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PUTTING ONESELF IN THE LOWEST' SHOES: A MULTI-METHOD INVESTIGATION OF EMPATHY TOWARDS (DEROGATED) OUTGROUPS

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Table of Contents

Résumé

Plusieurs décennies de recherche sur le Modèle du Contenu des Stéréotypes témoignent que les groupes perçus comme peu compétents et peu chaleureux sont victimes de stéréotypes négatifs, de dénigrement, de déshumanisation et d'agression. Dans l'ensemble, ces résultats pointent vers un manque d'empathie envers les membres de ces groupes désavantagés. Toutefois, les recherches sur ce sujet sont rares et se limitent souvent à des questionnaires d'auto-évaluation. Notre programme de recherche vise à étudier l'empathie envers les membres de groupes stigmatisés en s'appuyant sur de multiples approches de l'empathie, allant des mesures comportementales à des mesures neurales. À travers ces multiples mesures investiguant diverses composantes de l'empathie, nos données ne soutiennent pas l'hypothèse que l'appartenance à des groupes stigmatisés modère l'empathie. Dans l'ensemble, nos résultats suggèrent que la relation entre les stéréotypes de groupe en termes de compétence et de chaleur et l'empathie s'avère plus complexe que ce que l'on pourrait supposer. Nous appelons les futures recherches sur cette question à prendre en compte des facteurs plus fins afin de mieux comprendre le lien entre stigmatisation et empathie.

Abstract

As evidenced by decades of research on the Stereotype Content Model, groups perceived as low on competence and warmth are victims of negative stereotypes, strong derogation, dehumanization, and aggression. Taken together, these findings point towards a lack of empathy towards members of such derogated groups, but research on this issue is scarce and often limited to self-report questionnaires. Our research program aims to investigate empathy towards derogated outgroup members by relying on multiple approaches to empathy, ranging from behavioural to neural measurements. Across these multiple measures tapping into various components of empathy, we did not find evidence that membership in derogated outgroups moderates empathy. Taken together, our findings suggest that the relation between group stereotyping in terms of competence and warmth and empathy proves more complex than hypothesized. We call on future research on this issue to consider more fine-grained factors in order to better understand the link between outgroup derogation and empathy.

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Introduction

Introduction

"First of all, if you learn a simple trick, Scout, you'll get along a lot better with all kinds of folks. You never really understand a person until you consider things from his point of view... until you climb into his skin and walk around in it."

Atticus Finch, To Kill A Mockingbird (Lee, 1960)

Imagine that on a cold, snowy day, you are strolling in a park and approaching a small flight of stairs. At the top of these stairs, you see a person walking towards you. Unfortunately, this person starts slipping on the icy snow and violently falls down the five-steps-long stairs. Bear with us a little longer and imagine that based on a series of visual cues, you assumed that this person was a firefighter. Would you feel for this person, and would you think this person felt bad? Now, imagine that following this poor firefighter, a banker falls down the stairs. And now an elderly person. Or a drug addict. Do you think you would feel the same way when seeing each of these people slip and fall? This very question is at the heart of the present doctoral dissertation.

Decades of research show that membership in one social group or another is not equivalent. For instance, being labelled a banker or a drug addict activates very different stereotypes in the observers' mind (Cuddy et al., 2009; Fiske et al., 2007). As shown by the work on the Stereotype Content Model (Fiske, 2015, 2018; Fiske et al., 2002), the content of these stereotypes revolves around two main dimensions: the competence dimension, referring to perceptions of a group's ability to carry out their intents, and the warmth dimension, denoting perceptions of a group's willingness to cooperate or compete. Sadly, a substantial amount of research shows that the groups perceived to be low in both competence and warmth (LCLW) are the victims of derogation and dehumanization. For example, research on social dilemmas showed that people are more willing to sacrifice members of these groups compared to members of other groups (Awad et al., 2018; Cikara et al., 2010) and that these decisions are perceived as easier to make and trigger less negative emotions (Bai et al., 2021). Other research on social perception shows that people generally report feeling disgust when faced with LCLW group members (Cuddy et al., 2009), an emotion usually related to elicitors that people try to avoid such as body wastes or rats (Curtis & Biran, 2001). In addition, research looking at behavioural tendencies put forth that membership in LCLW groups elicits both passive harm (e.g., exclusion) and active harm (e.g., physical violence) on the observers' part (Cuddy et al., 2007). Finally,

people consider LCLW group members to be closer to inanimate objects than to humans, as they deny them the ability to possess mental states (Cameron et al., 2016; Harris & Fiske, 2006, 2007, 2009, 2011).

One societal outcome of such dehumanization is reflected by so-called hostile architecture, that is, the conception of urban environments to be as uncomfortable or even painful as possible to rest on for longer periods of time in order to drive homeless people away (L. Hudson, 2023). One could easily imagine that people behind these decisions never put themselves in a homeless person's shoes nor considered how this person would feel, being forced to sleep on a concrete floor under the rain. In other words, such decisions show a clear lack of empathy towards LCLW group members.

