: for LBs, L2 induced more global perceptual processing than L1, and more global perceptual processing lead to judgments of higher Social Distance from the experimenter. For EBs, no effects reached significance.

Importantly, in Experiment 2 and 3 where AoA had an important role, EBs and LBs were unbalanced bilinguals with a similar degree of L2 proficiency which excludes the possibility that differences in construal-level are a result of differences in linguistic fluency between groups (see Alter & Oppenheimer, 2008). Also, and across the three experiments the Linguistic Context did not affect participants' mood, which excludes mood as a possible mediator between Linguistic Context and Construal Level (see Gasper & Clore, 2002; Isen & Daubman, 1984), and consequently, Social Distance.

In both Experiments 1 and 3 significant results were only obtained regarding a specific type of social target – the experimenter. Similar findings were reported in the CLT literature for spatial and temporal distances. Liberman and Förster's (2009b) observed that priming level of construal affected spatial distance estimates between the participant and a sticker in the room, but it did not impact the spatial distance estimates between the experimenter and a marked desk in the room. Consistently, level of construal did not affect estimates of temporal distance that were not anchored on now (e.g., "*How much time after receiving an invitation would you go to the dentist?*"). Our results replicate these findings, but this time with Social Distance judgments, namely construal level did not affect social distance judgments when the evaluated social targets were not anchored in the present situation.

Contrary to what was observed in Experiment 1, in Experiment 3 a direct effect of Language on Social Distance did not emerge. One possible explanation is that Familiarity ratings and Resources Allocation constitute different measures of the same construct of Social Distance. Moreover, Resources Allocation implies an action. To give more to someone while remaining with less constitutes a cost to the self, while passively evaluating someone's familiarity does not constitute a loss. It is possible that to be willing to incur in costs to the self implies a really high social proximity from a target, whereas evaluating someone as familiar or similar to the self does not require being so close to someone. We believe it would be important to replicate these findings and to investigate whether these measures, sometimes used indiscriminately, differ in such a way. We also suggest that more direct measures of social distance, such as the Inclusion of Other in the Self Scale (IOS; Aron, Aron, & Smollan, 1992) should be used.

Considering that nowadays the use of a second language is a common phenomenon and that important decisions are made in this language we recommend that further studies replicate and explore these effects. For example, as the four dimensions of psychological distance – social, temporal, spatial, and hypotheticality - are interrelated (e.g., Bar-Anan, Liberman, Trope, & Algom, 2007) we suggest that the effects of Linguistic Context on Social Distance should be replicated in further studies for the other dimensions of psychological distance. This work extends bilingualism literature by revealing the relation between linguistic context and social distance. Moreover, the effects of the linguistic context on both conceptual and perceptual processing provide strong support to our claim that linguistic

context affects construal-level. Finally, our results extend the embodiment literature typically based on findings from a native-language, to a second-language.

CHAPTER FIVE:

SIMULATING AND EVALUATING THE AFFECTIVE CONTENT OF SENTENCES: THE ROLE OF LANGUAGE AND GROUP MEMBERSHIP

Communication is what confers a unique social essence to human interactions. It allows us to share experiences, express intentions, understand each other's thoughts and feelings and ultimately to relate with others (Vaughan & Hogg, 2014). Nowadays people communicate in a highly technologic multicultural world, where face-to-face interactions are losing preponderance to the written word, and the use of a second language is an increasingly common phenomenon (e.g., European Commission Special Eurobarometer, 2006, 2012; U.S. Census Bureau, 2010, 2013). Since socio-cognitive processes and affective experience cannot be fully understood without considering the physical and social contexts where they take place (see for review, Garrido, Azevedo, & Palma, 2011; Semin & Garrido, 2015; Semin, Garrido, & Palma, 2012, 2013; Semin & Smith, 2002; Smith & Semin, 2004, 2013), contextual cues should be considered when investigating linguistic communication.

The goal of the present article is to advance our understanding on the influence of contextual cues such as *group membership* and the *language* one is using on affective linguistic communication. Specifically, the present research was designed to investigate the impact of processing affective information about different social groups (in-group and out-group) in a native (L1) or second (L2) language. First, we will argue that since more positive attitudes (e.g., Likowski, Mühlberger, Seibt, Pauli, & Weyers, 2008) and affect (e.g., Otten & Moskowitz, 2000) are directed towards in-group than out-group members, group membership should impact both judgments and simulation of sentences describing social targets in emotional situations. The second assumption regards the grounding mechanisms of affective language in L1 and L2. As we shall argue, L1 and L2 are not embodied in the same way (e.g., Foroni, 2015), and thus judgments and simulation of emotional sentences should be different across languages. Finally, considering the last two assumptions, we will argue that the differences in judgments and simulation of emotional sentences regarding in-group and out-group targets should be enhanced when using L1 and reduced when using L2.

Judgments and group membership

Our first argument relies on the fact that people classify themselves into distinct social groups. The social categorization process provides the grounds for the distinction between *us* (the in-group) and *them* (the out-group), which is acknowledged as a sufficient condition to elicit *in-group favoritism* - the tendency to favor one's own group and its members over an out-group and its members (e.g., Tajfel, Billig, Bundy, & Flament, 1971; Tajfel & Turner, 1979; see for review Vala & Costa-Lopes, 2015). This in-group bias is reflected into different judgments (e.g., Wang et al., 2014), behaviors (e.g., Turner, Brown, & Tajfel, 1979) and even

in distinct patterns of facial mimicry (e.g., Bourgeois & Hess, 2008) elicited by social targets belonging to different social groups.

In-group favoritism is expressed in many different ways, namely in more positive attitudes (e.g., Likowski et al., 2008) and affect (e.g., Otten & Moskowitz, 2000) towards in-group compared to out-group members. Moreover, more positive characteristics are ascribed to in-group members (e.g., Dovidio & Gaertner, 1993; Perdue, Dovidio, Gurtman, & Tyler, 1990; Rustemli, Mertan, & Ciftci, 2000), and their negative behaviors are less remembered than out-group members' behaviors (e.g., Howard & Rothbart, 1980). Behaviorally, people tend to allocate more resources to in-group than out-group members (e.g., Turner, Brown, & Tajfel, 1979), even when group membership is artificially created (e.g., Billig & Tajfel, 1973; Tajfel et al., 1971).

Importantly for this work, previous research consistently found that group membership influence judgments of emotional facial expressions. For instance, when asked to choose the facial expression that would be more appropriate in emotionally neutral situations, European descents attributed more often neutral faces to the out-group, and more often and more intense smiles to the in-group (Beaupré & Hess, 2003). Furthermore, Hutchings and Haddock (2008) have found that White (in-group) participants rated racially ambiguous angry faces as more likely to be Black (out-group) compared to either racially ambiguous neutral or racially ambiguous happy faces. The same authors found that participants scoring high in implicit prejudice judged the *same* racially ambiguous angry faces as being emotionally more intense when they judged them as out-group rather than in-group members. Consistently, in another study from Wang and colleagues (2014), Chinese participants judged the out-group (White) negative expressions - anger, sadness and fear - as emotionally more intense than the in-group negative expressions (see also Hugenberg & Bodenhausen, 2003, 2004).

These studies indicate that judgments of emotional facial expressions are influenced by group membership. Additionally, the essential role of group membership is also extensively reported in the emotional mimicry literature.

Emotional mimicry and group membership

The embodied cognition approach sustains that knowledge is grounded in modality-specific systems (e.g., Barsalou, 1999a, 2008; Glenberg, 1997; Semin & Cacioppo, 2008). According to this approach, processing emotional information involves the partial re-

experience (i.e., simulation) of that emotion or particular emotional cue (e.g., Niedenthal, 2007; Niedenthal, Barsalou, Winkielman, Krauth-Gruber, & Ric, 2005; Niedenthal, Winkielman, Mondillon, & Vermeulen, 2009). A large body of research has shown that overlapping areas of the mirror neuron system are activated both when one performs an action and when one observes or understands someone else's actions (e.g., Buccino et al., 2001; Buccino, Binkofski, & Riggio, 2004; see for review Rizzolatti & Craighero, 2004; Rizzolatti, Fogassi, & Gallese, 2001). Indeed, merely observing others' emotional facial expressions activates the same facial muscles in the observer (e.g., Dimberg, 1982, 1990; Dimberg, Thunberg, & Elmehed, 2000), a process known as *emotional mimicry*.

Recently, the automatic nature of mimicry has been challenged and it has been argued that emotional mimicry works as a social regulator (see Hess & Fischer, 2013, 2014), fostering social coordination (e.g., Lakin, Jefferis, Cheng, & Chartrand, 2003), social bonds, understanding and empathy (e.g., Fischer, Becker, & Veenstra, 2012). According to this perspective, patterns of emotional mimicry only become meaningful when the relation between observer and expresser, and the emotion being mimicked are taken into account (e.g., Bourgeois & Hess, 2008; Fischer et al., 2012; Hess & Fischer, 2013).

Individuals are more likely to mimic the emotional reactions of similar ones (vs. dissimilar; e.g., McIntosh, 2006), of liked ones (vs. disliked ones; e.g., Likowski, et al., 2008), and of in-group members (vs. out-group members; e.g., Bourgeois & Hess, 2008; Herrera, Bourgeois & Hess, 1998; Van der Shalk et al., 2011). Additionally, people tend to mimic smiles of strangers to a greater extent than their frowns when they do not have access to any other information (Hinsz & Tomhave, 1991). This happens because smiles are positive and highly affiliative signals. They signal that everything is well, and have low social costs because they do not require an action from the observer. On the contrary, anger expressions signal threat and lack affiliative intent. Mimicking anger expressions may lead to unwanted social signals, which may have social costs for the mimicker (e.g., starting or reinforcing a conflict; e.g., Bourgeois & Hess, 2008; Van der Shalk et al., 2011; see for review Hess & Fischer, 2013). Thus, emotional mimicry depends on the displayed emotion, since different emotions signal distinct affiliative intents and represent different social costs for the observer.

These notions have been supported by research showing that anger displays of in-group members were mimicked to a greater extent than those of out-group members, but only when anger was clearly directed at a common adversary, and not when it was directed at the observer. Importantly, happiness displays were mimicked across in-group and out-group

targets (Bourgeois & Hess, 2008). Van der Schalk and colleagues (2011) replicated these findings verifying that participants mimicked in-group's (vs. out-group's) anger and fear displays to a greater extent, and mimicked in-group and out-group happiness displays to the same extent. Although mimicry of happy faces may overcome group boundaries, it may be reduced or absent when one is facing an enemy or out-group member target of negative attitudes (e.g., McHugo, Lanzetta, & Bush, 1991), even when these are newly formed (e.g., Likowski et al., 2008). Furthermore, negative attitudes towards out-group members may evoke patterns of counter-mimicry (i.e., divergent facial expressions). Some examples of counter-mimicry are smiling when seeing a competitor in pain (Lanzetta & Englis, 1989); smiling at expressions of sadness and frowning at expressions of happiness of out-group members (Herrera et al., 1998); showing fear at out-group anger displays and aversion at out-group fear displays (Van der Schalk et al., 2011).

In conclusion, there is accumulated evidence showing that people simulate the emotions of others and that group membership impacts both simulation and judgments of emotional facial expressions. Importantly, embodied theories suggest that linguistic representations (i.e., words, sentences) of emotions or of emotional facial expressions should give rise to the same emotional simulation processes. However, the role of group membership in modulating these processes remains to be examined.

Simulating language affective content

The embodiment approach to language stresses that language comprehension also involves simulation of action (e.g., Glenberg & Kaschak, 2002), perception (e.g., Stanfield & Zwaan, 2001), and emotion (e.g., Foroni & Semin, 2009). Thus, consistent facial responses are activated in the observer not only when perceiving others' emotional facial expressions, but also by linguistic representations of emotional states (e.g., Foroni & Semin, 2009, 2013; Niedenthal et al., 2009).

Behavioral evidence for this argument comes from studies showing that when participants' facial expressions (i.e., positive or negative emotions) and the valence of sentences with emotional content (e.g., describing a happy or sad situation) matched judgments of sentences valence and sensibility were faster than when they mismatched (Havas, Glenberg, & Rinck, 2007). Moreover, when the activity in the corrugator muscle, responsible for frowning, was blocked the comprehension of sad and angry sentences was impaired (Havas, Glenberg, Gutowski, Lucarelli, & Davidson, 2010). Furthermore, Foroni

and Semin (2009) found that reading emotional expressions (e.g., to smile, to frown) activates the correspondent facial muscles in the perceiver. The authors also verified that reading emotional expressions impacted judgments, but only when the activation of facial responses was not blocked. The same authors (Foroni & Semin, 2013) further found that affective simulation occurs when reading different types of sentences: affirmative sentences ("I am smiling") activated the zygomatic muscle, whereas reading their negation ("I am not smiling") inhibited the muscle activation.

In sum, perceiving someone's facial expression or reading emotion sentences recruit the same neural systems and activate the same somatic responses. Moreover, if contextual cues, such as group membership, modulate emotional mimicry effects when photos or videos of social targets are presented, the same effects should be observed for affective simulation of emotional sentences about social targets belonging to different groups. However, we argue that this should be the case when language comprehension is grounded on the sensorimotor systems and affective states, which is the case of a native language.

Language simulation in L1 and L2

Bilingualism literature presents extensive research showing the stronger emotional intensity of L1 over L2 (see for review Caldwell-Harris, 2014, 2015; Pavlenko, 2012) and the distancing effect of L2 (e.g., Azevedo, Garrido & Semin, 2016b; Bond & Lai, 1986). Although L2 seems to be acquired through the same neural devices responsible for L1 acquisition (Perani & Abutalebi, 2005) and to share the same brain language systems (e.g., Frenck-Mestre, Anton, Roth, Vaid, & Viallet, 2005; Kovelman, Baker, & Petitto, 2008), the socialization histories of both languages are usually distinct which may explain their differences in affective grounding. L1 is usually learned and used in contexts that are affectively laden (i.e., family and peers; e.g., Harris, Gleason, & Ayçiçeğiet al, 2006), and its acquisition and use integrates information received from all sensory modalities, including kinesthetic and visceral (e.g., Pavlenko, 2008). This language is usually learned during childhood when language meaning is closely related to the body (see Azevedo, Garrido & Semin, 2016b). In contrast, L2 is frequently mastered in more emotionally neutral formal settings (i.e.., school, work; e.g., Bond & Lai, 1986), and its acquisition takes place without significant involvement of the majority of sensory modalities (Perani & Abutalebi, 2005).

Differences between L1 and L2 were shown in studies in which bilinguals judged the emotional intensity of positive (e.g., Dewaele, 2004) and negative information (e.g.,

Dewaele, 2004, 2010; Gawinkowska, Paradowski, & Bilewicz, 2013) as stronger in L1 than in L2. These differences were supported by studies reporting higher skin conductance responses (SCRs) for taboo words and childhood reprimands in L1 relative to L2 (e.g., Caldwell-Harris & Ayçiçeği-Dinn, 2009; Harris, Ayçiçeği & Gleason, 2003; Harris et al., 2006). Moreover, decision-making biases were fewer (Costa, Foucart, Arnon, Aparici, & Apesteguia, 2014; Keysar, Hayakawa, & An, 2012) and utilitarian (vs. emotional) choices were more frequent when one is in a L2 rather than in a L1 linguistic context (e.g., Costa, Foucart, Hayakawa et al., 2014; Geipel, Hadjichristidis, & Surian, 2015b). Additionally, moral transgressions (e.g., consensual incest) were judged less harshly in L2 than in L1 (Geipel, Hadjichristidis, & Surian, 2015a). Finally, affective priming and interference effects were found in L1 but were absent or reduced in L2 (e.g., Degner, Doycheva & Wentura, 2012; Segalowitz, Trofimovich, Gatbonton & Sokolovskaya, 2008).

Taken together, the presented evidence indicates that affective processing is less intense and less automatic in L2. However, only recently this question has been addressed within an embodied/grounded cognition framework. It has been argued that due to their socialization histories L1 and L2 are differently grounded on the perceptual-motor and somatovisceral systems, resulting in different simulations of affective experience and judgments in each of these languages.

Azevedo, Garrido and Semin (2016a) argued that sensorimotor mechanisms grounding affective communication might be responsible for the observed differences in emotional intensity between L1 and L2. Using an affective priming paradigm presenting valenced words as primes and targets, they have found the typical affective priming effect (faster responses when the prime-target's valence matched) in L1 but not in L2, despite the equal hit rates observed in both languages (Experiment 1). In Experiment 2 they have used words-photos (facial expressions) and photos-words pairs as primes and targets. Notably, when photos were introduced, the affective priming effect emerged in both languages suggesting that processing facial expressions overruled the lack of affective grounding associated to L2. Moreover, Azevedo and colleagues (2016b) found that a social target (the experimenter) was judged as more socially distant when participants where in L2 rather than L1 linguistic context. Notably, this effect was only found for participants who were L2 Late Bilinguals (LBs) for whom L2 is not affectively grounded. The authors also found that the mechanism explaining the relation between L2 and social distance for LBs was a more

abstract level of information processing (both conceptual and perceptual), a characteristic associated to disembodied cognition (see Maglio & Trope, 2012).

Finally, while positive affirmative sentences ("I am smiling") activated and negation sentences ("I am not smiling") lead to a relaxation of the zygomatic muscle (Foroni & Semin, 2013) when presented in L1, in L2 affirmative sentences activated the zygomatic muscle but negation sentences did not produce a relaxation in this muscle (Foroni, 2015). These results suggest that processing emotional language in L1 relies on simulation of the language affective meaning, whereas such simulation is reduced or does not happen to the same extent in L2, at least for more abstract and complex type of information (i.e., negation).

5.1. Overview

Research has shown that more negative judgments and less (or divergent) emotional mimicry are activated by out-group (vs. in-group) members' emotional facial expressions. Notably, these results are expected when out-group members are target of negative evaluations and attitudes.