Although empathy is a complex concept, often serving as an umbrella term for multiple phenomena (Batson, 2009), it is generally defined as the process of '*feeling for another person'* (Davis, 2018; Zaki & Ochsner, 2016). Across the literature on intergroup empathy, research consistently shows that people display a tendency to show more empathy for members of their own group compared to members of an outgroup. But what happens when targets are both outgroup members, belonging to different groups? Unfortunately, evidence on this question is very limited (Aue et al., 2021; Cikara & Fiske, 2012). As seen above, one could make the inference that observers display less empathy towards LCLW targets compared to other social targets, as they exhibit a tendency to dehumanize these targets. After all, if you saw a chair falling down the icy stairs of flight, would you feel bad for the chair? Because the literature on intergroup perception hints towards people perceiving LCLW as less human, in this dissertation we set out to test if, in turn, observers display lower levels of empathy for such targets compared to other, non-dehumanized social targets.

To do so, we present a total of seven chapters in this doctoral dissertation. In Chapter 1, we start by detailing the social perception framework on which we relied, namely the Stereotype Content Model (Fiske et al., 2002). We detail the history of the research on the two fundamental dimensions of social perception, that is, competence and warmth, and briefly allude to their recent subdivision in facets (Abele et al., 2016, 2021). We go on by detailing the orthogonal relation between dimensions, resulting in four quadrants, and discuss the different emotional and behavioural reactions that facing or thinking about group members of each quadrant entails. We then present an overview of the literature pertaining to the dehumanization of groups in the low competence low warmth quadrant.

In Chapter 2, we offer a comprehensive review of the concept of empathy, from its historical roots to the *hydra-like* concept it developed into (i.e., when one researcher kills a definition, two more emerge) and the empirical effort currently taking place to develop a consensus on the nature of this phenomenon (Eklund & Meranius, 2021). In addition, we detail (social) neuroscientific evidence highlighting the presence of neural correlates

implicated in empathy (Fan et al., 2011). We additionally discuss the role of motivation in empathy. We end by reviewing recent propositions of models structuring empathy, its components, antecedents, consequences, and their relations, both at the neural and behavioural levels (Zaki, 2014).

In Chapter 3, we consider social factors moderating empathy. We start by detailing factors at the individual and interpersonal levels such as psychological disorders or power. We then outline the research effort focusing on empathy at the intergroup level, by describing the work on parochial empathy (i.e., the preferential empathy for ingroup *vs*. outgroup targets) and its moderators. We illustrate the importance of considering the outgroup's characteristics by presenting work on Schadenfreude (i.e., the counter-empathic reaction from a competitive target's misfortune; Cikara et al., 2014) and point out the very limited work effort considering the influence of the outgroup's characteristics on empathy. We end by detailing why it is important to study empathy especially regarding derogated groups.

Chapter 4 comprises a set of five experiments (four in the main text as well as one in supplementary material) looking at observers' perceived cognitive cost of empathy and their resulting motivation to empathize with derogated targets. Building upon previous work showing that observers display a clear preference for physically describing targets compared to empathizing with them due to higher perceived cognitive costs associated with the latter compared to the former (Cameron et al., 2019), we test whether this perceived cognitive cost of empathy proves greater for LCLW compared to other social targets. As observers generally show a reduced mind attribution to LCLW group members (Cameron et al., 2016; Harris & Fiske, 2006), we hypothesize that compared to merely describing targets, observers will display a reduced motivation to empathize with targets due to higher perceived cognitive cost, and that this effect will be even stronger for LCLW targets as observers need to re-attribute a mind to such targets prior to empathizing.

In Chapter 5, we investigate empathy by looking at observers' visual perspective taking ability (VPT), the ability to imagine what a target sees. Past research on VPT showed that observers display an egocentric bias in the sense that they prove less efficient in adopting the visual perspective of a target when the target's and their own perspectives diverge (Surtees et al., 2012, 2016). In a collection of six experiments (four in the main text and two in supplementary material), we look at whether observers prove differentially efficient at adopting the visual perspective of a target as a function of this target's group membership (i.e., SCM quadrant). Based on work suggesting LCLW targets are dehumanized, we predicted that we would replicate the egocentric bias, but that this bias would prove even stronger for LCLW targets.

In Chapter 6, we turn to a neuroscientific approach to empathy and rely on event-related potential measures to capture the time course of empathy for pain, that is, the difference of

electrical brain activation over time when witnessing a target subjected to painful (*vs.* painless) stimulations. Research on intergroup empathy at the neural level put forth that observers show more empathy towards ingroup members' pain compared to outgroup members, as measured by brain activity (S. Han, 2018). In the first study, we seek to replicate and extend past work by looking at this parochial empathy when contrasting ingroup targets to LCLW targets, thus going beyond the usual juxtaposition of racial in- *vs.* outgroup targets. Based on previous work, we hypothesized that we would observe parochial empathy, that is, a greater difference in observers' brain activity between painful and painless stimulations when such stimulations are administered to ingroup compared to outgroup targets. In the second study, we test whether the derogatory perception of an outgroup moderates the emergence of empathy, by contrasting HCHW to LCLW outgroup members. We hypothesized that observers would prove less empathic towards the pain of LCLW compared to HCHW outgroup members.

Finally, in Chapter 7 we discuss the findings of this doctoral dissertation. We start with a summary of the rationale underlying our empirical effort. We then summarize each empirical chapter individually, detailing and discussing our results. Finally, we conclude this dissertation by providing a more integrative discussion of the bulk of our findings, suggesting interpretations, limitations, and avenues for future research across our three empirical chapters.

Chapter 1.