Our first study was conducted to identify the social groups that are more positively and negatively evaluated by Portuguese participants. For this purpose we examined the perceived identification, similarity, belonging and attitudes towards several social groups in the Portuguese society. Based on these evaluations we aimed to select two social groups to represent the in-group and the out-group in the subsequent experiments.

Experiments 1 and 2 examined the impact of *group membership* and *language* on affective simulation and judgments of sentences with emotional content. Different studies on intergroup relations have shown that positive (negative) facial expressions are attributed more often and judged as more intense when displayed by in-group (out-group) members (e.g., Beaupré & Hess, 2003; Hutchings & Haddock, 2008). In Experiment 1 we aimed to replicate these results using a different methodology. Participants were asked to judge the intensity, probability and valence of sentences describing in-group and out-group members in emotionally positive (i.e. happiness) and negative (i.e., anger) situations. Moreover, based on the assumption that L1 and L2 are embodied in different ways (e.g., Foroni, 2015; Azevedo et al., 2016a,b), sentences were presented both in participants' L1 and L2. In our second experiment participants performed this same task while the activity of their *corrugator supercilii* and *zygomatic major* muscles was recorded.

In Experiments 1 and 2 we expected higher intensity and probability, and more positive judgments of sentences describing in-group (vs. out-group) targets in positive emotional situations, while higher intensity and probability, and more negative judgments were expected for out-group (vs. in-group) targets in negative emotional situations. Furthermore, in line with the emotional mimicry literature (e.g., Bourgeois & Hess, 2008; Van der Schalk et al., 2011), in Experiment 2 we expected that sentences describing in-group members in anger and happiness situations would be simulated to a greater extent than sentences describing out-group members in the same emotional situations. Furthermore, since L2 lacks affective grounding (e.g., Azevedo et al., 2016a,b) affective simulation and judgments of both positive and negative sentences were expected to be stronger and more extreme when sentences were presented in L1 (vs. L2).

Finally, we considered the joint impact of group membership and language on simulation and judgments. The affective content of words (e.g., Azevedo et al., 2016a) and sentences (e.g., Foroni, 2015) is processed more automatically and to a greater extent in L1 than in L2, because the former is supposed to be more affectively grounded. Thus, the affective content of sentences describing the in-group (e.g., positive, liked, familiar, similar, proximal to the self) and the out-group (e.g., negative, disliked, non-familiar, non-similar, distant from the self) should be activated more automatically and in a stronger way in L1 (vs., L2), producing a higher affective differentiation between in-group and out-group targets. Hence, differences in simulating and judging sentences regarding the in-group and the out-group are expected to be enhanced in L1.

5.2. Pilot Study

In this pilot we aimed to explore the perceptions of a Portuguese sample regarding several social groups. Specifically we wanted to identify which were the social groups perceived as more/less socially distant, more/less similar, evaluated with the lower/higher degree of identification and belonging, and target of the most negative/positive attitudes.

5.2.1. Method

Participants

Thirty-five Portuguese white students (91.4% female; *Mean age* = 21. 23, *SD*= 6.60) of ISCTE-IUL agreed to voluntarily participate in this study. Four non-white participants and

one with double nationality (Portuguese and Spanish) were excluded from the analyses. In the end 30 participants were considered in the analyses.

Materials and Procedure

Participants voluntarily participated in the pilot study during class and all the procedures were in line with the ethical guidelines of the host institution. In the beginning of the questionnaire participants could read "Our social life implies that we all belong to one or more groups. From these various groups stand out those based on nationality (e.g., Portuguese, Spanish, German, Chinese, etc.), on ethnicity (e.g., Caucasians, Africans, Asians, Gypsies, etc.), on race (e. g, white, black, etc.), religion (e.g., Catholics, Jews, Muslims, Hindus, etc.), among others".

Afterwards participants were asked to fill in several scales evaluating the following groups*:* Portuguese, Caucasian, Africans, Asians, Chinese, Indians, Gypsies, Germans, Brazilians, Eastern Europeans, Arabs, and Spanish. First, they filled the Self-Group Overlap item of the Overlap of Self, In-group, and Out-group (OSIO; Schubert & Otten, 2002).

Specifically, participants were asked to choose one of the seven pictorial representations of closeness for each of the groups, with higher ratings meaning higher overlap between the self and the group and lower ratings meaning higher distance between the self and the group. Furthermore, participants were told to identify, using 7-point scales their a) degree of identification (1 - *Low identification*; 7 - *High identification*); b) perceived similarity (1 - *Very different*; 7 - *Very similar*); c) belonging (1 - *No belonging*; 7 - *High belonging*); d) and attitudes (1 - *Very negative*; 7 - *Very positive*) towards the above mentioned groups (see Appendix C).

5.2.2. Results and Discussion

We contrasted the social distance, identification, similarity, belonging and attitudes' ratings of each group against all the other groups using paired samples t-tests (see Table 3).

Table 3. *Means (and Standard Deviations) of Ratings of Social Distance (SDist), Similarity (Sim.), Identification (Ident.), Belonging (Bel.) and Attitudes (Atti.) Towards Different Social Groups.*

	Caucasian	Portuguese	Spanish	Brazilian	African	Eastern European	German	Asian	Indian	Chinese	Arab	Gypsy
SDist.	6.07^{a}	5.93^{a}	4.43^{b}	4.23^{b}	4.27^{b}	3.43^{c}	3.23^{cd}	3.13^{cd}	3.00^{cd}	2.90^{d}	2.57^{e}	2.20^{f}
	(1.34)	*(1.53)*	*(1.43)*	*(1.50)*	*(1.51)*	*(1.55)*	*(1.55)*	*(1.43)*	*(1.60)*	*(1.45)*	*(1.43)*	*(1.27)*
Sim.	6.50^{a}	6.47^{a}	5.33^{b}	4.77^{b}	4.20^{c}	3.67^{c}	3.90^{c}	3.23^{d}	3.20^{d}	3.13^{de}	2.87^{e}	2.37^{f}
	(0.90)	*(1.20)*	*(1.40)*	*(1.38)*	*(1.47)*	*(1.65)*	*(1.69)*	*(1.63)*	*(1.73)*	*(1.68)*	*(1.57)*	*(1.47)*
Ident.	6.30^{a}	6.20^{a}	5.03^{b}	4.53^{bc}	4.37^{c}	3.63^{d}	3.60^{d}	3.27^{de}	3.13^{ef}	3.03^{f}	2.63^{g}	2.33^{g}
	(1.06)	*(1.32)*	*(1.33)*	*(1.46)*	*(1.35)*	*(1.54)*	*(1.63)*	*(1.31)*	*(1.59)*	*(1.33)*	*(1.30)*	*(1.60)*
Bel.	6.50^{a}	6.60^{a}	4.70^{b}	4.30^{b}	3.47^{c}	2.97^{cd}	3.30^{c}	2.60^{e}	2.67^{de}	2.53^{ef}	2.37^{fg}	2.07^{g}
	(1.07)	*(0.97)*	*(1.53)*	*(1.60)*	*(1.76)*	*(1.76)*	*(1.74)*	*(1.75)*	*(1.77)*	*(1.74)*	*(1.45)*	*(1.51)*
Atti.	6.37^{a}	6.27^{a}	5.67^{b}	5.00^{c}	5.47^{b}	4.50^{d}	4.70^{cd}	4.80^{cd}	4.73^{cd}	4.63^{cd}	3.90^{e}	2.93^{f}
	(0.96)	*(1.11)*	*(0.99)*	*(1.36)*	*(1.36)*	*(1.59)*	*(1.66)*	*(1.63)*	*(1.55)*	*(1.67)*	*(1.59)*	*(1.68)*

Note. Means with the same superscript within rows are not significantly different at the $p < .05$.

Portuguese and Caucasians were the groups evaluated as closer (all *ps* < .001) and more similar to the self (all *ps* < .001), as well as the groups with which participants mostly identified with (all *ps* < .001), felt they belong to (all *ps* < .001), and towards which participants expressed the most positive attitudes (all *ps* ≤ .001), with no significant differences observed between these two groups in all measures. In contrast, Gypsies were evaluated as the most socially distant (all *ps* ≤ .025) and less similar to the self (all *ps* < .05), and the target of the most negative attitudes (all *ps* ≤ .001). Gypsies (and Arabs) were also the groups towards which participants reported the lowest degree of identification (all *ps* < .01) and belonging (all *ps* < .05).

This data is consistent with previous studies showing the persistence of blatant racism against Gypsies around the world, and particularly in Portugal. While subtle racism, the most common expression of racism, is characterized by the absence of positive sentiments and the denial of positive emotions to out-group members, blatant prejudice is characterized by the presence of strong, overtly negative attitudes and evaluations, towards out-groups (e.g., Pettigrew & Meertens, 1995). People tend to present more frequently and overtly in-group favorable rather than out-group unfavorable evaluations because the latter is considered anti-

normative (see for a review on *positive-negative asymmetry*, Mummendey & Otten, 1998; Otten & Mummendey, 1999).

Participants' evaluations are in line with previous studies showing that while most minorities are target of subtle racism (see Pettigrew & Meertens, 1995) in the United States (e.g., Gaertner & McLaughlin, 1983) and Europe (e.g., Vala, Brito, & Lopes, 1999a,b) that does not seem to be the case of Gypsies. More specifically, in Portugal, while subtle racism has predominance against blatant prejudice for the majority of social groups (e.g., Blacks; Vala, 1999; Vala, Brito, & Lopes, 1999a,b), blatant racism against Gypsies seems to persist (e.g., Correia, Brito, Vala, & Pérez, 2005).

In our pre-test the evaluations about the Gypsy group expressed this blatant prejudice, with participants presenting overtly negative judgments and attitudes towards this social group (Gypsies were rated below 3 in all 7-point scales). Considering these results, Portuguese Caucasian was chosen to be the in-group and Portuguese Gypsy was chosen to be the out-group in the subsequent experiments. The targets' nationality (Portuguese) was kept constant, so that the ethnicity was the only characteristic of group membership to be manipulated.

5.3. Experiment 1

Experiment 1 examines whether the judgments of intensity, probability and valence of emotional sentences were influenced by group membership (in-group or out-group) and language (L1 or L2). The blatant prejudice against Gypsies in Portugal should impact judgments, namely judgments of intensity and probability should be higher and judgments of valence should be more positive for sentences describing in-group (vs. out-group) targets in emotionally positive situations (i.e., happiness), while judgments of intensity and probability should be higher and judgments of valence should be more negative for sentences describing out-group (vs. in-group) targets in emotionally negative situations (i.e., anger). We also expected more extreme judgments in L1 (vs. L2), and that differences in evaluations of in-group and out-group sentences would be accentuated in L1, since the processing of affective content is more intense and automatic in this language.

5.3.1. Method

Participants and Design

Eighty students (67.6% female; *Mean age* = 23.39, *SD* = 5.17) of ISCTE-IUL participated in this study in exchange for course credit. Six participants were excluded from the analyses. Two because their first language was not Portuguese and four because their L2 age of acquisition was ≤ 4 years old. For these Early Bilinguals both languages are expected to be similarly embodied (see Azevedo et al., 2016b) and thus should not have different impact on judgments. The experiment had a 2 (*Emotion*: Anger vs. Happiness) X 2 (*Group Membership*: In-group vs. Out-group) X 2 (*Language*: L1 vs. L2) within-participants design.

Materials

A total of 32 sentences, half in L1 (Portuguese) and half in L2 (English) were presented to all participants. Half of the sentences displayed anger-related (Frowning*/Carrancudo(a);* Angry/*Zangado(a*)) and the other half happiness-related (Smiling/*Sorrir*; Happy/*Feliz*) content associated to four social targets. Half of the presented sentences concerned two in-group targets (João and Ana) and the other half two out-group targets (Sandro and Salomé) (see Appendix C). The Intensity of the emotions expressed in the sentence was evaluated in a 7-point scale (from 1- *Not intense at all* to 7- *Very intense*), as well as the Probability of the described emotional situation to happen (1- *Not probable at all;* 7- V*ery probable)*, and the sentence Valence (1- *Very negative;* 7- V*ery positive).*

The attitudes towards the four experimental targets were reported in a 7-point scale (from 1- *I do not like him/her at all* to 7- *I like him/her very much*). The closeness between the self and each experimental target was evaluated with the Inclusion of Other in the Self scale (IOS; Aron, Aron, & Smollan, 1992) and the closeness between the self and each social group was measured with an adaptation of the Self-Group Overlap (Schubert & Otten, 2002). Both measures were 7-point scales in which 1 represents the larger social distance between the self and the target or group, and 7 the strongest perceived social proximity. The Bilingualism and Emotion questionnaire (BEQ; Dewaele & Pavlenko, 2001-2003) was used in the end of the experiment to assess the linguistic variables of interest concerning L1 and L2, such as age of language acquisition, proficiency, frequency of use and context of acquisition.

Procedure

In the informed consent participants could read that the experiment was about impression formation. They were told that impressions are spontaneously formed even when people do not have much information about the social targets. All the procedures were

conducted in line with ethical guidelines of the host institution. In the beginning of the experiment four targets were presented to the participants. They were asked to pay attention to the information because some related questions would be asked in the end of the experiment. They could read "João is a Portuguese Caucasian boy; Ana is a Portuguese Caucasian girl; Sandro is a Portuguese Gypsy boy; Salomé is a Portuguese Caucasian girl". Participants were told they would be presented with several sentences about the four targets in different emotional situations and they should imagine each situation while reading the sentences and form an impression about the target.

In each trial participants saw a blank screen during 3 seconds followed by a fixation point (1 second). Then, an emotion sentence (e.g., Sandro is angry; Ana is smiling) was presented for 3 seconds and after seeing it participants should evaluate its Intensity, Probability and Valence. The order of language presentation was counterbalanced across participants and, in each language block, the order of emotions-related content and target was randomized. After reading and evaluating all emotional sentences concerning the four targets in the two languages, participants were asked to indicate how much they liked each of the four targets and how close they felt from each one of them. Participants were also asked to indicate how close they felt from each social group (Portuguese Caucasian and Portuguese Gypsy). In the end of the experiment participants filled the Bilingualism and Emotion questionnaire (BEQ; Dewaele & Pavlenko, 2001-2003).

5.3.2. Results

Data regarding targets with the same group membership were averaged within-participants. T-tests were performed to assess attitudes and perceived social distance towards the experimental targets, and towards different social groups. All three dependent measures were separately submitted to a 2 (*Emotion*: Anger vs. Happiness) X 2 (*Group Membership*: In-group vs. Out-group) X 2 (*Language*: L1 vs. L2) repeated-measures ANOVA. Bonferroni post-hoc tests were used to explore the interactions. Finally, we used planned t-tests to test our *a priori* hypothesis, namely that the differences in judgments of in-group and out-group sentences would be more emphasized in L1 than in L2 (see Table 4).

Manipulation check

Participants reported to equally like the Portuguese Caucasian (M = 4.82, SD = 0.99) and the Portuguese Gypsy targets (M = 4.72, SD = 1.33), $t(73)$= 0.58, p = .56. However, participants reported feeling closer to the Portuguese Caucasian (M = 3.05, SD = 1.69) than to

the Portuguese Gypsy experimental targets (M = 2.39, SD = 1.45), $t(73) = 3.60$; $p = .001$. Consistently, participants reported feeling closer to the Portuguese Caucasian (M = 5.20, SD = 1.64) than to the Portuguese Gypsy social group (M = 2.82, SD = 1.49) $t(73)= 10.14$; $p < .001$. Importantly, all participants identified correctly the targets' ethnicity in the end of the experiment.

Self-Reports

Intensity. The results revealed an Emotion main effect $F(1, 73) = 55.38$, $p < .001$, $\eta^2 = .43$, with happiness sentences (M = 5.39, SD = 0.98) being evaluated as more intense than anger sentences (M = 4.83, SD = 0.95). Moreover, a significant interaction between Emotion and Language was observed $F(1, 73) = 5.96$, $p = .017$, $\eta^2 = .08$. While happiness sentences were rated as equally intense in L1 (M = 5.35, SD = 1.02) and L2 (M = 5.43, SD = 1.00, $p >$ .20), anger sentences were rated as more intense in L1 (M = 4.90, SD = 1.03) than in L2 (M = 4.76, SD = 0.99) although this difference did not reach significance (p =. 09). None of the other main effects or interactions were significant (all ps = ns). None of the planned t-tests were significant (all ps = ns.).

Probability. The results revealed an emotion main effect $F(1,73) = 43.75$, $p < .001$, $\eta^2 = .37$, with happiness-related situations being rated as more likely to occur (M = 5.25, SD = 0.91) than anger-related ones (M = 4.34, SD = 1.13). This effect was qualified by an interaction between Emotion and Group Membership $F(1,73) = 5.87$, $p = .02$, $\eta^2 = .07$. As expected, happiness-related situations were considered more likely to occur to the in-group (M = 5.34, SD = 0.93) than to the out-group (M = 5.15, SD = 1.02, $p = .02$), and anger-related situations were rated as marginally more likely to happen to the out-group (M = 4.42, SD = 1.17) than to the in-group (M = 4.26, SD = 1.21, $p = .07$). The other main effects and interactions were non-significant (all $ps > .13$). Planned t-tests revealed that happiness situations were considered to be more likely to occur to the in-group (M = 5.37, SD = 1.02) than to the out-group (M = 5.09, SD = 1.14) only when the sentences were presented in L2, $t(73) = 2.91$, $p = .005$. None of the other contrasts reached significance (all ps = ns.).

Valence. Finally, the analysis on valence ratings yielded an emotion main effect $F(1,73) = 255.95$, $p < .001$, $\eta^2 = .78$, with happiness-related sentences (M = 5.67, SD = 0.86) being evaluated as more positive than anger-related sentences (M = 2.83, SD = 0.87). Furthermore, a Group Membership main effect also emerged $F(1,73) = 10.53$, $p = .002$, $\eta^2 = .13$, with in-group sentences (M = 4.31, SD = 0.44) being evaluated more positively (less

negatively) than out-group sentences (M = 4.19, SD = 0.43). The other effects did not reach significance (all ps > .24). Planned t-tests revealed that anger sentences were considered significantly more negative when the target was an out-group (M = 2.80, SD = 0.93) rather than an in-group (M = 2.95, SD = 0.94) member, only when the sentences were presented in L2, $t(73) = 2.40$, $p = .02$. None of the other contrasts reached significance (all ps = ns.).