Group stereotypes: from admiration to derogation

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1. Fundamental dimensions of social perception

Social perception is central to human life and has been the subject of countless scientific studies in the past decades, not only at the interpersonal- but also at the group level. Most past research focused on the processes at play in social perception, but more recently researchers also started to focus on the content of social perception. Across all levels of social perception and in various different domains, the bulk of findings points to the fact that there are two fundamental dimensions underlying the content of social perceptions[1]. These two dimensions are commonly referred to as the "Big Two" (Abele et al., 2021; Yzerbyt, 2016), with traits related to these dimensions making up 82% of the variance in social judgments (Wojciszke et al., 1998).

Although different terms have been used in various research traditions, these two dimensions have recently been labelled the horizontal and vertical dimensions (Abele et al., 2021) and are related to two important questions arising when considering social targets (Fiske, 2015). The horizontal dimension refers to the question about the target's intent: Can the target be considered a threat, or does the target harbour good intentions? This question serves as a basis to determine whether we will cooperate or compete with the target. The horizontal dimension is strongly related to a target's likeability and morality. The vertical dimension refers to the question about the target's ability to carry out these intentions: Is the target capable of harming me if they mean to do so, or will the target be helping me if they are friendly? As such, the vertical dimension is strongly related to a target's status, power, and resources. Taken together, these two questions shape the relations we have with a target. For instance, a target may seek cooperation, but lack the ability to achieve any goal, thus being more of a burden than a help. In other cases, a target may seek competition but may prove a rather limited threat as they are unable to achieve any goal.

Within the impression formation literature, Rosenberg and colleagues (1968) conducted what is considered to be the first study investigating and clearly identifying these two dimensions of social perception. These authors compiled a list of traits commonly used in impression formation and asked participants to indicate their perception of people they knew regarding these traits by sorting traits that went together into the same pile and putting those that did not fit together in different piles. Relying on multi-dimensional

[1] Of note, the ABC model (Koch et al., 2016) recently argued for a three-dimensions solutions, namely agency, beliefs, and communion. However, this model seem to prove most relevant when judging a large number of social groups (Koch et al., 2021). In addition, the ABC model does not conceptualize the dimensions in a similar way, positing that communion derives from perceived agency and beliefs for instance. As such, it constitutes an exception in the scientific landscape, that we do not deem relevant in our theoretical approach of group stereotyping.

scaling analysis, they found that the data were best described using a two-dimensional model, with one dimension being mostly related to (the lack of) social abilities, namely "Social good-bad", and the other dimension being mostly related to (the lack of) intellectual abilities, namely "Intellectual good-bad". Since then, the two dimensions have been investigated in a large variety of domains and settings, ranging from interpersonal projection (Toma et al., 2012) to marketing (Bratanova et al., 2015), and from negotiation research (Demoulin & de Dreu, 2010) to organizational psychology (Cuddy et al., 2011) – to name but a few. Somewhat confusingly, they also have been given different names by various researchers, such as other-profitability and self-profitability (Peeters, 1992), warmth and competence (Fiske et al., 2002), social desirability and social utility (Dubois & Beauvois, 2005), morality and competence (Wojciszke, 2005), communion and agency (Abele & Wojciszke, 2007), or socio-emotional orientation and task orientation (Bales, 1950). While many different labels have been used, the underlying content of these two dimensions remains largely the same, with the first dimension relating to a target's intent and the second dimension relating to a target's ability. As the focus of this thesis is mainly on group perception, we decided to apply the terminology of the Stereotype Content Model (Fiske et al., 2002; for a recent review on social perception models see Abele et al., 2021) as our preferred framework and will use the labels warmth and competence for the horizontal and vertical dimension, respectively.

Very recent research on social perception highlighted the fact that the Big Two can be further divided into two components each, resulting in four facets of social perception (Abele et al., 2008, 2016, 2021; Brambilla et al., 2012; Carrier et al., 2014). The facets of the warmth dimension are sociability, referring to the pleasantness of a target, and morality, referring to the decency and integrity of a target. These facets are assessed using traits such as 'friendly' or 'nice' for sociability, and 'honest' or 'sincere' for morality. The facets of the competence dimension are ability, referring to the capacity of a target, and assertiveness, referring to the motivation of a target. These facets are assessed using traits such as 'skilled' or 'smart' for sociability, and 'confident' or 'determined' for assertiveness (Barbedor et al., 2024). Although these facets have long been present in the traits used to assess warmth and competence, their recognition as distinct subcomponents of the Big Two is fairly recent (Abele et al., 2021; Carrier et al., 2014). As such, most of the past literature on group perception revolves around the warmth and competence dimensions, without further specifying facets. Consequently, in this thesis, we decided to only rely on warmth and competence as encompassing labels.

2. The Stereotype Content Model

In their Stereotype Content Model (SCM), Fiske and colleagues (2002) propose that the content of stereotypes derives from the relationship between groups (i.e., cooperation or competition) as well as their relative status. Across a series of studies, Fiske and colleagues showed that group stereotypes can indeed be captured by the warmth and competence dimensions and that these two dimensions relate to competitiveness and status, respectively (Kervyn et al., 2015). Additionally, they also found that warmth and competence can be considered orthogonal, resulting in a two-dimensional space constituted of four distinct quadrants. Importantly, similar results have been found outside of the original US sample,

for example across 10 non-US samples varying on the individualism-collectivism continuum (Cuddy et al., 2009). These findings emphasize the usefulness of the SCM as a universal framework for understanding group stereotypes.

The first quadrant comprises groups stereotypically perceived as both highly competent and warm (HCHW). Such groups are often our ingroups, or groups that we collaborate with and consider allies (Yzerbyt & Demoulin, 2019), and that elicit emotions of admiration or pride (Fiske et al., 2002). According to the behaviours from intergroup affect and stereotypes (BIAS) map proposed by Cuddy and colleagues (Cuddy et al., 2007), HCHW groups are the target of behaviours corresponding to active (e.g., helping carrying a heavy object) and passive (e.g., collaborating with a target because of their assumed intelligence) facilitation. Clearly thus, most behaviours directed towards these groups aim at benefiting them, be it active or passive behaviours.

The second quadrant concerns groups stereotypically perceived as high on competence but low on warmth (HCLW). These groups elicit envy (Fiske et al., 2002) and benefit from passive facilitation but can also be the targets of active harm (Cuddy et al., 2007) such as physical aggression. As the feeling of envy involves both bitterness and respect, the misfortune of HCLW group members can sometimes trigger a certain pleasure among observers, an emotion also known as Schadenfreude (Cikara & Fiske, 2013). Conversely, the success of HCLW group members can sometimes cause displeasure among observers, known as Glückschmerz (Cikara et al., 2014). Although no social group universally belongs to a specific quadrant, examples of HCLW groups around the globe include rich people or white-collar workers (Durante et al., 2017b).

The third quadrant includes groups such as elderly people, stereotypically perceived as low on competence but high on warmth (LCHW; Cuddy et al., 2005). These groups elicit pity (Fiske et al., 2002) and benefit from active facilitation, but can also be the victim of passive harm (Cuddy et al., 2007; Rohmer et al., 2022) such as social exclusion. For instance, while some LCHW groups benefit from a series of policies aimed at helping and facilitating them in various spheres such as employment or health, the same groups can also be ostracized, excluded, and see their needs neglected, both at the interpersonal and institutional levels. This dovetails nicely with research on disabled people from Rohmer and Louvet (2012, 2016, 2018) showing that, although at the explicit level this group is described as lacking competence but displaying a high level of warmth, it is associated with neither competence nor warmth at a more indirect level. One account for this discrepancy is social desirability, with people expressing a positive association between disabled people and warmth at the explicit level so as to appear unprejudiced.

The fourth quadrant involves groups stereotypically perceived as lacking both competence and warmth (LCLW). These groups elicit contempt and disgust (Fiske et al., 2002) and are the victims of both active and passive harm (Cuddy et al., 2007; Lott, 2002). Examples of LCLW groups around the globe include groups such as poor people (Lindqvist et al., 2017) or immigrants (Binggeli et al., 2014).

3. Derogating the lowest

As seen above, perceivers do not evaluate and treat all outgroups in the same way. Moreover, there is definitely more to stereotypes than a mere negative–positive valence dimension, as research clearly shows two dimensions organize the various evaluations associated with different social groups. According to the SCM perspective, groups belonging to the LCLW quadrant often are the victims of dehumanization (for a recent review on dehumanization, see Kteily & Landry, 2022). That is, they are denied typical human traits and are not perceived as truly social agents. In a study relying on neuroimaging, Harris and Fiske (2006, 2007) showed that when presented with exemplars of LCLW group members, the brain area associated with social cognition fails to be activated. No such pattern emerged for targets of other quadrants. Conversely, the brain area associated with disgust shows a higher level of activation when people are presented with LCLW group members compared to targets from the other quadrants. This reduced tendency to appraise LCLW targets as 'social targets' can also be observed in the attribution of mental states. For instance, people use fewer verbs referring to mental state (relative to verbs referring to descriptive or interpretive actions) when relating the daily life of a LCLW target compared to targets from the other quadrants (Harris & Fiske, 2009). People also explicitly ascribe less mental states to LCLW targets, for example judging that LCLW targets possess less self-control or experience hunger and fear in lesser degrees (Cameron et al., 2016). Such results are surprising given that, as pointed out by Harris and Fiske (2011, p. 175): 'People can spontaneously infer mental states even for targets without actual minds.' These authors observed that brain regions linked to attention and conflict resolution were active when facing LCLW targets. They thus conjectured that, although people perceive the humanness of LCLW targets, they actively dehumanize them and shift their attention away from them, resulting in the activation of the conflict resolution area of the brain.

This dehumanization of LCLW targets leads to extreme derogation. For instance, poor people, welfare recipients or homeless people come across as dishonest and lazy, or as tending to engage in irresponsible behaviours such as alcohol abuse; they are also generally considered to be responsible for their situation (Bertrand et al., 2004; Bolitho et al., 2007; Bullock, 1999; Cozzarelli et al., 2001; Lott, 2002; Underlid, 2005; Woods et al., 2005). Drug addicts are deemed dangerous, with people explicitly expressing their reluctance to having a drug addict in their social circle as well as their willingness to accept discriminatory actions towards them (Barry et al., 2014; Corrigan et al., 2009). Immigrants are perceived as a threat and as criminals (Esses, 2021; Pettigrew, 1998), and in the Eurobarometer (2018), which gathered data from 28 European countries, more than half of respondents claimed that immigrants arriving from outside the European Union 'are a burden on the country's welfare system' and 'worsen the crime problems in the country'. Such representations of LCLW groups are propagated through the media (Boyd, 2002; Bullock et al., 2001; Esses et al., 2013; S. Taylor, 2008), and can be found across multiple European countries such as Germany, the Netherlands and Czech Republic, but also in the USA (Esses et al., 2021; Kreidl, 2000; Pettigrew et al., 2007; Wagner et al., 2008).