Table 4. *Means (and Standard Deviations) for Intensity, Probability and Valence Ratings as a Function of Group Membership and Language.*

	L1			L2		
	In-group	Out-group	*t*	In-group	Out-group	*t*
Intensity						
Happiness	5.36 (1.07)	5.33 (1.05)	*0.50*	5.48 (1.04)	5.38 (1.06)	*1.36*
Anger	4.85 (1.13)	4.95 (1.06)	*-1.22*	4.79 (1.05)	4.72 (1.04)	*0.88*
Probability						
Happiness	5.32 (0.91)	5.21 (1.03)	*1.18*	5.37 (1.02)	5.09 (1.14)	*2.91***
Anger	4.27 (1.33)	4.42 (1.23)	*-1.47*	4.25 (1.23)	4.43 (1.23)	*-1.88*
Valence						
Happiness	5.75 (0.97)	5.62 (0.96)	*1.82*	5.71 (0.94)	5.60 (0.91)	*1.55*
Anger	2.82 (1.07)	2.75 (1.03)	*1.12*	2.95 (0.94)	2.80 (0.93)	*2.40**

Note. * = $p < .05$, ** = $p < .01$.

Results from Experiment 1 revealed that, as expected, group membership plays an important role in the evaluation of positive and negative emotional content. However, the role of language, and the joint impact of language and group membership in these judgments was not clear. Our pattern of results is consistent with studies showing that explicit measures (i.e., self-reports) do not always assess objectively the true affective experience triggered by L1 and L2, as it was revealed by the discrepancies in results between data from self-reports and from psychophysiological measures (e.g., Caldwell-Harris & Ayçiçeği-Dinn, 2009). Therefore in Experiment 2 we used implicit measures to examine affective experience towards in-group and out-group in L1 and L2.

5.4. Experiment 2

In Experiment 2 we aimed to extend the findings from Experiment 1 by examining the role of group membership, language and the joint impact of language and group membership on both affective simulation and judgments. Since conclusions drawn exclusively from self-

report data might be distorted or biased, and might be considered only indirect evidence of emotional strength, we considered that a more direct and implicit measure of emotional experience (EMG) would be more adequate to fully understand the impact of group membership and language on affective simulation. Thus, in the following experiment both self-reports and EMG will be used.

We predicted that in-group positive (out-group negative) sentences would be evaluated with higher intensity, probability and more positive (negative) valence. Moreover, sentences would elicit larger activation of the respective muscles (i.e., larger corrugator activity for anger-related sentences, and larger corrugator relaxation and zygomatic activity for happiness-related sentences) when presented in L1 than in L2, since simulation of affective content is impaired in L2 (e.g., Foroni, 2015; Azevedo et al., 2016a). Finally, we predicted that differences in simulating in-group and out-group sentences (i.e., larger and more convergent patterns of facial activation for in-group sentences) would be enhanced in L1 (vs. L2), since affective processing, and thus affective responses, should be more automatic and stronger in this language.

5.4.1. Method

Participants and Design

Thirty-eight white female students (*Mean age* = 22.71; *SD* = 5.97) from ISCTE-IUL participated in this study in exchange for course credit. Six participants were excluded from further analyses: two due to technical problems during EMG recordings and four because their L2 age of acquisition was between 1 and 4 years old. For these Early Bilinguals both languages were expected to be similarly embodied and thus linguistic context should not moderate emotional mimicry. The experiment had a 2 (*Emotion*: Anger vs. Happiness) X 2 (*Group Membership*: In-group vs. Out-group) X 2 (*Language*: L1 vs. L2) within-participants design.

Materials and Procedure

Materials and procedure were the same as in Experiment 1. The only difference was the recording of psychophysiological indicators (i.e., EMG). In the informed consent participants were told that people are able to form impressions about other people spontaneously, and that studies indicated that impression formation and body temperature were related. Therefore, during the experiment, electrodes would be measuring their bodily temperature. We used this cover story to reduce the possibility that participants were aware

that electrodes were measuring their facial expressions. After signing the informed consent, the electrodes were attached to the participants' faces. All the procedures were conducted in line with the ethical guidelines of the host institution.

Facial EMG data recording and treatment

Activity of the corrugator supercilii and the zygomatic major muscles was recorded on the left side of the face using bipolar placements of 13/7 mm Ag/AgCl surface-electrodes, and all pairs were referenced to a forehead electrode placed near the midline (Fridlund & Cacioppo, 1986). The impedances of all electrodes were reduced to less than 10 kOhm. The raw EMG signal was measured with a BIOPAC-EMG- 100C module amplified with a Gain of 1000 Hz, and a sampling frequency of 1000 Hz. Raw data was filtered online with a 10-500 Hz bandpass filter, and a 50 Hz notch filter.

The raw EMG data was Root Mean Squared offline and integrated with a 250ms time constant. The signals were screened for movement and electrical artifacts. Trials containing artifacts (5.03%) were removed prior to analysis. Baseline values for each trial were calculated as the average root mean squared EMG activity in the 1000 ms prior to sentence onset, and the trial mean activity was calculated as the average root mean squared EMG activity during the 3000 ms from sentence onset. All EMG data were z-transformed within participants and muscle site attenuating the impact of highly reactive individuals on group scores (Tassinary & Cacioppo, 2000).

The reported EMG activity is a change score expressing the change in activity from the baseline level to the mean activity during sentence presentation. Before statistical analyses, EMG data was collapsed over trials containing the same Muscle (Corrugator, Zygomatic), Emotion (Anger, Happiness), Group Membership (In-group, Out-group), and Language (L1, L2). Patterns consistent with frowning are indicated by corrugator activity and patterns consistent with smiling by corrugator relaxation and zygomatic muscle activation.

5.4.2. Results

Data from targets with the same group membership were averaged within-participants for all the DV's. Paired samples t-tests were used in the manipulation check. The five dependent measures (i.e., intensity, probability, and valence evaluations, as well as corrugator and zygomatic activity) were separately submitted to a 2 (*Emotion*: Anger vs. Happiness) X 2 (*Group Membership*: In-group vs. Out-group) X 2 (*Language*: L1 vs. L2) repeated-measures ANOVA. Bonferroni post-hoc tests were used to explore the interactions. Planned t-tests

were used to test our *a priori* hypothesis, namely that in L1 differences in judgments and affective simulation between sentences describing in-group and out-group targets would be more accentuated than in L2 (see Table 5).

Manipulation check

Participants reported to like more the Portuguese Caucasian (M = 4.88, SD = 0.92) than the Portuguese Gypsy experimental targets (M = 4.27, SD = 1.05), $t(31)$= 2.36; p= .02. Furthermore, the Portuguese Caucasian targets were perceived as closer to the participants (M = 3.38, SD = 1.62) than the Portuguese Gypsy targets (M = 2.33, SD = 1.19), $t(31)$= 4.07; p < .001. Consistently, participants reported to feel closer to the Portuguese Caucasian (M = 5.88, SD = 1.21) than to the Portuguese Gypsy (M = 2.75, SD = 1.24) social group $t(31)$= 10.64; p < .001. Importantly, all participants correctly identified the targets' ethnicity in the end of the experiment.

Self-Reports

Intensity. Results revealed an Emotion main effect $F(1, 31) = 26.95$, $p < .001$, η^2 = .47, with happiness sentences (M = 5.73, SD = 0.55) being evaluated as more intense than anger sentences (M = 5.07, SD = 0.76). Moreover, an interaction between Emotion and Group Membership was also observed, $F(1, 31) = 6.06$, p = .02, η^2 = .16. In-group happiness sentences (M = 5.88, SD = 0.58) were rated as marginally more intense than out-group happiness sentences (M = 5.58, SD = 0.81; p = .07), with no differences between groups registered for anger sentences (M = 5.09, SD = 0.80 vs. M = 5.06, SD = 0.80; p = .78). None of the other main effects or interactions were significant (all Fs < 1.98, all ps > .16). None of the planned t-tests were significant (all ps = ns.).

Probability. The analysis revealed an Emotion main effect $F(1, 31) = 31.74$, $p < .001$, η^2 = .51, with sentences describing happiness situations being rated as more likely to occur (M = 5.27, SD = 0.86) than sentences describing anger situations (M = 4.25, SD = 1.14). This effect was qualified by an interaction between Emotion and Group Membership $F(1, 31)$ = 7.99, p = .008, η^2 = .20. As expected, happiness situations were rated as more likely to happen to the in-group (M = 5.46, SD = 0.97) than to the out-group (M = 5.09, SD = 1.00; p = .04), and anger situations were rated as more likely to happen to the out-group (M = 4.37, SD = 1.14) than to the in-group (M = 4.14, SD = 1.20; p = .02). The remaining main and interaction effects were non-significant (all Fs < 1.94, all ps > .17). Planned t-tests revealed that happiness situations were judged as more likely to happen to the in-group (M = 5.48, SD

= 0.99) than to the out-group (M = 5.02, SD = 0.96) only in L1, ($t(31) = 2.96$, $p = .006$) and anger situations were judged as more likely to happen to the out-group (M = 4.36, SD = 1.05) than to the in-group (M = 4.17, SD = 1.10) targets only in L2, ($t(31) = -2.52$, $p = .02$). None of the remaining planned t-tests was significant (all *ps* = ns.).

Table 5. *Means (and Standard Deviations) for Intensity, Probability and Valence Ratings as a Function of Group Membership and Language.*

	L1			L2		
	In-group	Out-group	*t*	In-group	Out-group	*t*
Intensity						
Happiness	5.83 (0.63)	5.60 (0.73)	*1.62*	5.92 (0.59)	5.55 (1.03)	*1.85*
Anger	5.11 (0.84)	5.03 (0.92)	*0.67*	5.06 (0.85)	5.09 (0.80)	*-0.34*
Probability						
Happiness	5.48 (0.99)	5.02 (0.96)	*2.96***	5.44 (0.98)	5.16 (1.15)	*1.34*
Anger	4.11 (1.36)	4.38 (1.34)	*-1.88*	4.17 (1.10)	4.36 (1.05)	*-2.52**
Valence						
Happiness	6.20 (0.50)	5.85 (0.75)	*2.54**	6.16 (0.53)	5.98 (0.70)	*1.38*
Anger	2.30 (0.74)	2.33 (0.64)	*-0.19*	2.37 (0.57)	2.40 (0.62)	*-0.38*

Note. * = $p < .05$, ** = $p < .01$.

Valence. The analysis yielded an Emotion main effect, $F(1, 31) = 673.95$, $p < .001$, $\eta^2 = .96$, with happiness sentences (M = 6.05, SD = 0.44) being evaluated as more positive than anger sentences (M = 2.35, SD = 0.54). Furthermore, a Group membership marginal main effect was also observed $F(1, 31) = 3.71$, $p = .06$, $\eta^2 = .11$, with in-group sentences (M = 4.26, SD = 0.32) being evaluated more positively (less negatively) than out-group sentences (M = 4.14, SD = 0.34). Planned t-tests revealed that happiness sentences were considered more positive for in-group (M = 6.20, SD = 0.50) than out-group (M = 5.85, SD = 0.75) but only in L1, $t(31) = 2.54$, $p = .02$.

Facial EMG

Zygomatic. An Emotion main affect was observed, revealing that happiness sentences evoked overall larger zygomatic activity (M = 0.27, SD = 0.54) than anger sentences did (M = 0.02, SD = 0.18), $F(1, 31) = 7.92$, $p = .008$, $\eta^2 = .20$. None of the other main effects or interactions reached significance (all $Fs < 2.18$, all $ps > .15$). None of the planned t-tests was significant (all $ps > .16$).

Corrugator. Results indicated an Emotion main effect $F(1, 31) = 8.48$, $p = .007$, $\eta^2 = .21$, with anger sentences evoking overall larger corrugator activity ($M = .08$, $SD = .34$) than happiness sentences ($M = -0.14$, $SD = 0.26$). Moreover, a Language main effect was observed $F(1, 31) = 6.80$, $p = .01$, $\eta^2 = .18$, with L1 sentences resulting in larger corrugator activity ($M = 0.02$, $SD = 0.22$) than L2 sentences ($M = -0.08$, $SD = 0.25$). These effects were qualified by an interaction between Emotion and Language $F(1, 31) = 4.30$, $p < .05$, $\eta^2 = .12$. As expected, anger sentences lead to larger corrugator activity in L1 ($M = 0.18$, $SD = 0.38$) than in L2 ($M = - 0.01$, $SD = 0.37$; $p = .001$). No differences were observed in the simulation of happiness sentences in L1 ($M = - 0.14$, $SD = 0.34$) and L2 ($M = - 0.14$, $SD = 0.28$; $p > .90$). Interestingly, in L1 the corrugator activity was responsive to the sentences' affective content, as expressed in a larger activation of the muscle for anger than happiness sentences ($p = .004$), while in the L2 condition no differences in activation were registered for anger and happiness sentences ($p > .05$).

Moreover, an interaction between Emotion and Group Membership was also observed $F(1, 31) = 9.67$, $p = .004$, $\eta^2 = .24$. As predicted, in-group anger sentences elicited larger corrugator activity ($M = 0.14$, $SD = 0.40$) than out-group anger sentences ($M = 0.02$, $SD = 0.35$; $p < .04$). A consistent pattern of results was found for happiness sentences, with in-group happiness sentences evoking a marginally ($p = .056$) larger corrugator relaxation ($M = -0.18$, $SD = 0.30$), than out-group happiness sentences ($M = -0.10$, $SD = 0.25$. Notably, while in-group anger sentences evoked larger corrugator activation than in-group happiness sentences ($p = .001$), no differences in activation were found for out-group anger and out-group happiness sentences ($p > .10$). The higher order three-way interaction did not reach statistical significance $F(1, 31) = 1.19$, $p = .28$, $\eta^2 = .04$.

Furthermore, we tested our specific hypotheses about group membership and language effects (see Figure 7). No differences were observed in corrugator activity between in-group anger sentences ($M = 0.20$, $SD = 0.47$) and out-group anger sentences ($M = 0.15$, $SD = 0.45$), when sentences were presented in L1, $t(31) = 0.59$, $p = .56$. Surprisingly, when sentences were presented in L2, in-group anger sentences ($M = 0.08$, $SD = 0.51$) elicited larger corrugator activity than out-group anger sentences ($M = -0.10$, $SD = 0.37$), $t(31) = 2.17$, $p = .038$. None of the planned t-tests was significant for happiness sentences (all $ps > .16$).

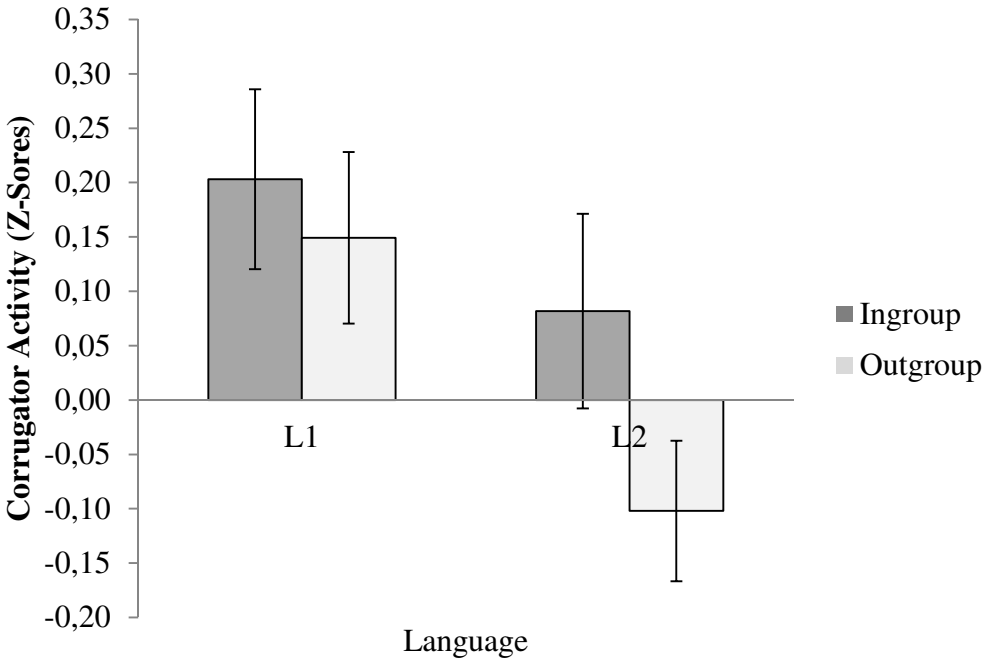

Figure 7. Change scored corrugator activity (z-transformed) and standard errors for anger sentences as a function of group membership and language.

Based on the obtained results we explored *a posteriori* the differences in sentence simulation between the out-group anger sentences presented in L2 (the condition with smaller activation) and the other two remaining conditions. Namely, out-group anger sentences presented in L2 (M = -0.10, SD = 0.37) elicited lower corrugator activity than out-group anger sentences (M = 0.15, SD = 0.45); p = .003) and in-group anger sentences (M = 0.20, SD = 0.47; p = .001) presented in L1. Moreover, we explored the final remaining comparison. Namely, although in-group anger sentences evoked larger corrugator activation when presented in L1 than when presented in L2, this difference did not reach significance (p > .55).

Thus, out-group anger sentences presented in L2 were the ones evoking the smallest corrugator activity. Particularly, contrary to the other three conditions, out-group anger sentences presented in L2 evoked a relaxation of the corrugator muscle, a pattern that is consistent with smiling.