In addition to the group-specific consequences listed above, this dehumanization entails further consequences at a more general level. For instance, Cikara and colleagues (2010) showed that when confronted with the well-known trolley dilemma, in which people must

choose between sacrificing a target in order to save multiple other targets or vice-versa, participants are more likely to sacrifice LCLW targets compared to targets from the other quadrants. Relying on a similar design, Bai and colleagues (2021) found that sacrificing LCLW targets was perceived as an easier decision than sacrificing other social targets, and participants reported feeling less emotional when doing so. More recently, Awad and colleagues (2018) set up a similar moral dilemma, but with the trolley being replaced by an autonomous car, and with the choice being saving pedestrians whilst sacrificing the passengers or vice-versa. They found that, among other things, homeless people were more often sacrificed than saved, at rates similar to those found for animals, unlawful people, and the elderly[2]. Other consequences of the dehumanization of LCLW targets include the fact that people find it more tolerable to ostracize them and have a representation of faces lacking both competence and warmth when picturing an ostracized target (Rudert et al., 2017). Moreover, the more a trait is seen as human (e.g., higher cognitive abilities), the less people attribute this trait to LCLW targets (Vaes & Paladino, 2010). On this note, Kteily and colleagues (2015) asked participants to rate multiple social groups regarding the degree to which they considered these groups as constituted of evolved members or of members closer to lower animals, with 0 being fully animal and 100 being fully human. In addition to these extremely explicit instructions, the authors added a few pictures representing the human evolution above the slider, ranging from a chimpanzee to a current human being. They found that even when using such a blatant measure of dehumanization, US participants indicate that some groups typically perceived as LCLW are less evolved than their ingroup, whereas other non-derogated outgroups are perceived as fully evolved. This is in line with Pettigrew's observation (1998) that, although subtle prejudice is the most current form of prejudice, people still display blatant forms of prejudice to this day.

Of note, the concept of dehumanization is still largely debated, with a recent critique arguing that dehumanization as measured by the attribution of typical human traits is merely the result of ingroup favouritism (Enock et al., 2021, but see Vaes, 2023). Our goal here is not to take a stand on these issues, as this would require experimental work going beyond the scope of this doctoral thesis. Rather, we want to point out that the fact that LCLW targets are dehumanized does not stem from a comparison with the ingroup, but rather a comparison with other outgroups. Indeed, in their study, Vaes and Paladino (2010) included multiple outgroups, but only LCLW outgroups were dehumanized. The same holds for the findings of Harris and Fiske (2006, 2007) discussed above. This shows that LCLW quadrant groups entail a different and specific social perception compared to other quadrants, namely a strong derogatory one, and that this perception does not merely stem from an ingroup comparison. In turn, this supports the need to look more closely at the influence of an outgroup's specific characteristic (e.g., its location in the SCM quadrant) in the literature on intergroup relations.

Research on the Stereotype Content Model and the low competence low warmth quadrant makes it clear that groups belonging to this quadrant are victims of strong derogatory and dehumanizing perceptions. All in one, the negative outcomes stemming from this dehumanization (e.g., higher tolerance for the ostracism of LCLW targets)

[2] The presence of elderly targets in the most sacrificed groups is in accordance with the idea mentioned above that, while people explicitly associate some groups with high warmth, they are in fact more closely related to LCLW targets in people's mind (Chang et al., 2023; Rohmer & Louvet, 2012, 2016, 2018).

suggest that people fail to display empathy towards these targets, as compared to other social targets. In the next chapter, we will present an integrative view of the concept of empathy, from its historical roots to the most recent models and research efforts.

Chapter 2.

Empathy: A multi-faceted process

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This chapter introduces the concept of empathy, a sometimes elusive but key concept in this dissertation. To better grasp this phenomenon, we explore the origin of empathy and detail its many conceptualizations, from its conception to the most recent propositions. We discuss important findings in behavioural and neurosciences and offer a selection of recent models that we deem are relevant to our work. Importantly, the chapter ends with a summary of what we consider as empathy in the context of this dissertation.

1. The many faces of empathy

As stated by Zaki (2014, p.1608): 'There are nearly as many definitions of empathy as there are scientists who study this phenomenon'. This opinion has been shared by many authors throughout the decades (Batson, 2009; Batson et al., 1987; Cuff et al., 2016; Hall & Schwartz, 2022; Levy, 1997; Quesque et al., 2024; Wispé, 1986). As an amusing anecdote illustrating this observation, Decety and Cowell (2014, p. 525) related that when attending an international society meeting, they noticed that every time an attendee would ask how empathy could be integrated into the speaker's research, they were met with the same reply: 'What do you mean by empathy?.' In fact, a review conducted a few years ago found 43 unique and coexisting definitions and conceptualizations of empathy (Cuff et al., 2016). Fortunately, some authors argue that research on empathy is slowly heading towards a consensus, with multiple fields of research defining empathy as comprising four core concepts: the understanding of a person's mental state, the activation of appropriate feelings in response to this mental state, the sharing of representations relative to this mental state, and finally a self-other distinction (Eklund & Meranius, 2021).