5.5. General Discussion

The present research was designed to investigate differences in affective experience and judgments of emotional sentences depending on the targets' group membership and the

language in use. Despite the relevance of contextual cues for the understanding of socio-cognitive and affective processes, the impact of group membership and language on sentence simulation is still under-investigated. Moreover, emotional mimicry studies typically present photos or videos of emotional facial expressions, even though linguistic representations of emotions (i.e., words, sentences) activate the same somatic patterns of facial activation in the reader. Finally, to the best of our knowledge, only one study (Foroni, 2015) has compared the simulation of affective content (measured with EMG) in L1 and L2 (see Foroni & Semin, 2013).

In our pilot study we observed that Gypsies were the social group perceived as more socially distant, less similar, rated with the least degree of identification and belonging and target of the most negative explicit attitudes by our Portuguese sample. Hence we have chosen the Portuguese Caucasians to represent the in-group and the Portuguese Gypsies to represent the out-group in our two experiments.

Overall, in Experiments 1 and 2 we have confirmed our predictions about the role of group membership on judgments and affective simulation of emotional sentences. Namely, in both experiments, happiness-related situations were considered to be more likely to occur to the in-group targets, while anger-related situations were considered more likely to occur to the out-group targets. These findings are consistent with evidence presented in the intergroup relations literature showing that in-group members are generally associated with more positive, and out-group members with more negative emotional facial expressions (e.g., Beaupré & Hess, 2003; Hutchings & Haddock, 2008). Our data on valence self-reports, usually absent in previous studies, shows a general higher positivity associated to the in-group, and a general higher negativity associated to the out-group, which is consistent with previous findings using different measures (e.g., Dovidio et al., 1993; Likowski et al., 2008; Otten & Moskowitz, 2000; Rustemli et al., 2000).

Extending the findings of emotional mimicry literature to the use of linguistic stimuli, we found, as expected, that anger and happiness sentences evoked more affective simulation when referring to in-group rather than to out-group members. Interestingly, while in-group sentences elicited simulation of affective meaning, as shown by differences in corrugator activity evoked by anger and happiness sentences, for out-group sentences this pattern was not observed.

However, our prediction concerning the impact of language and the joint impact of language and group membership on affective simulation and judgments were only partially confirmed. Regarding the self-report measures, we were faced with the same pattern of inconsistent results previously reported in the literature (e.g., Caldwell-Harris & Ayçiçeği-Dinn, 2009), suggesting that these measures are probably not the most adequate to explore differences in the affective experience triggered by L1 and L2.

As shown in Experiment 2, EMG seems to be a more accurate and direct measure to assess these effects. As predicted, language impacted affective simulation, namely anger sentences evoked larger corrugator activation when presented in L1 than in L2. Interestingly, while in the L1 condition the affective meaning of sentences was simulated, as shown by differences in corrugator activity evoked by anger and happiness sentences, in L2 affective meaning did not seem to be simulated, at least to the same extent. Surprisingly, differences in the simulation of in-group and out-group sentences seemed to be accentuated when the language in use was L2, and not when it was L1. Namely, participants simulated the affective content of in-group anger sentences to a greater extent than out-group anger sentences when these were presented in L2, and not in L1.

Specifically, when participants were presented with out-group anger sentences in L2, a relaxation of the corrugator muscle was observed. Corrugator relaxation is a pattern consistent with smiling, and thus when it is observed as a response to anger-related stimulus could be interpreted as a pattern of counter-mimicry. Counter-mimicry has been found mainly in studies presenting emotional facial displays but it is still under-explored in studies using emotional sentences. Moreover, this specific pattern of counter-mimicry (i.e., smiling when reading about an out-group target that is angry or frowning) is not commonly described in previous studies.

Usually, facing a member of an out-group that is angry elicits fear in the perceiver (e.g., Van der Schalk et al., 2011). We suggest that our pattern of results may be explained by the distance imposed by the written language, by L2, and by out-group members. To *know* that an out-group target is angry but not *seeing* it might have different effects. Specifically, not seeing the target's face imposes distance from the situation, and the anger expression might be interpreted as non-threatening for the self and even elicit positive affect (e.g., "He/she is angry but he/she cannot harm me"), similarly to *Schadenfreude*. This may happen particularly in L2 because it is a language that has already been identified as fostering social distance (see Azevedo et al., 2016b), and for out-group targets that were also perceived as

more socially distant than in-group targets. Thus, the corrugator relaxation evoked by out-group anger sentences presented in L2, may be explained by the fact that counter-mimicry is usually elicited by social targets perceived as socially distant (i.e., out-group members), and that this perceived social distance might be accentuated in the written L2.

Importantly, previous evidence has revealed that L2 simulation is not impaired in all situations and for all types of information. For example, simulation in L2 seems to be particularly impaired for more abstract types of information (e.g., affect - Li et al., 2015; negation - Foroni, 2015). An alternative explanation to the social distance argument is that out-group members are represented and described more abstractly (see Liberman, Trope & Stephan, 2007) and L2 is also processed at a more abstract level (Azevedo et al., 2016b). Thus, maybe simulation was inhibited when out-group anger sentences were presented in L2, because both out-groups and L2 are represented more abstractly, and affective simulation in L2 seems to be impaired for more abstract information.

In future studies these alternative explanations should be explored by measuring the impact of language and group membership on both perceived social distance and the level at which information is represented (i.e., construal-level). Furthermore, we suggest that the activity of other facial muscles could be measured. Zygomatic and corrugator muscles' activity constitutes an index of positive versus negative mood (Larsen, Norris, & Cacioppo, 2003) and not necessarily of discrete emotions. Corrugator activity might signal anger but also fear, and thus the measurement of the frontalis muscle would be recommended to better differentiate these two emotions (see Hess & Fischer, 2013). Moreover, we believe that increasing the sample size would increase the power of our studies, and would also allow exploring possible effects of linguistic variables (e.g., age of L2 acquisition) on affective simulation.

Overall, our findings are potentially relevant for several research domains. First, they are relevant for research with bilinguals, since studies using psychophysiological indicators (particularly EMG) to access emotional experience in L1 and L2 are still scarce. Second, our findings may be relevant for embodiment research since they replicate results showing that language comprehension entails emotion simulation (Foroni & Semin, 2009), and extend these results to the study of L2 and bilingual populations. Third, our results are also informative for the in-group favoritism domain, showing another expression of in-group preference, namely through the use of intensity, probability and valence self-reports concerning positive and negative emotional expressions of in-group and out-group members.

Finally, our findings might have some societal impact. The “Refugees crisis”, “Brexit”, and the ascension of right-wing conservative views often enter our daily lives through the written word, and sometimes in a language that we have learned later in life. Thus, exploring the effects of group membership and language on people’s emotional experiences, empathy, cognitions and behaviors is of preponderant relevance, since it may impact important social and political decisions.

CHAPTER SIX:

GENERAL DISCUSSION

In this last chapter we review our main questions, as well as our specific goals and hypotheses. Then we discuss the significance of the empirical findings in addressing those questions, as well as their theoretical and applied contributions. Finally we identify some of the limitations of our research and advance some possible experimental ways to overcome them.

6.1. Summary and theoretical contributions

The main goal of the present research program was to experimentally examine the grounding of a first-native (L1) and a second-learned language (L2), and how these different languages would impact intra-individual, inter-individual and inter-group processes. Framing our work within a Socially Situated Cognition approach and integrating evidence from embodied cognition and bilingualism fields, in three sets of experiments we investigated whether L1 and L2 are grounded in the same way and the consequences that different groundings might have.

In **Chapter 1** we reviewed two major approaches on language and cognition. First, we briefly described how language and cognition have been framed in the traditional socio-cognitive perspective largely characterized by amodal, symbolic and decontextualized processes (e.g., Collins & Loftus, 1975; Newell & Simon, 1972; Pylyshyn, 1984). Second, we described a more recent perspective, the *Socially Situated Cognition approach* (SSC; see Garrido, Azevedo, & Palma, 2011; Semin & Garrido, 2015; Semin, Garrido, & Palma, 2012, 2013; Semin & Smith, 2002; Smith & Semin, 2004) which argues for a macro level of analysis of the socio-cognitive processes, which considers the joint impact of body, mind, physical and social context on cognition (e.g., Barsalou, et al., 2003; Niedenthal, et al., 2005; Smith & Semin, 2004).

We also discussed the applications of these assumptions to the study of linguistic communication. Specifically, we have argued that a full understanding of the linguistic communication processes would only be possible if one considers that 1) linguistic communication is an emergent phenomenon; 2) language is a tool for adaptive action; 3) language is a tool to distribute and extend cognition, allowing for the offloading of cognition into the environment, individuals and groups; 4) language is a tool for social coupling, and communication is biologically grounded; and 5) language comprehension is embodied, being grounded on sensorimotor experiences. We explored in greater detail the last assumption, reviewing embodiment theoretical accounts of language (e.g., Barsalou, 1999a; 2008),

showing that language processing and comprehension entails at least a partial simulation of perception (e.g., Zwaan & Yaxley, 2003), action (e.g., Glenberg & Kaschak, 2002) and affective states (e.g., Foroni & Semin, 2009).

Most of the ideas presented in Chapter 1 are not new and can be found in the SSC and embodiment of language literatures. However, this chapter constitutes an integrative theoretical effort to apply SSC assumptions to linguistic communication. Our main goal was to have a theoretical framework to guide our own studies but that could also constitute a useful framework for scholars working on SSC, embodiment, language and bilingualism, among others fields.

In **Chapter 2** we examined whether different languages, namely first-native (L1) and second-learned (L2), are grounded in the same way. This chapter had two main goals. First, to reviewed the available literature showing the differences in processing and comprehending L1 and L2, and how these differences may impact cognition, emotion and behavior. Second, considering the inconsistencies that characterize the main findings reported in studies examining the grounding of L1 and L2 with bilingual populations, we tried to present a critical analysis of these findings, to advance some suggestions for methodological improvement, and to indicate some future research directions in this field.

In the first section we described the Linguistic Relativism perspective, which argues that the language available to think and describe one's experiences influences the experiences itself (e.g., Boroditsky, 2001; Casasanto, 2010; Gentner & Goldin-Meadow, 2003). More specifically, the revised studies demonstrated that one's native language have an important role on structuring both low-level (e.g., Drivonikou et al., 2007; Spaepen, Coppola, Spelke, Carey, & Goldin-Meadow, 2011) and high-level thought (e.g., Boroditsky, 2001; Casasanto et al., 2004).

Second, we briefly described some important concepts and notions applied in bilingualism studies, namely the key variables identified as modulators of the bilinguals' experience with different languages. Variables such as order of acquisition, language dominance, level of proficiency, frequency of use, age (AoA) and context (CoA) of acquisition have been acknowledged as important factors shaping the emotional experience triggered by different languages. Namely, while L1 is usually learned and used in more emotional settings and its comprehension entails the integration of information received from all sensory modalities (Pavlenko, 2008), L2 is frequently acquired and used in more neutral

formal settings, without a significant involvement of the majority of sensory modalities (Perani & Abutalebi, 2005). In the end of this section we concluded that since L1 and L2 have different linguistic, affective, and socialization histories, associated with different sensorimotor experiences, it makes sense to argue that sensorimotor and affective grounding may be different between these two languages.

Our argument was further developed by reviewing studies conducted with bilingual populations showing that processing and comprehending information in L2: may serve a distancing function (e.g., Movahedi, 1996; Santiago-Rivera, Altarriba, Poll, Gonzalez-Miller, & Cragun, 2009); is usually associated with reduced self-reported emotional intensity (e.g., Dewaele, 2004, 2008); induces lower skin conductance responses (SCRs; Harris, 2004; Harris, et al., 2003) at least for taboo words and childhood reprimands; is associated with an impairment in recall (e.g., Anooshian & Hertel, 1994); triggers less automatic processing of affective content (e.g., Degner, Doycheva, & Wentura, 2012; Segalowitz, Trofimovich, Gatbonton, & Sokolovskaya, 2008); and leads to less biases in decision-making and to more rational choices (e.g., Costa, Foucart, Hayakawa, et al., 2014; Keysar, Hayakawa, & An, 2012).

We then presented evidence from recent studies suggesting that the affective grounding of L1 and L2 may be different, since affective simulation does not occur to the same extent in both languages (e.g., Foroni, 2015; Li, Liu, & Ma, 2015). In the end of this chapter we revisited the previous studies and suggested a few methodological refinements as well as some directions regarding future studies.

The review presented in Chapter 2 constitutes, in our view, an important theoretical contribution. Indeed, and despite the great surge of interest in studying linguistic communication, research has been focused on the processing, comprehension and affective experience of first-native language by monolingual populations in fields such cognitive linguistics (e.g., Kövecses, 2000; Lakoff & Johnson, 1999), linguistic anthropology (e.g., Kulick & Schieffelin, 2004), pragmatics (e.g., Gilbert, 2001; Zhang & Patel, 2006), communication sciences (e.g., Krauss & Fussell, 1996), social-cognition (e.g., H. Clark, 1996; Lindblom & Ziemke, 2007; Ricoeur, 1955), and SSC (e.g., Semin & Garrido, 2015; Semin, Garrido, & Palma, 2012, 2013). Most importantly, the association of each language (L1 and L2) to different sensorimotor and affective experiences, and its impact on perception, action and emotion simulation, has been relatively left aside, even within the embodiment framework (e.g., Barsalou, 1999a, 2008; Foroni & Semin, 2009; Glenberg, 1997; Glenberg &

Robertson, 2000; see for exceptions Foroni, 2015; Li et al., 2015). Thus, this chapter may provide and interesting input for a better theoretical understanding of the socio-cognitive and affective impact of linguistic communication, when this communication involves a language other than one's native.

Moreover, even though some reviews on emotional experience and bilingualism are available (e.g., Pavlenko, 2012), they are mainly focused on affective experiences, and are extremely vague in advancing with a theoretical proposal regarding the mechanism that may explain the differences found between L1 and L2. In Chapter 2 we have emphasized the role of embodied simulation as the mechanism responsible for the (different) grounding of L1 and L2. Finally, our critical review and analysis of the literature can improve research practices, inform theoretical accounts and contribute with new perspectives to inform future research.

Based on the theoretical accounts and the empirical evidence reported in the first two chapters we argued that L1 and L2 are not likely to be grounded in the same way. Thus, in the empirical chapters we examined this assumption suggesting that, if that is the case, intra-individual (i.e., how one processes affective information), inter-individual (i.e., how one perceives and evaluates others in terms of social distance), and intergroup (i.e., how emotional information about social groups is evaluated and simulated) processes should reflect the different groundings of L1-L2.

In **Chapter 3**, we hypothesized that processing affective information would be facilitated and more automatic in L1 than in L2. In two experiments, we have used the affective priming paradigm to investigate prime/target congruency effects in L1 and L2. In Experiment 1, valenced words were used as primes and targets and the pairs were presented both in L1 and in L2. The typical congruency effect was found, that is, participants responded faster when the prime-target pairs had a congruent valence (i.e., positive-positive or negative-negative). Notably, as predicted, the congruency effect was found only when the pairs were presented in L1 but not when the pairs were presented in L2. In Experiment 2, participants evaluated both words-photos (facial expressions) and photos-words pairs and the words were presented in both L1 and L2. This time, congruency effects were observed in both L1 and L2, in both types of task (i.e., evaluating word-photos and photo-words pairs). Other relevant outputs also emerged from the analyses. In both experiments the hit rates were very high and independent of language, and overall response times were faster in L1.

These results lend additional support to previous findings showing that affective priming effects are observed in L1 but not in L2 (e.g., Degner et al., 2012) and constitute strong support for our claim that L2 is not affectively grounded to the same extent as L1. Since affective priming effects rest on the affective grounding of language (e.g., Foroni & Semin, 2012), and these effects are absent in L2, these findings support the idea that due to different affective groundings, affective processing is facilitated in L1 relative to L2.

Importantly, the equal hit rates observed in both languages suggest that it is highly unlikely that our results are due to lack of comprehension in L2. Moreover, the fact that participants were slower to evaluate stimuli in L2 suggests that simulation is more difficult in this language (see Foroni, 2015; Foroni & Semin, 2012).

Our studies extend previous findings by introducing word-photo and photo-word pairs. When photos were part of the prime/target pairs language did no longer moderate the congruency effects suggesting that the simulation of facial expressions permit to overcome the slowdown produced by L2 words. Hence, one might argue that the affective constraints imposed by a second language are reduced by the simulation of valenced facial expressions. This is consistent with the idea that photos of facial expressions constitute strong affective cues that are processed very fast (De Houwer & Hermans, 1994), and that they recruit somatic activity, thus producing the same emotional expression in the perceiver (e.g., Dimberg, Thunberg, & Elmehed, 2000).

In **Chapter 4** we examined the impact of language on inter-individual processes, namely on judgments of perceived social distance. In this chapter we experimentally tested whether an L2 linguistic context leads to judgments of higher social distance from social targets, as compared to an L1 linguistic context. We further proposed that construal-level should be the mechanism explaining the relation between linguistic context and perceived social distance. This proposal was advanced based on two main arguments. First, in L2 (vs. L1) the simulation of previous sensorimotor experiences during language comprehension is impaired (e.g., Foroni, 2015), and sensorimotor information constitutes a low-level characteristic of a situation (Maglio & Trope, 2012). Thus, we reasoned that L2 should activate a higher level mindset than L1. Second, higher (vs. lower) level construals induce higher perceived social distance between the *self* and a target (e.g., Stephan, Liberman, & Trope, 2011). Hence, we have hypothesized that language should impact judgments of social distance through construal-level.

We have tested these assumptions in three experiments. Linguistic context was manipulated between-subjects by asking participants to write a short neutral story either in L1 or L2. In Experiment 1, social distance was measured both as familiarity and similarity to the self, while in Experiment 3 it was measured as resources allocation. Construal-level was measured both as conceptual level of processing using the Behavior Identification Form (BIF; Vallacher & Wegner, 1989) in Experiment 2, and as perceptual level of processing with the Shape Task (Kimchi & Palmer, 1982) in Experiment 3. In the analysis we have also taken into account the role of L2 age of acquisition as an important modulator of language effects.

In Experiment 1, participants read about fictitious and real (i.e., the experimenter) social targets' actions and were asked to write small narratives about their behaviors in L1 or L2. After writing the small narrative, they were asked to evaluate the social target for familiarity and similarity to the self. Results have shown that linguistic context did not affect evaluations of fictitious social targets but did affect evaluations made about the experimenter. Namely, in the L1 condition participants considered the experimenter to be more familiar and similar to the self than in the L2 condition. In Experiment 2, we have explored the impact of linguistic context on conceptual construal-level. Results showed that L2 leads to a higher level conceptual construal than L1. Notably, as predicted, this difference was only found for Late Bilinguals (LBs), and not for Early Bilinguals (EBs). In Experiment 3, we tested our full model. We found for LBs a negative conditional indirect effect of the linguistic context on social distance from the experimenter through level of perceptual construal. More specifically, for LBs (and not for EBs), L2 induced higher level perceptual construal than L1, which led to lower resources allocation (higher social distance) to the experimenter. Importantly, overall, neither linguistic context, nor construal-level affected the resources allocated to fictitious social targets.

Suggestions that L2 has a distancing function have already been presented in clinical settings (e.g., Movahedi, 1996; Santiago-Rivera et al., 2009). However, the assumption that L2 leads to higher psychological distance than L1 was never, to the best of our knowledge, experimentally tested. This assumption relied essentially on a few case studies, on therapists' perceptions rather than on speakers' perceptions, or on qualitative data. Notably, it was also unclear what type of psychological distance were these reports referring to (i.e., temporal, spatial, social, or hypotheticality; e.g., Bar-Anan, Liberman, Trope, & Algom, 2007; Trope & Liberman, 2003), and what are the psychological mechanisms explaining the relationship between language and psychological distance. Additionally, our results contribute to the

construal-level literature, by proposing a new possible manipulation to induce different construal-level mindsets, namely the use of different languages.

Importantly, these results add meaningful inputs to the embodiment literature. Our findings suggest that the relation between embodiment and construal-level is bidirectional. Maglio and Trope (2012) have shown that under a high-level mindset embodiment effects are reduced. Our results suggest that conditions in which embodiment effects are minimized (i.e., L2) trigger a higher-level mindset. Moreover, linguistic context did not only affect the level of conceptual construal but also the level at which perceptual information is processed. These findings are in line with embodied approaches to cognition, suggesting that cognition derives from and is connected to perception, and that conceptual and perceptual systems are both re-enacted during language comprehension (e.g., Barsalou, 1999a, 2008; Borghi, Glenberg, & Kaschak, 2004). Finally, these findings extend the embodied cognition literature typically focused on the grounding of L1, by showing that the extent to which simulation processes occur can be moderated by the language (L1-L2) one is using.

In our final empirical chapter (**Chapter 5)** we had three main goals. First, to replicate findings showing that language comprehension requires at least partial simulation of affective states, which impacts judgments (e.g., Foroni & Semin, 2009). Second, to investigate whether sentences' affective simulation is affected by the group membership (i.e., in-group; out-group) of the described targets, similarly to the way facial mimicry is affected by the group membership of the targets' facial displays (e.g., Bourgeois & Hess, 2008). Finally, to explore whether the simulation and judgments of affective sentences describing targets with different group memberships are modulated by the language one is using.

In Experiments 1 and 2, we asked bilinguals to make judgments of intensity, probability and valence of sentences describing social targets (i.e., in-group or out-group) in emotional situations (i.e., anger or happiness). The sentences were presented to participants both in L1 and L2. In Experiment 2 the activity of the *corrugator supercilii* (i.e., associated with frown) and of the *zygomatic major* (i.e., associated with smile) muscles was also recorded through the use of facial electromyography (EMG).

Overall, in Experiments 1 and 2 we confirmed our predictions about the impact of group membership on judgments. Namely, in both experiments happiness-related situations were considered to be more likely to occur to in-group targets while anger-related situations were considered to be more likely to occur to out-group targets. Consistently, valence

judgments were more positive (and less negative) for sentences describing the in-group than for those describing the out-group. However, language manipulation had no significant influence in these self-reports. In Experiment 2 we have confirmed that affective simulation occurs during language comprehension, by showing that anger and happiness-related sentences consistently activated the muscles of interest (i.e., corrugator and zygomatic, respectively). Importantly, as predicted, the affective simulation of anger sentences was stronger in L1 than in L2, and anger and happiness sentences have elicited stronger affective simulation when referring to in-group rather than to out-group members.

Surprisingly, differences in affective simulation of sentences describing in-group and out-group targets have been enhanced in L2 and not in L1. Particularly, out-group anger sentences presented in L2 have elicited less corrugator activation than all the other conditions. Contrary to all the other conditions, out-group anger sentences presented in L2 have evoked a corrugator relaxation, a pattern consistent with smiling and thus with counter-mimicry. We have speculated that since counter-mimicry occurs more often in response to socially distant groups (i.e., out-groups) and L2 also fosters social distance (see Chapter 4), it was in this condition that counter-mimicry patterns were observed.

The findings reported in Chapter 5 have implication for several different fields. First, they are relevant for the bilingualism research, because studies using psychophysiological measures, particularly EMG, to access emotional experience in L1 and L2 are still scarce. Second, our findings are also informative for the in-group favoritism domain (Tajfel, 1982), by showing another expression of in-group preference, namely that probability and valence judgments of sentences with positive and negative emotional content are influenced by group membership.

Importantly, our results may be relevant for the embodiment research for several reasons. First, we have replicated findings showing that not only emotional facial displays (i.e., photos or videos) do evoke affective simulation, but that language comprehension also entails the simulation of affective experience (Foroni & Semin, 2009). Furthermore, our results are in line with previous findings showing that affective simulation is stronger in L1 than in L2, at least for some categories of stimuli (e.g., Foroni, 2015). Additionally, we have also replicated findings showing that group membership shapes affective simulation (e.g., Bourgeois & Hess, 2008). Finally, we extended the findings presented in the embodiment literature by showing that the impact of group membership on sentences' simulation depends on the language one is using.

Overall, our work has a multidisciplinary flavor and integrates approaches from different study domains, namely SSC, embodied cognition, bilingualism, construal-level theory and intergroup relations. The results from the three sets of experimental studies have shown that L1 and L2 are unlikely to be embodied in the same way, a finding that is expected to have consequences for intra-individual, inter-individual and inter-group processes. In addition to the theoretical contributions that this work may have, we have also identified some implications that it may bring to more applied fields, as described in the next section.

6.2. Applied Implications

The proposed research elucidates the factors and conditions that contribute to predictable positive and detrimental consequences of using L2 in everyday life. Particularly, we have found that L2's affective content is processed less automatically, that this language induces more abstract higher level thought, that it promotes social distance and that it strengthens the differences in the simulation of in-group and out-group members' emotions. These findings might have several consequences in terms of decision-making, social policies and educational programs. Although our suggestions may be somehow speculative, we think they deserve careful consideration and above all further experimental examination.

In our work we have found that L2's affective content is processed less automatically, which allows to reduce congruency effects (see Chapter 3). This is expressed in faster responses in decision-making, since the affective connotation implied by the decision is ignored (or at least it is processed more slowly). This might have practical positive implications when one uses L2. For instance, when the "best possible decision" should be made in a short time, implies reduced emotionality or a focus on utilitarism, using L2 instead of L1 to communicate seems to promote performance efficiency. This should be expected particularly when communication does not imply face-to-face contact, which could constrain the rationality implied by L2. Hence, we would advise the use of L2 to communicate in environments in which performance depends on fast and rational decisions, which is the case of multinational companies. However, when the emotional content needs to be considered in decision-making (e.g., cutting salaries, collective dismissals, or others' well-being) the use of L1 or face-to-face communication would be recommended.

In Chapter 4 we have shown that L2 is associated with more abstract high-level thought and L1 with more concrete low-level thought. This means that using L2 to communicate should make more available "how" an action is being performed, while using

L1 directs one's attention on "why" that action is being performed. In other words, it is expected that someone using L2 would focus "on the forest" while someone using L1 would focus "on the threes". Thus, the use of L1 or L2 might improve performance and motivation depending on the task at hand. For instance, sometimes one has to deal with an excessive amount of work, or to perform tasks characterized by high levels of complexity. Using L2 in communication could be a good way to improve employees' motivation because they would focus on the "why" they are doing their jobs (e.g., a good salary, to help someone at risk) putting aside what they have to do to achieve their goals. Performance might also come out benefited as having a more global picture can often help in complex situations. However, in many contexts this could have detrimental consequences. For instance, let's consider a war context in which the action to be implemented is "bombing Syria". In this context, to focus on "why" some measures are being implemented (e.g., "Make America great again") ignoring the "how" they are being implemented (e.g., killing civilians) might promote speeches and acts conveying that "the ends justify the means".

Taken together the findings of Chapter 3 and 4 one can assume that L1 is characterized by higher emotionality and induces higher familiarity than L2. It is well-known that people like what is familiar and buy what they like. If that is the case, advertisements should appear in the target population's native language to increase sales. Additionally, one can speculate that language of communication can also affect vote intentions. Politics could use sentences in the native language of the population they want to reach out (e.g., using sentences in Spanish if they want more Latinos' votes) to increase votes.

Besides revealing that L2 (vs. L1) induces higher perceived social distance (Chapter 4), and contrary to our prediction, our findings also seem to suggest that L2 strengthens the in-group favoritism bias (Chapter 5). Particularly, in L2 people seem to have more difficulty in simulating out-group members' emotions, and thus to feel (and maybe to fully understand) what others are feeling. Hence, when establishing social policies or making international decisions concerning other people' welfare, it would be important to have communication conveyed and transmitted in people's native language. Namely, in agencies responsible for important international decisions (e.g., EU, ONU, NATO) we would advise to transmit information in each person native language, and during decision-making to ask people to communicate in their L1. This could emphasize the emotional content of the decision, to decrease the perceived social distance between the decision maker and the targets of the decision, to promote empathy, and to minimize the differences between "us" and "them".

Finally, our findings may also impact the way schools integrate the learning of L2 in their programs. Since learning L2 in early stages in life promotes not only semantic acquisition but also the integration and simulation of affective meaning, it would be recommended that the acquisition of this language would occur already during early childhood. Moreover, it would be important to promote a learning environment that do not only stimulates semantic acquisition, but that also integrates sensorimotor and affective experiences in the learning process. This seems to be the best way to ensure that L2 becomes a truly common language.

6.3. Limitations, remaining questions, and ideas for future studies

The findings presented in this work have shed some light to some of our (many) initial questions. However, many others remained to be answered and new questions have arisen.

The results from affective priming tasks presented in Chapter 3 suggest that processing affective content in L2 is less automatic than processing the same content in L1, a constraint that is overcome by the use of emotional facial expressions. We suggest that in future studies affective priming tasks could be used to replicate our findings and that the affective experience of L1 and L2 could be further explored by introducing other types of stimulus materials.

Non-verbal communication (e.g., bodily postures, facial expressions) is essential in the expression and understanding of emotions, intentions and desires. However, one's perceptions and emotional experience are highly impacted by verbal communication, namely by what one hears. For instance, Harris, Ayçiçeği and Gleason (2003) have shown that L1 words presented in the auditory modality elicited stronger SCRs than the ones presented in the visual modality, with no differences registered between modalities in L2. These effects might reflect the outcome of distinct learning environments: the acquisition of language early in life (L1) occurs essentially via the auditory modality and thus richer affective and sensorimotor experiences might be associated with this modality. In contrast, L2 stimuli presented in the auditory and visual modalities might be more similar because a greater amount of experiences may have taken place with print, due to the learning context (e.g., school, work). The further examination of processing and comprehending L1's and L2's affective content in distinct modalities could be particularly relevant since the use of the auditory modality in L1 and L2 may express different emotional experiences associated with different contexts (e.g., strong emotional experiences with caregivers at home; neutral

emotional experiences during class at school, respectively), whereas the use of the visual modality in L1 and L2 could be associated with experiences in similar contexts (i.e., neutral emotional experiences during class at school), although in different moments in life (i.e., early childhood vs. late childhood or adolescence). Hence, the use of auditory stimuli might enhance the expression of the different affective groundings of L1 and L2.

Moreover, faces of in-group and out-group members could be used in further affective priming paradigms designed to extend our findings. If facial expressions are automatically simulated overcoming L2's constraints, maybe the use of faces of out-group members would not produce the same effect since they induce lower or absent facial mimicry (see Bourgeois & Hess, 2008; Van der Schalk et al., 2011). Additionally, further studies should address the question of why is L2 processing slower than L1 processing. Namely, is simulation more difficult in this language or can these results be explained by differences in proficiency, frequency of use or age of acquisition of L1 and L2?

The findings reported in Chapter 4 seem to suggest a bidirectional relation between construal-level and embodiment. While previous studies have shown that in a high-level mindset embodiment effects are reduced (Maglio & Trope, 2012), our own findings suggest that using a disembodied language (i.e., L2) can also trigger a higher level mindset. Thus, in future studies this possible bidirectional relation should be explored, as well as the extent to which varying the linguistic context (L1, L2) could be used as a manipulation to explore embodiment effects.

Our findings also indicate that for LBs the language used in communication (L1, L2) affects directly familiarity and similarity ratings (Experiment 1), but affects only indirectly resources allocation through level of perceptual construal (Experiment 3). One possible explanation for these results is that familiarity and similarity ratings, and resources allocation tasks, although often used interchangeably, measure different constructs or at least different features of social distance. First, resources allocation requires an action that is expected to have direct consequences, while rating someone is a more passive task with no direct consequences, neither for the self nor for the targets. Second, whereas giving more to someone while remaining with less constitutes a cost to the self, passively evaluating someone's familiarity and similarity does not constitute a loss. It is possible that, to be willing to incur in costs to the self implies a higher social proximity towards a target, whereas evaluating someone's familiarity or similarity does not require feeling that close to someone. Thus, we believe it would be important to replicate our findings and to investigate whether

these measures differ in such a way. We also suggest that more direct measures of social distance, such as the Inclusion of Other in the Self Scale (IOS; Aron, Aron, & Smollan, 1992) should be used in future studies.

In the experiments reported in Chapter 4 we addressed the question of whether L2 induces psychological distance to a greater extent than L1. Our findings suggest that this is the case but we only tested one dimension of this construct – social distance. Since nowadays the use of a second language is a common phenomenon and that important decisions are made when using this language, we suggest that the effects of linguistic context on social distance should be replicated and extended to the other three dimensions– temporal, spatial, and hypotheticality – since the four dimensions of psychological distance are interrelated (e.g., Bar-Anan et al., 2007).

Additionally it would be relevant to explore the consequences of these findings for cognition and behavior. For instance, using L2 in communication might have possible consequences for creativity due to its relation with psychological distance and abstract thought (both conceptual and perceptual; see Chapter 4). Extensive evidence was provided showing that psychological distance, as opposed to psychological proximity, promotes creative responses and better performance on problem solving tasks that require creative insight (e.g., Förster, Friedman, & Liberman, 2004; Jia, Hirt, & Karpen, 2009). Notably, distant perspectives, as opposed to proximal perspectives, undermine analytical problem solving (e.g., Förster et al., 2004). Hence, future studies could explore whether using L2 in communication could be used as a mean to promote creativity, while using L1 to communicate could be more recommended when decisions require analytical thought. Importantly, these studies should take into consideration that L2 could only be used as a tool to promote creative thinking when using this language does not elicit fear or anxiety (i.e., like in the case of speakers with low proficiency and frequency of use in this language), since these feelings are associated with lower creativity (see for meta-analysis, Baas, De Dreu, & Nijstad, 2008).

Moreover, further studies could explore whether using different languages – that seem to trigger different types of thought - could impact social judgments and attributions. Namely, actions performed by socially distant people are more likely to be represented in terms of abstract and superordinate characteristics, such as traits, whereas the same actions performed by close ones are more likely to be represented in terms of more concrete and subordinate features, such as contextualized behaviors (e.g., Idson & Mischel, 2001). Thus, since L1 and

L2 induce social distance and abstract thought to a different extent, it would be interesting to explore in further studies whether the use of these different languages would impact the causal explanations of other people's behavior.

It would also be important to replicate and extend the findings reported in Chapter 5, namely on the impact of language on judgments and simulation of affective content referring to targets with different group membership. Specifically, it would be interesting to explore in further studies whether using different languages (L1 and L2) would affect attitudes towards different social groups (in-group, out-group). Since L2 seemed to enhance differences between in-group and out-group members, at least when these were not measured explicitly, studies could be designed to implicitly assess (e.g., using IAT) whether attitudes toward out-group (in-group) members would be more negative (positive) when using L2 (vs. L1).

Moreover, it would be important to further examine whether our unexpected EMG findings (i.e., higher differences in simulating in-group and out-group sentences in L2; corrugator relaxation evoked by L2 out-group sentences) might be explained by a higher social distance or higher level construal induced by L2 and by out-group members, as suggested in the end of the chapter. Overall, it would be important to replicate our findings using a larger sample size to increase the power of the studies. Furthermore, with a larger sample, it would be possible to explore the impact of linguistic variables (e.g., age of acquisition, proficiency, and frequency of use) on the emotional experience of sentences describing in-group and out-group targets in L1 and L2. Finally, these studies should be accompanied by a direct measure of affective simulation (e.g., EMG) to ascertain that the findings can be explained by embodied mechanisms.

The important role of communication in our social lives is undeniable. We live in a multicultural technological world where the use of a second language to communicate is an increasingly common phenomenon. Using a second language can shorten distances across people, space and time, unify nations, countries, groups and individuals. However, it can also enhance differences, promote distance and foster emotional desensitization. In either way, approaching us or tearing us apart, using a common language has, like no other mean, allowed human beings to navigate the world in ways that we thought would never be possible.