Adam Smith and his *Theory of moral sentiments* (1759/1976) is often seen as a seminal work on empathy. Smith argued that in order to understand what a target feels in a given situation, one projects oneself in the target's situation to imagine what one would feel at their place, a phenomenon he labelled *fellow-feeling*. Contemporary to Smith, David Hume (1738/1978) argued that this *fellow-feeling* is not the result of a projection, but rather a contagion from the target's feeling. This debate illustrates that empathy was already conceptualized as involving different phenomena, that is, an active form that we could associate with perspective taking in the case of Smith and a passive form that we could associate with emotional resonance in the case of Hume (Fleischacker, 2019). In addition, even when discussing the work of Adam Smith, researchers argue over what exact phenomenon Smith was actually theorizing about (Sugden, 2002).

In psychology, the work on empathy finds its roots in the German study of aesthetics, with German psychologists working on *Einfühlung*, that is, the action of projecting inner feelings and movements into objects and art (Lanzoni, 2018). In 1908, the word *empathy* was proposed as an English translation of *Einfühlung* and soon started to refer to the action of imagining oneself in another person's situation (Cuff et al., 2016). From then on, this term has been defined in terms of various processes such as motor imitation, perspective taking or concern for others, among other things (Lanzoni, 2018), and has been studied in

multiple domains of psychology. For example, developmental psychology studied empathy as a form of mimicry and experience sharing in newborns (Hoffman, 1985). In clinical psychology, empathy has been studied as a moderating factor of therapeutic relations (i.e., the more a therapist shares in a patient's feelings and thoughts, the stronger the relation; Elliott et al., 2011), as well as in different psychopathologies such as psychopathy, autistic spectrum disorders or alexithymia (Kennett, 2017). In social psychology, empathy has been investigated at the personal, interpersonal (Davis, 2018) and intergroup levels (Batson & Ahmad, 2009). And the list of domains and definitions goes on (Davis, 2018; Zaki, 2014).

To measure empathy in these different domains, many inventories, scales, or questionnaires have been developed, most of them building on self-reports. Among many others, we can cite the Interpersonal Reactivity Index (Davis, 1983), the Empathy Quotient (Baron-Cohen & Wheelwright, 2004), the Basic Empathy Scale (Jolliffe & Farrington, 2006), the Toronto Empathy Questionnaire (Spreng et al., 2009), the Empathetic Care Scale (Lamberton et al., 2015), or the Affective and Cognitive Measure of Empathy (Vachon & Lynam, 2016). Some other types of measures are based on evaluations of an observer by external judges, such as the Consultation and Relational Empathy Measure (Mercer, 2004). Finally, some measures are not based on self-reports, but rather on interpretations of emotions and interpersonal cues, such as the Reading the Mind in the Eyes Test (Baron-Cohen et al., 2001). Due to the large variety of constructs captured by these different measures, it does not come as a surprise that correlations between these measures are generally inconsistent and weak (Elliott et al., 2011; Hall & Schwartz, 2019; Murphy & Lilienfeld, 2019).

In addition to the research effort looking at empathy through self-reported measures, (social) neurosciences investigated empathy at the brain level, offering new insights into this phenomenon. In the following section, we discuss such work effort on empathy at the neural level.

2. The neural correlates of empathy

In the field of neurosciences, empathy is a much researched phenomenon, with a growing amount of research on this topic taking place every year (Schurz et al., 2021). However, work on empathy at the neural level started more than a century ago, with some authors noticing that particular lesions in patients' brains had an impact on their behaviours, and more specifically triggered or prevented behaviours related to empathy (Shamay-Tsoory, 2009). One of the most famous and fundamental instances of such a relation between brain lesions and empathy deficit is perhaps the case of Phineas Gage, as detailed by Harlow (1868). Due to a working accident, Gage suffered multiple lesions in the frontal lobes, leaving him alive but completely transformed personality-wise. Not only did he suddenly lack inhibition and adopt a short temper, but he also started to display behaviours that illustrated a complete lack of empathy towards other people.

Since the case of Phineas Gage, many studies have emerged to investigate the neural correlates of empathy, both at the spatial (brain areas related to empathy) and the temporal level (time course of brain activation in empathy; Decety & Holvoet, 2021). Not surprisingly, the field of neurosciences was not immune either to the emergence of multiple definitions and conceptualizations of empathy (Pfeifer & Dapretto, 2009). Researchers have

investigated empathy at the *spatial level*, relying on tools such as functional magnetic resonance imaging (fMRI). They found that multiple areas of the brain are related to empathy, but that these areas seem to vary as a function of what is considered as empathy. Indeed, research on empathy at the spatial brain level claims to have identified two types of empathy, labelled empathy and Theory of Mind (ToM). However, the distinction between these two concepts is not always clear (Schurz et al., 2021). In addition, some authors include a broader variety of processes in empathy, such as self-other distinction, emotion regulation and altruistic motivation (Tousignant et al., 2017).