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APPENDICES

APPENDIX A (CHAPTER 3 – Experiments 1 and 2)

Experiment 1: Word-Word Pairs

Experiment1: Word Primes

English Version			Portuguese Version		
negative	neutral	positive	negative:	neutral	positive
to enrage	to hammer	to kiss	enfurecer	martelar	beijar
to cry	to seat	to smile	chorar	sentar	sorrir
to hate	to answer	to entertain	odiar	responder	divertir
to despise	to hide	to laugh	desprezar	esconder	rir
to annoy	to cook	to love	aborrecer	cozinhar	amar
to terrify	to swim	to enjoy	aterrorizar	nadar	apreciar

Adapted from the Affective Norms for English Words (ANEW, Bradley & Lang, 1999) adaptation for European Portuguese (Soares, Comesaña, Pinheiro, Simões, & Frade, 2012). The norms include the original English word and the Portuguese translation, so L1 and L2 words sets were alike.

Experiment1: Word Targets

English Version		Portuguese Version	
negative	positive	negative	positive
upset	beautiful	chateado	belo
sad	kind	triste	amável
selfish	joyful	egoísta	alegre
sick	friendly	doente	amigável
lonely	nice	solitário	simpático
unhappy	happy	infeliz	feliz

Selected from the same normative set (Soares et al., 2012).

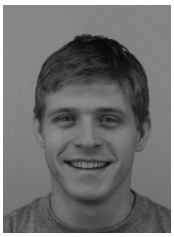
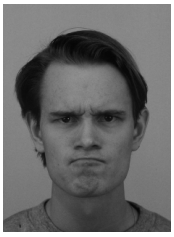
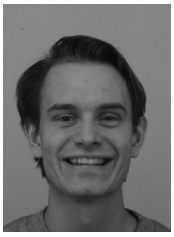
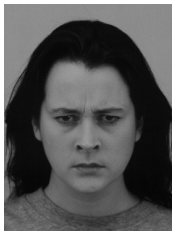
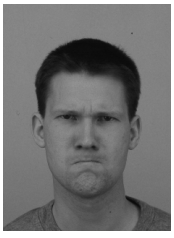
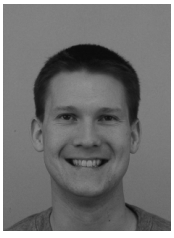
Experiment 2: Word-Photo & Photo-Word Pairs

Word Primes / Photo Targets

Experiment 2: Word Primes

English Version			Portuguese Version		
negative	neutral	positive	negative	neutral	positive
upset	shy	beautiful	chateado	tímido	belo
sad	odd	kind	triste	invulgar	amável
selfish	moody	joyful	egoísta	temperamental	alegre
sick	smooth	friendly	doente	suave	amigável
lonely	quick	nice	solitário	rápido	simpático
unhappy	astonished	happy	infeliz	espantado	feliz

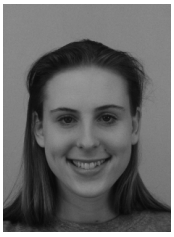
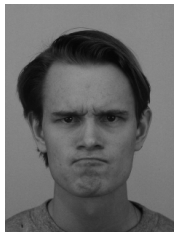
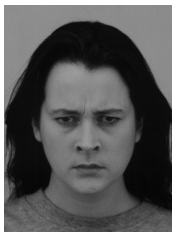
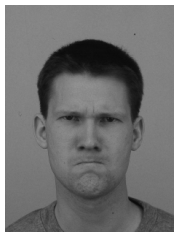
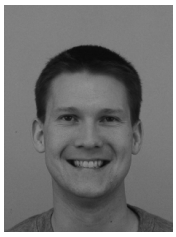
Experiment 2: Photo Targets

Female Targets		Male Targets	
negative	positive	negative	positive
			
			
			

Experiment 2: Word-Photo & Photo-Word Pairs

Photo Primes / Word Targets

Experiment 2: Photo Primes

Female Targets			**Male Targets**		
negative	neutral	positive	negative	neutral	positive
					
					
					

Experiment 2: Word Targets

English Version		**Portuguese Version**	
negative	positive	negative	positive
upset	beautiful	chateado	belo
sad	kind	triste	amável
selfish	joyful	egoísta	alegre
sick	friendly	doente	amigável
lonely	nice	solitário	simpático
unhappy	happy	infeliz	feliz

APPENDIX B (CHAPTER 4 – Experiments 1, 2 and 3)

Experiment 1: Presented Sentences

Portuguese Version

A Alice está a dar de comer a um gato vadio.

O Daniel está a convidar pessoas para uma festa.

A Diana está a fumar no parque.

O David está a ler um livro sobre o Tibete.

A Laura está a falar alto ao telemóvel.

O Samuel está a explicar um trabalho a um colega de turma.

A Catarina está a recolher dados no laboratório *(sentence regarding the experimenter)*

English Version

Alice is feeding a stray cat.

Daniel is inviting guests to a party.

Diana is smoking in the park.

David is reading a book about Tibet.

Laura is speaking loudly on the cell phone.

Samuel is explaining an assignment to a classmate.

Catarina is collecting data in the laboratory *(sentence regarding the experimenter)*

Experiment 2: Behavioural Identification Form (BIF)

Portuguese Version

Vamos de seguida apresentar-lhe uma nova tarefa. Por favor leia atentamente as instruções que se seguem.

Todos os comportamentos podem ser descritos de várias formas. Por exemplo, uma pessoa poderá descrever um comportamento como "escrever um artigo", enquanto que outra pessoa poderá descrever o mesmo comportamento enquanto "pressionar teclas no teclado". Ainda, outra pessoa poderá descrevê-lo como "expressar pensamentos". Este questionário foca-se nas suas preferências pessoais relativas a como um comportamento deve ser descrito.

Seguidamente irá encontrar vários comportamentos listados. Depois de cada comportamento estarão duas formas através das quais o comportamento poderá ser identificado. Por exemplo:

Ir à aula *(o comportamento)*

a. sentar numa cadeira

b. olhar para o professor

A sua tarefa é escolher a opção, *a* ou *b,* que a seu ver melhor descreve o comportamento. Escolha simplesmente a opção que prefere (*a* ou *b*). Confirme que respondeu a todos os itens. Escolha apenas uma alternativa para cada par. Lembre-se, escolha a descrição que *pessoalmente acredita* ser a mais apropriada para cada par.

1. Fazer uma lista a. Ficar organizado b. Apontar coisas	**13. Votar** a. Influenciar a eleição b. Preencher o boletim de voto
2. Ler a. Percorrer linhas impressas b. Adquirir conhecimento	**14. Trepar a uma árvore** a. Conseguir uma boa vista b. Agarrar-se a ramos
3. Juntar-se ao exército a. Ajudar na defesa da Nação b. Alistar-se	**15. Preencher um teste de personalidade** a. Responder a questões b. Revelar como és
4. Lavar a roupa a. Remover odores da roupa b. Pôr a roupa na máquina	**16. Escovar os dentes** a. Prevenir cáries dentárias b. Mover uma escova às voltas dentro da boca
5. Apanhar uma maçã a. Arranjar algo para comer b. Colher uma maçã de um galho	**17. Fazer um teste** a. Responder a questões b. Mostrar conhecimento
6. Derrubar uma árvore a. Empunhar um machado b. Arranjar lenha	**18. Cumprimentar alguém** a. Dizer olá b. Mostrar simpatia
7. Medir um quarto para alcatifar a. Preparar-se para remodelar b. Usar uma fita métrica	**19. Resistir à tentação** a. Dizer "não" b. Mostrar coragem moral
8. Limpar a casa a. Mostrar asseio b. Aspirar o chão	**20. Comer** a. Obter nutrientes b. Mastigar e engolir
9. Pintar um quarto a. Dar pinceladas b. Fazer o quarto parecer novo	**21. Plantar um jardim** a. Plantar sementes b. Obter vegetais frescos
10. Pagar a renda a. Manter um sítio para viver b. Passar um cheque	**22. Viajar de carro** a. Seguir um mapa b. Ver a paisagem
11. Cuidar das plantas de casa a. Regar as plantas b. Tornar a divisão mais bonita	**23. Arranjar um buraco num dente** a. Proteger os seus dentes b. Ir ao dentist
12. Trancar a porta a. Pôr uma chave na fechadura b. Proteger a casa	**24. Falar com uma criança** a. Ensinar algo a uma criança b. Usar palavras simples
25. Tocar à campainha a. Mexer um dedo b. Ver se alguém está em casa	

English Version

Now we will present you a new task. Please read carefully the following instructions.

Any behavior can be described in many ways. For example, one person might describe a behavior as "writing a paper," while another person might describe the same behavior as "pushing keys on the keyboard." Yet another person might describe it as "expressing thoughts." This questionnaire focuses on your personal preferences for how a number of different behaviors should be described.

Below you will find several behaviors listed. After each behavior will be two different ways in which the behavior might be identified. For example:

Attending a class *(the behavior)*

a. sitting in a chair

b. looking at a teacher

I do not understand the meaning of some of these behaviors

Your task is to choose the identification, a or b, that best describes the behavior for you. Simply chose the option you prefer (a or b). Be sure to respond to every item. Please mark only one alternative for each pair. Remember, choose the description that you personally believe is more appropriate for each pair.

Note: If you do not understand the meaning of some of the behaviors (of the target behavior, of the behavior A or B, please choose “I do not understand the meaning of some of these behaviors.”

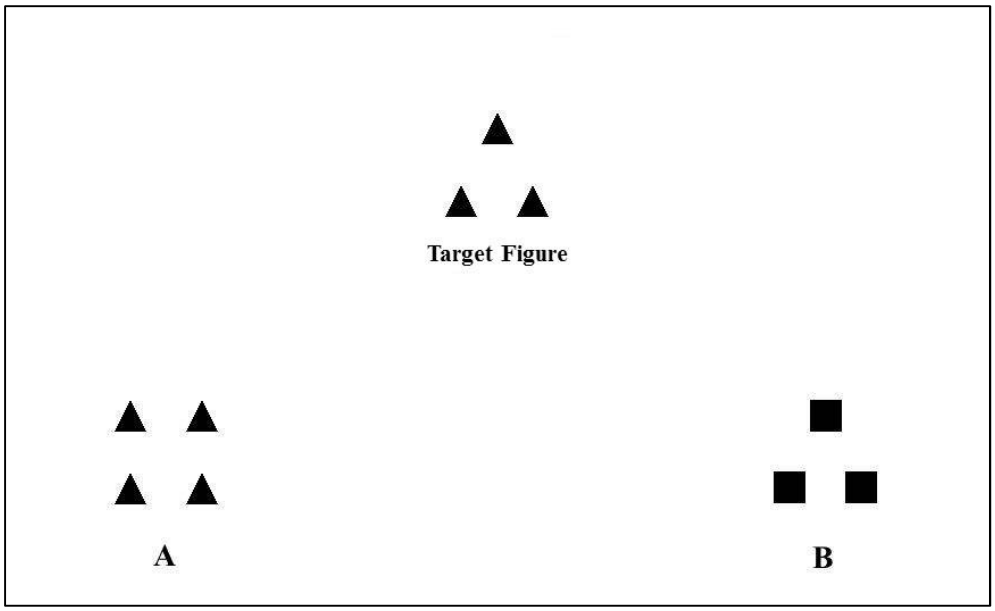
1. Making a list a. Getting organized b. Writing things down *I do not understand the meaning of some of these behaviors*	**10. Paying the rent** a. Maintaining a place to live b. Writing a check *I do not understand the meaning of some of these behaviors*
2. Reading a. Following lines of print b. Gaining knowledge *I do not understand the meaning of some of these behaviors*	**11. Caring for houseplants** a. Watering plants b. Making the room look nice *I do not understand the meaning of some of these behaviors*
3. Joining the Army a. Helping the Nation's defense b. Signing up *I do not understand the meaning of some of these behaviors*	**12. Locking a door** a. Putting a key in the lock b. Securing the house *I do not understand the meaning of some of these behaviors*
4. Washing clothes a. Removing odors from clothes b. Putting clothes into the machine *I do not understand the meaning of some of these behaviors*	**13. Voting** a. Influencing the election b. Marking a ballot *I do not understand the meaning of some of these behaviors*
5. Picking an apple a. Getting something to eat b. Pulling an apple off a branch *I do not understand the meaning of some of these behaviors*	**14. Climbing a tree** a. Getting a good view b. Holding on to branches *I do not understand the meaning of some of these behaviors*
6. Chopping down a tree a. Wielding an axe b. Getting firewood *I do not understand the meaning of some of these behaviors*	**15. Filling out a personality test** a. Answering questions b. Revealing what you're like *I do not understand the meaning of some of these behaviors*
7. Measuring a room for carpeting a. Getting ready to remodel b. Using a tape measure *I do not understand the meaning of some of these behaviors*	**16. Tooth brushing** a. Preventing tooth decay b. Moving a brush around in one's mouth *I do not understand the meaning of some of these behaviors*
8. Cleaning the house a. Showing one's cleanliness b. Vacuuming the floor *I do not understand the meaning of some of these behaviors*	**17. Taking a test** a. Answering questions b. Showing one's knowledge *I do not understand the meaning of some of these behaviors*
9. Painting a room a. Applying brush strokes b. Making the room look fresh *I do not understand the meaning of some of these behaviors*	**18. Greeting someone** a. Saying hello b. Showing friendliness *I do not understand the meaning of some of these behaviors*
19. Resisting temptation a. Saying "no" b. Showing moral courage *I do not understand the meaning of some of these behaviors*	**22. Traveling by car** a. Following a map b. Seeing countryside *I do not understand the meaning of some of these behaviors*

20. Eating a. Getting nutrition b. Chewing and swallowing *I do not understand the meaning of some of these behaviors*	**23. Having a dental cavity filled** a. Protecting your teeth b. Going to the dentist *I do not understand the meaning of some of these behaviors*
21. Growing a garden a. Planting seeds b. Getting fresh vegetables *I do not understand the meaning of some of these behaviors*	**24. Talking to a child** a. Teaching a child something b. Using simple words *I do not understand the meaning of some of these behaviors*
25. Pushing a doorbell a. Moving a finger b. Seeing if someone's home *I do not understand the meaning of some of these behaviors*	

Experiment 3: Shape Task

Example of figures presented in the Shape Task (Kimchi & Palmer, 1982)

Which of the Figures (A or B) is more similar to the Target Figure?



Experiment 3: Dictator Game

Portuguese Version

Cenário 1

Imagine-se na biblioteca. A única pessoa que lá está, o João, está a ler um livro.

Agora imagine que você foi premiado com **10 livros novos**. Você pode ficar com os livros para si ou pode dar alguns ao João.

Por favor indique o número de livros que estaria disposto(a) a dar ao João.

0 1 2 3 4 5 6 7 8 9 10

Cenário 2

Imagine-se à espera na fila para comprar café na cafetaria. O Pedro é a única pessoa na fila atrás de si para comprar café.

Agora imagine que no momento que está prestes a comprar o café, o café acaba-se. O dono da cafetaria compensa-o (mas não ao Pedro) dando-lhe **20 senhas de café grátis**. Você pode ficar com as senhas para si ou pode dar algumas ao Pedro.

Por favor indique o número de senhas que estaria disposto(a) a dar ao Pedro.

0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20

Cenário 3

Imagine-se a fazer cópias de alguns artigos. O André, a única pessoa que lá está, acabou de chegar para tirar algumas cópias.

Agora imagine que encontra **5 cartões de cópias para a fotocopiadora** no chão. Você pode ficar com os cartões para si ou pode dar algumas ao André.

Por favor indique o número de cartões que estaria disposto(a) a dar ao André.

0 1 2 3 4 5

Cenário 4

Imagine que chegou ao teatro mas a peça foi cancelada. Outra pessoa que veio ver a mesma peça, a Matilde, está à procura de informação a esse respeito.

Agora imagine que depois de se queixar aos directores, estes lhe oferecem (mas não à Matilde) **8 bilhetes para outras peças**. Você pode ficar com todos os bilhetes para si ou pode dar alguns à Matilde.

Por favor indique o número de bilhetes que estaria disposto(a) a dar à Matilde.

0 1 2 3 4 5 6 7 8

Cenário 5

Imagine que está numa loja de música num momento de saldos. Imagine a Inês a entrar na loja.

Agora imagine que o dono da loja lhe ofereceu **15 CD's gratuitamente**. A Inês chega logo a seguir mas já não sobravam nenhuns para dar. Você pode ficar com todos os CD's para si ou pode dar alguns à Inês.

Por favor indique o número de CD's que estaria disposto(a) a dar à Inês.

0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15

Cenário 6

Imagine que chegou a uma padaria mas o empregado estava prestes a fechar a loja duas horas mais cedo devido a algum motivo. Outra pessoa, a Cláudia, está a aproximar-se da padaria.

Agora imagine que o empregado da padaria lhe oferece **7 pães** porque estava com pressa para fechar a loja. A Cláudia também queria comprar pão mas quando chega o empregado já tinha fechado a padaria. Você pode ficar com todos os pães para si ou pode dar alguns à Cláudia.

Por favor indique o número de pães que estaria disposto(a) a dar à Cláudia.

0 1 2 3 4 5 6 7

Cenário 7

Agora vai ser-lhe apresentado outra situação. Por favor note que a outra pessoa nesta situação é **a Catarina, a experimentadora deste estudo**.

Por favor tente imaginar a seguinte situação:

Imagine que passa por uma campanha de telemóveis no Campus Universitário. A única pessoa que se está a aproximar do *stand* é a Catarina.

Agora imagine que os patrocinadores lhe deram o último conjunto de **9 cartões para telemóvel**, e que não havia mais para a Catarina.

Você pode ficar com todos os cartões para si ou pode dar alguns à Catarina.

Por favor indique o número de cartões que estaria disposto(a) a dar à Catarina.