In a meta-analysis, Fan and colleagues defined two types of empathy, namely *affective-perceptual* and *cognitive-evaluative* empathy (Fan et al., 2011, p. 904). Affective-perceptual empathy is a type of empathy that is 'evoked automatically in participants through observation, without them being aware of the goal of the experiments', whereas cognitive-evaluative empathy is a type of empathy that is 'substantially influenced by whether or not one attends to the feelings of the target through the explicit imagination or evaluation of feelings.' Based on this conceptualization these authors sought to investigate the presence of a core neural network underlying empathy across both affective-perceptual and cognitive-evaluative empathy, and whether specific brain areas were more closely related to one of the two types. Their analysis of forty studies that investigated empathy using fMRI measures showed that the left anterior insula (AI) was activated in the same proportion for both types of empathy, whereas the right AI and the left anterior midcingulate cortex (aMCC) showed higher activation in tasks requiring affective-perceptual and cognitive-evaluative empathy, respectively.

In a further meta-analysis, Molenberghs and colleagues defined empathy as 'the ability to understand others' mental states, and to appreciate that these may differ from our own' (Molenberghs et al., 2016, p. 278). They also distinguished two types of empathy, with affective empathy being defined as 'an understanding of others' emotions or feelings', and cognitive empathy being defined as 'an understanding of their beliefs, thoughts or intentions'. Through their analysis of 144 datasets, they identified a cluster of brain regions activated in both affective and cognitive empathy, namely the medial prefrontal cortex (mPFC), the bilateral temporoparietal junction (TPJ), and the anterior part of the middle temporal gyrus. In contrast, the posterior medial frontal cortex (mFC), the bilateral inferior frontal gyrus (IFG), the temporal poles, and the posterior middle temporal gyrus showed a higher activation in relation to affective empathy, whereas the precuneus, the bilateral TPJ, and the right middle temporal gyrus showed a higher activation in relation to cognitive empathy.

In a more recent meta-analysis, Schurz and colleagues (2021) acknowledged the difficulty stemming from the diversity of conceptualization of empathy and investigated the relation between specific sets of tasks and brain activation. To do so, they assembled data from 188 studies measuring empathy at the spatial level when participants were performing a wide variety of tasks supposed to measure empathy. Relying on cluster analyses, they identified a three-cluster solution, indicating that most of the tasks used could be categorized into three specific groups as a function of the brain areas they activate. The first cluster was labelled the cognitive cluster, with the highest degree of activity in the anterior cingulate cortex and medial prefrontal cortex. This cluster was associated with terms such as 'theory of mind' and 'mentalizing' and was related to tasks such as false beliefs tasks –

in which participants must predict target's thoughts and behaviours based on their erroneous beliefs (e.g., thinking that an object is in a specific place although it has been displaced) – or trait judgments – in which participants must attribute traits underlying targets' behaviours (e.g., attributing friendliness to a target hugging someone else). The second cluster was labelled the affective cluster, and mainly comprised activity across the right frontal cortex, the supplementary motor area, and the adjacent medial frontal gyrus and midcingulate cortex. This cluster was associated with terms such as 'pain' or 'affective' and was related to tasks involving emotion observations or sharing of emotions (e.g., simply looking at a target in pain or trying to feel the target's pain). Lastly, the third cluster was labelled the intermediate cluster. Whereas the cognitive and affective clusters were largely independent, the intermediate cluster comprises areas related to both cognitive and affective empathy, such as the bilateral temporoparietal cortex and precuneus also found in the cognitive cluster, or the left insula and inferior frontal gyrus also found in the affective cluster. This highlights the fact that the intermediate cluster is partly a combination of both cognitive and affective processes, which have been theorized to work conjointly in many daily situations (Zaki, 2014). Interestingly, this cluster was also related to brain areas independent of the two previous clusters, such as the bilateral temporal lobes. This cluster was more closely associated with words such as 'sentences' and 'comprehension' than the two previous clusters but was also related to words found in the two previous clusters. In addition, this cluster was related to tasks involving both cognitive and affective processes at the same time, such as social animations tasks – in which participants must describe a social interaction and describe protagonists' emotions or thoughts – or rational actions tasks – in which participants must predict a target's next action based on the target's inferred mental states. Taken together, these findings illustrate that although two independent and global phenomena related to aspects of empathy (cognitive vs. emotional) can be distinguished at the spatial brain level, these two processes often work together as well.

In addition to a spatial approach, researchers have also investigated empathy at the *temporal level* in terms of the time course of processes unfolding at the neural level, relying on tools presenting a high temporal resolution. Research on this topic overwhelmingly focused on empathy for pain, relying on an emotion detection paradigm (S. Han et al., 2009; X. Han et al., 2016), in which participants have to indicate as quickly as possible whether a target is subjected to a painful vs. painless stimulation. During the task, researchers monitor the brain's electrical signals through an electroencephalogram (EEG) and register activity in relation to specific stimuli. This paradigm is known as event-related potentials (ERP) and allows to identify the time course of specific processes. Specifically, it measures the positive or negative amplitude variations in electrical brain signals. Each variation is labelled using its direction, that is, the P1 component represents the first positive variation of amplitude, which generally occurs before 100ms after stimuli exposure. Following positive amplitude variations are labelled P2, P3, etc. In the same logic, the N1 component represents the first negative variation of amplitude, occurring right after P1 somewhere around 100ms after stimuli exposure. Following negative amplitude variation are labelled N2, N3, etc. Using the ERPs, the bulk of research agrees that there seems to be two main components of empathy at the temporal level: as with the spatial level, affective empathy can be distinguished from cognitive empathy.

Affective empathy is akin to emotion sharing or emotional resonance and is defined as the process of vicariously identifying and experiencing to some extent a target's feelings.