0 1 2 3 4 5 6 7 8 9 10

English Version

Scenario 1

Imagine yourself in the library. The only other person there, João, is reading a book.

Now, imagine that you were awarded with **10 new books** by the library. You can either keep the books to yourself or give some to João.

Please indicate the number of books you would be willing to give to João.

0 1 2 3 4 5 6 7 8 9 10

Scenario 2

Imagine yourself waiting in line to buy coffee in the cafeteria. The only other person, Pedro, is next in line after you to get coffee.

Now imagine that in the moment you are about to get your coffee, the coffee runs out. The owner of the cafeteria compensates you (but not Pedro) with **20 free-coffee coupons**. You can either keep the coupons to yourself or give some to Pedro.

Please indicate the number of free-coffee coupons you would be willing to give to Pedro.

0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20

Scenario 3

Imagine yourself making copies of some articles. The only other person there, André, just arrived to make some copies.

Now imagine that you find **5 copy cards** for the copy machine on the floor. You can either keep the cards to yourself or give some to André.

Please indicate the number of cards you would be willing to give to André.

0 1 2 3 4 5

Scenario 4

Imagine that you arrive to a theatre, but the performance was cancelled. Another person who arrived to see the same play, Matilde, is looking for the information about it.

Now imagine that after complaining to the directors, you (but not Matilde) were offered **8 tickets to other performances**. You can either keep all the tickets to yourself or give some to Matilde.

Please indicate the number of tickets you would be willing to give to Matilde.

0 1 2 3 4 5 6 7 8

Scenario 5

Imagine that you are at a music shop in a moment of sales. Imagine Inês who is entering the shop.

Now imagine that the shop owned granted you with **15 CDs for free**. In a minute Inês arrives but there were no free CDs left. You can either keep all the awarded CD's to yourself or give some to Inês.

Please indicate the number of CD's you would be willing to give to Inês.

0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15

Scenario 6

Imagine that you arrived to a bakery but the employee was about to close two hours earlier due to some necessity. Another person, Cláudia, is approaching the bakery.

Now imagine that the bakery employee offered you **7 breads** because he was in a hurry to close the shop. Cláudia also wanted to buy some bread but when she arrived the employee had just closed the bakery. You can keep all the breads to yourself or give some to Cláudia.

Please indicate the number of breads you would be willing to give to Cláudia.

0 1 2 3 4 5 6 7

Scenario 7

Now, you will be presented with another situation. Please note that the other person in this situation **is Catarina, the experimenter of this study**. Please try to imagine the following situation:

Imagine that you came across a cell phone campaign by the University Campus. The only other person approaching the campaign stand is Catarina.

Now, imagine that you received the last set of **9 cards for cell phone** from the advertisers, and there weren't any cards left to Catarina. You can either keep all the cards to yourself or give some to Catarina.

Please indicate the number of cards you would be willing to give to Catarina.

0 1 2 3 4 5 6 7 8 9 10

Appendix C (CHAPTER 5 - Pilot Study, Experiment 1 and 2)

Pilot Study

Nacionalidade: _____; Etnia: _____

Idade: _____; Sexo: F ☐ M ☐

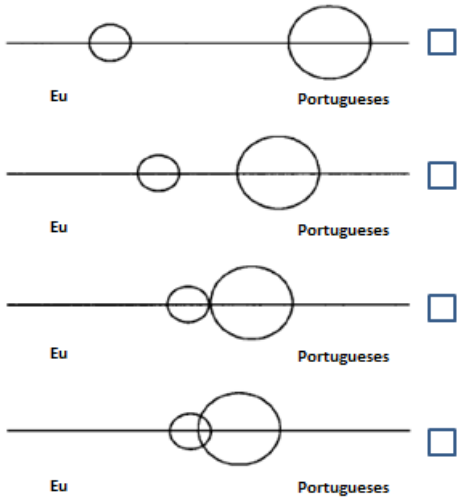
A nossa vida social implica que todos pertençamos a um ou mais grupos. De entre estes vários grupos destacam-se os baseados na nacionalidade (e.g., portugueses, espanhóis, alemães, chineses, etc.), na sua etnia (e.g., caucasianos, africanos, asiáticos, ciganos), na sua raça (e.g., branco, negro, mestiço, etc.), sua religião (e.g., católicos, judeus, muçulmanos, hindus, etc.) entre outros.

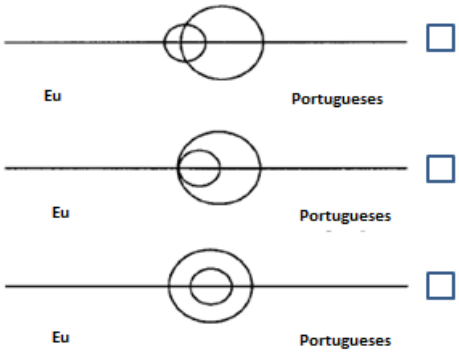
Muitas vezes com base em pistas simples, conseguimos categorizar os outros num determinado grupo, e isso constitui um importante mecanismo de poupança de recursos cognitivos quando formamos impressões, permitindo antecipar alguns dos seus comportamentos e facilitando a nossa interacção social. Em Psicologia Social é comum referir as pessoas que fazem parte do nosso grupo como sendo do nosso **In-group**. As pessoas que fazem parte de outro grupo que não o nosso pertencem a um **Out-group**.

++

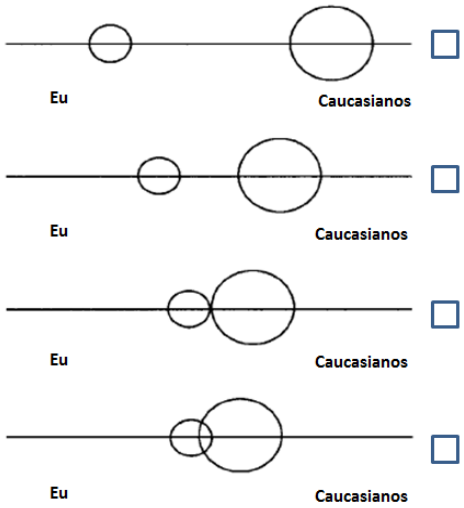
1. Assinale com uma X no ☐ da figura que melhor descreve a sua percepção de **PROXIMIDADE** com os seguintes grupos. Escolha uma **ÚNICA** opção (das 7 existentes) por cada grupo.

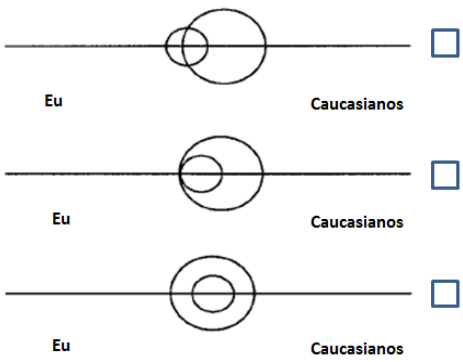
Portugueses



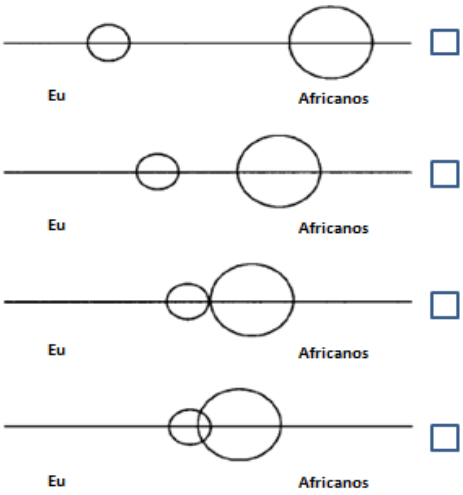


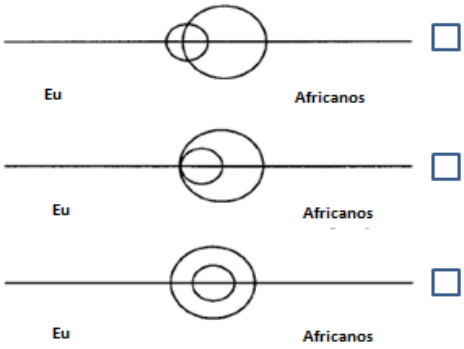
Caucasianos



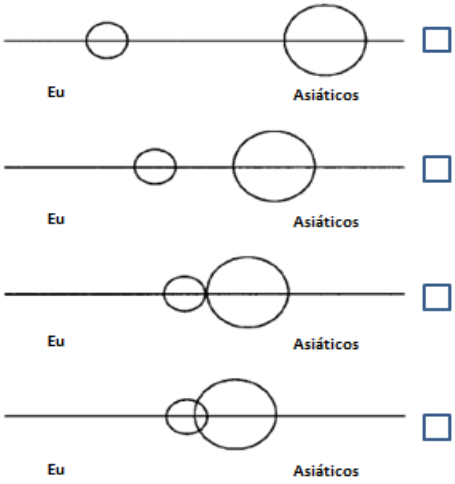


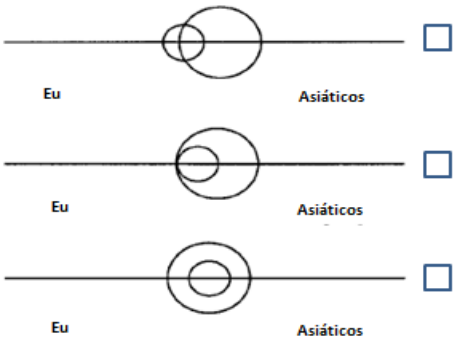
Africanos



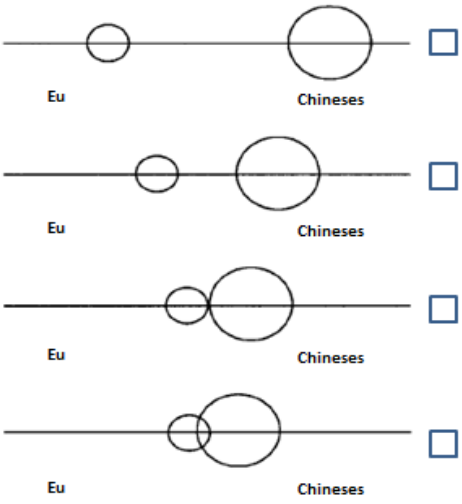


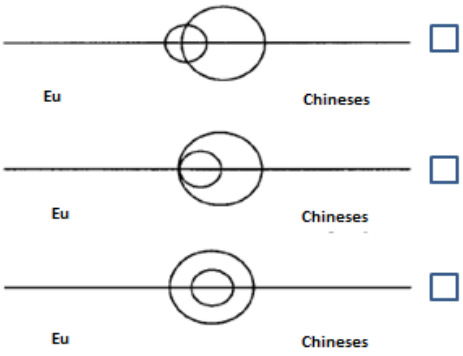
Asiáticos



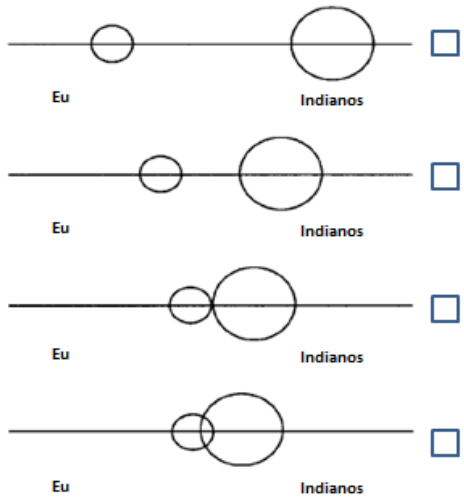


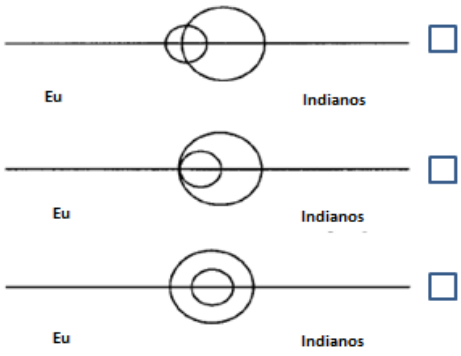
Chineses



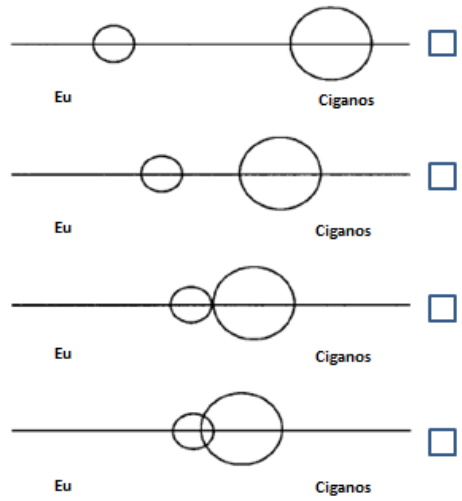


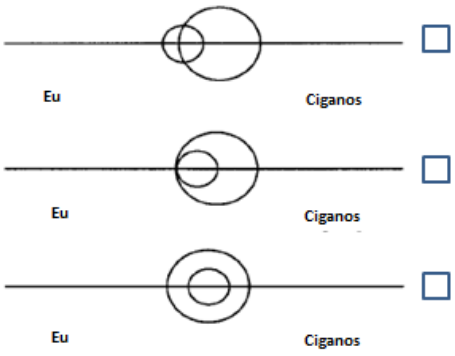
Indianos



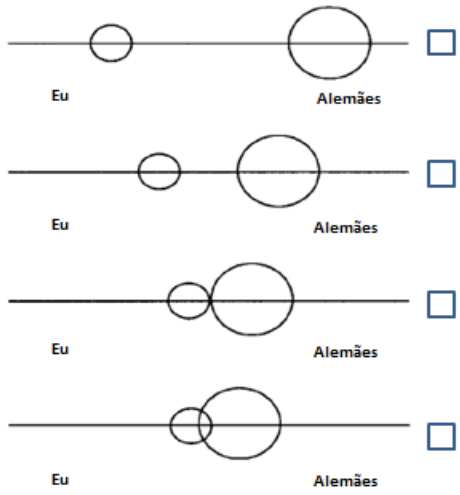


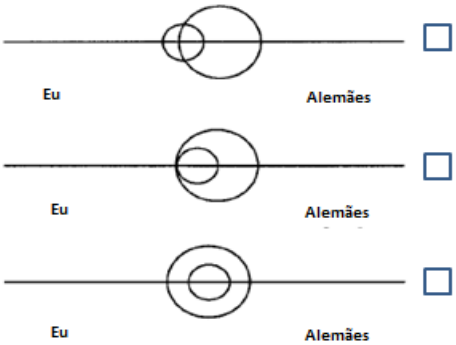
Ciganos



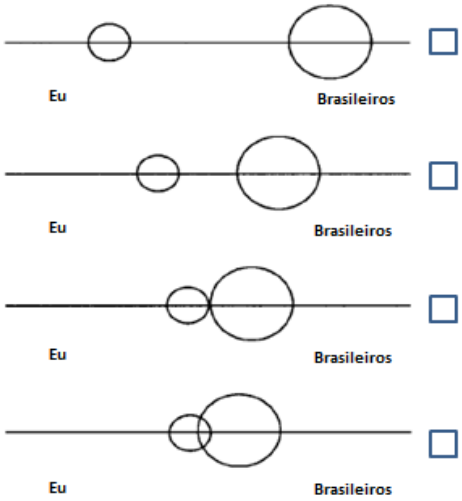


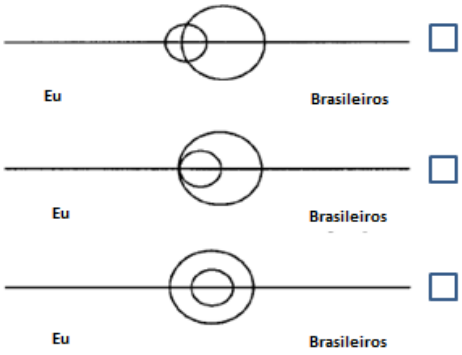
Alemães



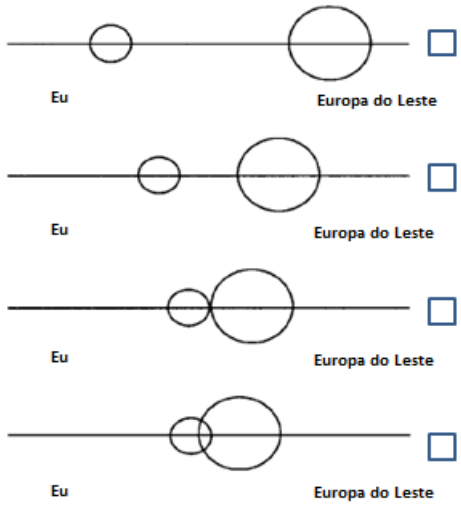


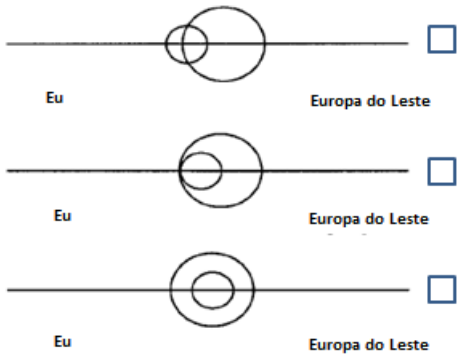
Brasileiros



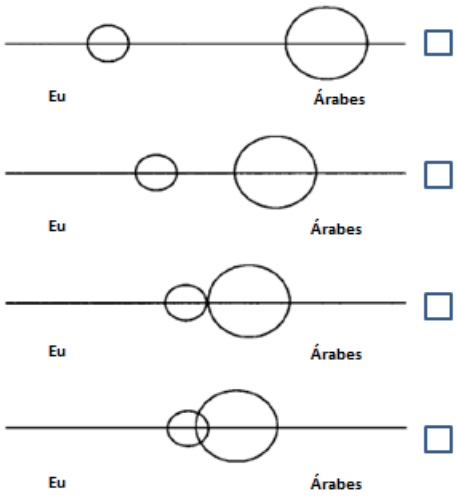


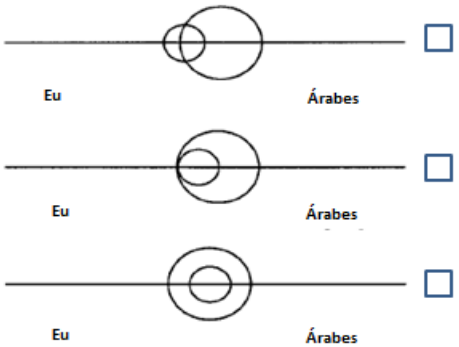
Europa do Leste



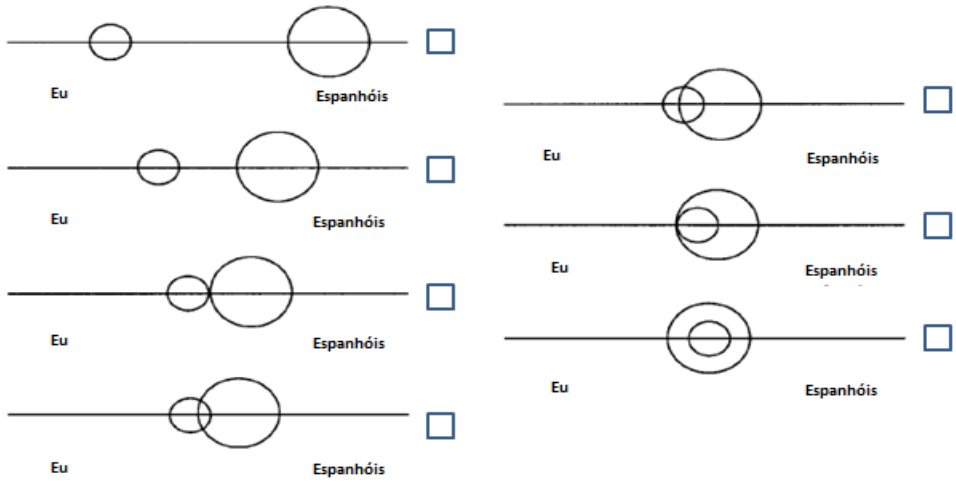


Árabes





Espanhóis



2. Escolha o número da escala (fazendo um **círculo** à sua volta) que melhor represente a sua opinião. Qual o seu grau de ***IDENTIFICAÇÂO*** em relação aos seguintes grupos**?**

Outgroups	*Identificação em relação ao Out-group*
Portugueses	**Pouca Identificação 1 2 3 4 5 6 7 Muita Identificação**
Caucasianos	**Pouca Identificação 1 2 3 4 5 6 7 Muita Identificação**
Africanos	**Pouca Identificação 1 2 3 4 5 6 7 Muita Identificação**
Asiáticos	**Pouca Identificação 1 2 3 4 5 6 7 Muita Identificação**
Chineses	**Pouca Identificação 1 2 3 4 5 6 7 Muita Identificação**
Indianos	**Pouca Identificação 1 2 3 4 5 6 7 Muita Identificação**
Ciganos	**Pouca Identificação 1 2 3 4 5 6 7 Muita Identificação**
Alemães	**Pouca Identificação 1 2 3 4 5 6 7 Muita Identificação**
Brasileiros	**Pouca Identificação 1 2 3 4 5 6 7 Muita Identificação**
Europa do Leste	**Pouca Identificação 1 2 3 4 5 6 7 Muita Identificação**
Árabes	**Pouca Identificação 1 2 3 4 5 6 7 Muita Identificação**
Espanhóis	**Pouca Identificação 1 2 3 4 5 6 7 Muita Identificação**

3. Escolha o número da escala (fazendo um **círculo** à sua volta) que melhor represente a sua opinião. Qual a sua percepção de ***SEMELHANÇA*** em relação aos seguintes grupos**?**

Outgroups	*Percepção de Semelhança em relação ao Out-group*
Portugueses	**Muito Diferente 1 2 3 4 5 6 7 Muito Semelhante**
Caucasianos	**Muito Diferente 1 2 3 4 5 6 7 Muito Semelhante**
Africanos	**Muito Diferente 1 2 3 4 5 6 7 Muito Semelhante**
Asiáticos	**Muito Diferente 1 2 3 4 5 6 7 Muito Semelhante**
Chineses	**Muito Diferente 1 2 3 4 5 6 7 Muito Semelhante**
Indianos	**Muito Diferente 1 2 3 4 5 6 7 Muito Semelhante**
Ciganos	**Muito Diferente 1 2 3 4 5 6 7 Muito Semelhante**
Alemães	**Muito Diferente 1 2 3 4 5 6 7 Muito Semelhante**
Brasileiros	**Muito Diferente 1 2 3 4 5 6 7 Muito Semelhante**
Europa do Leste	**Muito Diferente 1 2 3 4 5 6 7 Muito Semelhante**
Árabes	**Muito Diferente 1 2 3 4 5 6 7 Muito Semelhante**
Espanhóis	**Muito Diferente 1 2 3 4 5 6 7 Muito Semelhante**

4. Escolha o número da escala (fazendo um **círculo** à sua volta) que melhor represente a sua opinião. Qual a sua percepção de **PERTENÇA** em relação aos seguintes grupos

Outgroups	*Percepção de Pertença em relação ao Out-group*
Portugueses	**Nenhuma Pertença 1 2 3 4 5 6 7 Completa Pertença**
Caucasianos	**Nenhuma Pertença 1 2 3 4 5 6 7 Completa Pertença**
Africanos	**Nenhuma Pertença 1 2 3 4 5 6 7 Completa Pertença**
Asiáticos	**Nenhuma Pertença 1 2 3 4 5 6 7 Completa Pertença**
Chineses	**Nenhuma Pertença 1 2 3 4 5 6 7 Completa Pertença**
Indianos	**Nenhuma Pertença 1 2 3 4 5 6 7 Completa Pertença**
Ciganos	**Nenhuma Pertença 1 2 3 4 5 6 7 Completa Pertença**
Alemães	**Nenhuma Pertença 1 2 3 4 5 6 7 Completa Pertença**
Brasileiros	**Nenhuma Pertença 1 2 3 4 5 6 7 Completa Pertença**
Europa do Leste	**Nenhuma Pertença 1 2 3 4 5 6 7 Completa Pertença**
Árabes	**Nenhuma Pertença 1 2 3 4 5 6 7 Completa Pertença**
Espanhóis	**Nenhuma Pertença 1 2 3 4 5 6 7 Completa Pertença**

5. Escolha o número da escala (fazendo um **círculo** à sua volta) que melhor represente a sua opinião. Qual a sua **ATITUDE** em relação aos seguintes grupos**?**

Outgroups	*Atitude em relação ao Out-group*
Portugueses	**Muito Negativa 1 2 3 4 5 6 7 Muito Positiva**
Caucasianos	**Muito Negativa 1 2 3 4 5 6 7 Muito Positiva**
Africanos	**Muito Negativa 1 2 3 4 5 6 7 Muito Positiva**
Asiáticos	**Muito Negativa 1 2 3 4 5 6 7 Muito Positiva**
Chineses	**Muito Negativa 1 2 3 4 5 6 7 Muito Positiva**
Indianos	**Muito Negativa 1 2 3 4 5 6 7 Muito Positiva**
Ciganos	**Muito Negativa 1 2 3 4 5 6 7 Muito Positiva**
Alemães	**Muito Negativa 1 2 3 4 5 6 7 Muito Positiva**
Brasileiros	**Muito Negativa 1 2 3 4 5 6 7 Muito Positiva**
Europa do Leste	**Muito Negativa 1 2 3 4 5 6 7 Muito Positiva**
Árabes	**Muito Negativa 1 2 3 4 5 6 7 Muito Positiva**
Espanhóis	**Muito Negativa 1 2 3 4 5 6 7 Muito Positiva**

Experiments 1 and 2: Presented Sentences

Portuguese Stimuli	*English Stimuli*
O João está a Sorrir	João is Smiling
O João está Carrancudo	João is Frowning
O João está a Chorar	João is Crying
O Sandro está a Sorrir	Sandro is Smiling
O Sandro está Carrancudo	Sandro is Frowning
O Sandro está a Chorar	Sandro is Crying
A Ana está a Sorrir	Ana is Smiling
A Ana está Carrancuda	Ana is Frowning
A Ana está a Chorar	Ana is Crying
A Salomé está a Sorrir	Salomé is Smiling
A Salomé está Carrancuda	Salomé is Frowning
A Salomé está a Chorar	Salomé is Crying
O João está Feliz	João is Happy
O João está Zangado	João is Angry
O João está Triste	João is Sad
O Sandro está Feliz	Sandro is Happy
O Sandro está Zangado	Sandro is Angry
O Sandro está Triste	Sandro is Sad
A Ana está Feliz	Ana is Happy
A Ana está Zangada	Ana is Angry
A Ana está Triste	Ana is Sad
A Salomé está Feliz	Salomé is Happy
A Salomé está Zangada	Salomé is Angry
A Salomé está Triste	Salomé is Sad

Catarina Melo e Azevedo

Instituto Universitário de Lisboa (ISCTE-IUL)/CIS-IUL.

Av. das Forças Armadas, Edifício II, Room D608, 1649-026, Lisboa.

Mobile phone: (+351) 914523090

Email Address: catarina_azevedo@iscte.pt

Current Position

Since 2012: PhD Candidate at Centre for Research and Social Intervention (CIS-IUL), ISCTE-IUL, Lisbon. Supervision: Margarida V. Garrido and Gun R. Semin.

Previous Position

2010/2011: Research Assistant on an FCT funded project, "Socially Situated Cognition", coordinated by Margarida V. Garrido.

Education

2008/2010. Master in Social and Organizational Psychology (final grade: 17/20); (Dissertation grade: 19/20).

Instituto Universitário de Lisboa (ISCTE-IUL); Università degli Studi di Roma "La Sapienza".

2005/2008: Bachelor in Psychology (final grade: 16/20).

Instituto Universitário de Lisboa (ISCTE-IUL).

Internships at other Universities

01/2012 – 02/2013: Visiting junior researcher at Universiteit Utrecht, the Netherlands.

10/2011 – 12/2011: Visiting junior researcher at Humboldt-Universität zu Berlin, Germany.

Publications

Book Chapters

Azevedo, C. M., Garrido, M. V., Prada, M., & Santos, A. S. (2013). *Good is up: A metaphor or a confound?* In C. Andrade, D. Garcia, S. Fernandes, T. Palma, V. Silva, & P. Castro (Eds.). Percursos de Investigação em Psicologia Social e Organizacional (vol. 5). (pp. 93-110). Lisboa: Sílabo.

Scientific journals with peer review

Garrido, M. V., Azevedo, C. M., & Palma, T. A. (2011). Cognição Social: Fundamentos, formulações actuais e perspectivas futuras. *Psicologia, 15*(1), 113-157.

Garrido, M. V., Azevedo, C., Prada, M., & Santos, A. (2011). Gostar ou elevar…eis a questão: Normas de valência e de conteúdo espacial de uma lista de palavras. *Laboratório de Psicologia, 9* (1), 67-93.

Scientific Meetings

Oral Presentations

Garrido, M. V., Prada, M., Azevedo, C., & Semin, G. R. (2016, July). Embodiment in a second language: Evidence from an Affective Priming task with words and faces. 9º Simpósio Nacional de Investigação em Psicologia, Faro, Portugal.

Garrido, M. V., Prada, M., Azevedo, C., & Semin, G. R. (2016, April). Affective priming in a native (L1) and in a learned (L2) language: Evidence for embodied processes? Paper presented at the 11º Encontro da Associação Portuguesa de Psicologia Experimental, ISCTE-IUL, Lisboa, Portugal.

Azevedo, C., Garrido, M. V., & Semin, G. R. (2015, June). The Language Role on Emotional Mimicry. Knowledge of Emotion, Manchester, UK.

Azevedo, C., Garrido, M. V., & Semin, G. R, (2015, April). Different languages, Different processing: The native and the second language cases. 10º Encontro da Associação Portuguesa de Psicologia Experimental, Faro, Portugal.

Azevedo, C., Garrido, M. V., & Semin, G. R. (2013, June). A corporalização da linguagem I: Respostas fisiológicas à apresentação de estímulos emocionais apresentados na língua nativa e na língua aprendida. VIII Simpósio Nacional de Investigação em Psicologia (APP), U. Aveiro, Aveiro, Portugal.

Garrido, M. V., Azevedo, C., & Semin, G. R. (2013, June). A corporalização da linguagem II: Respostas comportamentais à apresentação de estímulos linguísticos e pictóricos na língua nativa e na língua aprendida. (Embodiment of language I: Behavioral responses to L1 and L2). VIII Simpósio Nacional de Investigação em Psicologia, U. Aveiro, Aveiro, Portugal.

Azevedo, C., Garrido, M. V., & Semin, G. R. (2013, May). Grounding emotion on native (L1) and learned (L2) languages. IX Phd Meeting in Social and Organizational Psychology, ISCTE-IUL, Lisboa, Portugal.

Azevedo, C., Garrido, M., & Semin, G. (2013, April). Resposta Emocional à Língua Nativa e Aprendida: Medidas fisiológicas e comportamentais. 8º Encontro Nacional da Associação Portuguesa de Psicologia Experimental (APPE), Aveiro, Portugal.

Azevedo, C., Garrido, M. V., & Semin, G. R. (2012, September). Grounding emotion on language: Embodied differences between primary-native and secondary-learned languages. 14th Transfer of Knowledge Conference of the European Social Cognition Network 2 (ESCON2), Estoril, Portugal.

Farias, A. R., Garrido, M. V., Semin, G. R., & Azevedo, C. M. (2011, July). The auditory distribution of political positions. VIth General Meeting of the European Association of Social Psychology (EASP), Stockholm, Sweden.

Azevedo, C. M., Garrido, M. V., Prada, M., & Santos, A. S. (2011, May). Good is up: A metaphor or a confound? VI PhD Meeting in Social and Organizational Psychology, ISCTE-IUL, Lisbon, Portugal.

Posters

Azevedo, C., Garrido, M. V., & Semin, G. R. (2013, June). Grounding Emotions and Emoties: L1 and L2 differences. Summer School Embodied Inter-subjectivity: the 1st-person and the 2nd-person perspective, Island of Aegina, Greece.

Garrido, M. V., Azevedo, C., & Semin, G. R. (2013, May). Embodying a foreign language: Behavioral and psychophysiological evidence. 25th APS Annual Convention, Washington DC, USA.

Prada, M., Azevedo, C., Garrido, M. V., & Santos, A. S. (2011, July). To like or to elevate…that's the question: Valence and spatial content norms of a words list. 12th European Congress of Psychology, Istanbul, Turkey.

Azevedo, C. M., & Garrido, M. V. (2011, March). A ancoragem afectivo-espacial da memória: Uma questão de movimento. VI Encontro da Associação Portuguesa de Psicologia Experimental, Coimbra, Portugal.

Summer Schools

17-30 August, 2014: EASP Summer School, Group "Epistemology and Methods in Social Psychology", ISCTE-IUL and ICS, Lisbon, Portugal.

9-15 June, 2013: Summer School "Embodied Inter-subjectivity: the 1st-person and the 2nd-person perspective", Island of Aegina, Greece.

Organization of conferences and scientific meetings

17-30 August, 2014: Summer School of the European Association of Social Psychology (EASP) at ISCTE-IUL and ICS-UL.

15-16 September, 2011: Small Group Meeting on Socially Situated Cognition at ISCTE-IUL.

Research projects: grants and funding

PhD grant by FCT (SFRH/BD/77961/2011).

Project title: Social cognitive consequences of differences in the emotional grounding of concepts: The role of embodiment.

Research Assistant grant by FCT (PTDC/PSIPSO/099346/2008).

Project title: Socially Situated Cognition.

Graduate student scholarship for lecturing at the Laboratório de Línguas e Competências Transversais (LLCT-IUL).

Complementary training and education

17-30 August, 2014. Workshop Epistemology and Methods in Social Psychology. Klaus Fiedler & Leonel Garcia-Marques (ISCTE-IUL; ICS).

7-9 May, 2013. Workshop Scientific Writing and Publishing. James Coyne (ISCTE-IUL).

12 July, 2012. Skin Conductance Workshop. Francisco Esteves (ISCTE-IUL).

October – December, 2011. Advanced training on EMG data collection, treatment and analysis using Biopac hardware and AcqKnowledge software. Mentors: Ursula Hess & Christophe Blaison (Humboldt-Universität zu Berlin).

December, 2009. Certificado de Competências Pedagógicas (CCP) [Pedagogical Aptitude Certificate].

February – August, 2009. Erasmus Programme in Rome (Università degli Studi di Roma "La Sapienza").

Awards and Prizes

2014: Publication award by CIS-IUL (ISCTE-IUL).

2012: Publication award by CIS-IUL (ISCTE-IUL).

2010: Caixa Geral de Depósitos Prize – Best master student.

2005: Academic Excellence Prize– Best grades when entering the University.

Teaching undergraduate students

2014: Presentation skills (25h in class). LLCT-IUL/ISCTE-IUL.

2015: Professional Presentations (20h in class). LLCT-IUL/ISCTE-IUL.

2016: Professional Presentations AND Bibliographical Research and Information Analysis (25h in class). LLCT-IUL/ISCTE-IUL.

Entrepreneurial activities

2014: Projecto Warehouse. Campo das Salésias Project: Development of a questionnaire to access the population needs in terms of public spaces. Development of project proposals to apply for National Funds.

Languages

Portuguese (Native)

English: Speaking, understanding, writing and reading (Excellent)

Italian: Speaking (Good), Understanding (Good), Reading (Excellent)

Spanish: Understanding (Good), Reading (Excellent)

French: Reading (Excellent)