This process has been shown to trigger early neurophysiological responses, with components before P3 (around 400ms) showing a variation in amplitude. Contrary, cognitive empathy is akin to mentalization and is defined as the process of understanding a target's feelings and thoughts. This process has been shown to occur later, with neurophysiological responses observed on components after P3 (i.e., after 400ms).

As the body of evidence suggests, at the brain level empathy has likewise been found to encompass multiple processes, and in consequence various definitions and conceptualizations. Although the bulk of the literature suggests that empathy can be considered as comprising two components, namely affective and cognitive empathy, there is no consensus as of today. Specifically, some researchers consider empathy as comprising two components, whereas some authors (e.g., Decety & Jackson, 2004; Tousignant et al., 2017) argue that in addition to affective and cognitive components, empathy comprises further components. For instance, one such theorized further component is related to the self-other distinction. Indeed, they argue that the ability to differentiate one's own and a target's feelings is crucial and a key component in the ability to empathize. Another further component proposed by these authors is related to emotion regulation, with some authors arguing that an empathic response can only occur if observers are capable of correctly regulating their emotions, as otherwise the strength of observers' emotions might prevent them from accessing the target's feelings and thoughts. A fifth and final theorized component from these authors is related to altruistic motivation, with some authors arguing that the intention of helping a target in need can be considered a facet of empathy.

Of particular interest for the current work, neuropsychologists distinguish a specific type of empathy, which they labelled visuospatial perspective taking (VPT, Cole et al., 2020; A. R. Todd & Tamir, 2024). VPT is defined as the ability to adopt the visual point of view of a target and is related to the activation of brain areas such as the dorsal lateral prefrontal cortex and the inferior frontal gyrus (Bukowski, 2018). In that sense, it differs from previously defined types of empathy as it solely focuses on the ability to adopt a purely sensory input without involving any kind of (emotional) resonance. This type of empathy is the subject of a larger consensus in its definition (Erle & Topolinski, 2017; Samuel et al., 2024). However, VPT is open to some debate, as its mechanisms are still currently being investigated. Indeed, some authors argue that VPT is constituted of two components, labelled Level-1 and Level-2, which are related to the ability to imagine *whether* and *how* a target sees an object, respectively (Surtees et al., 2012). Other researchers argue that VPT is in fact a single system that allows a spontaneous, less controlled VPT (i.e., adopting a target's perspective unintentionally) as well as an intentional, more controlled VPT (i.e., adopting a target's perspective intentionally) depending on the context (Westra, 2017). Another current question of interest is whether VPT is only triggered by social targets, with researchers underlining the importance of gaze, or whether it can be triggered solely by presenting an attentional cue, such as an arrow pointing in a specific direction (Furlanetto et al., 2016; Heyes, 2014). Although it is often considered an independent component of empathy, recent research on the topic showed causal relations between both VPT and cognitive empathy (Erle & Topolinski, 2017) and VPT and affective empathy (Erle & Funk, 2022). These results highlight the fact that VPT may not be a completely independent facet of empathy. However, VPT does not present a causal relation with every aspect of affective empathy, indicating that it could still be considered partially independent (Erle & Funk, 2022). That is, adopting the visual

perspective of a target increases the perception of intensity and contagiousness of negative emotions, but does not improve the speed and accuracy of emotion recognition.

3. Towards a unified concept of empathy?

The above overview suggests that empathy is a broad and rather ill-defined construct. Both in psychology and neurosciences, empathy has been understood in terms of many processes, with sometimes overlapping, sometimes independent, or even mutually exclusive definitions existing in the literature. In an attempt to summarize research on empathy, Batson (2009) highlighted the fact that we can currently distinguish eight different categories of phenomena to which a plethora of researchers have ascribed the term *empathy* in their research, across various domains. Table 1 shows the labels attributed by Batson to these phenomena. According to him, these phenomena have been investigated mainly to answer two questions, namely how do people access the content of a target's mind (be it thoughts or emotions), and why do people react with consideration and solicitude when facing a target in pain? Presumably, these eight categories all relate to these two questions, sometimes aiming at answering one of the two, and sometimes both.

Concept 1	Knowing another person's internal state, including his or her thoughts and feelings
Concept 2	Adopting the posture or matching the neural responses of an observed other
Concept 3	Coming to feel as another person feels
Concept 4	Intuiting or projecting oneself into another's situation
Concept 5	Imagining how another is thinking and feeling
Concept 6	Imagining how one would think and feel in the other's place
Concept 7	Feeling distress at witnessing another person's suffering
Concept 8	Feeling for another person who is suffering

Table 1. Batson's taxonomy of the eight concepts considered as empathy in current research (Batson, 2009, pp.4-8).

In a recent review, Eklund and Meranius (2021) argued that with the recent growth of research on this topic – more than half of the publications related to empathy have been published after 2012 – common features of phenomena labelled *empathy* started to emerge across different research fields. As a further attempt to summarize and structure components, these authors grouped these common features into four superordinate themes.

The first theme is labelled *understanding* and is related to the observers' ability to understand targets' mental state. This theme is cognitive by nature and comprises sub-themes such as 'knowing' and 'perspective-taking'. The second theme is labelled *feeling* and is related to the observers' ability to adopt an adequate affective response towards targets. As mentioned, this theme is affective by nature and is constituted of sub-themes such as 'affect' and 'emotion'. The third theme is labelled *sharing* and is related to the observers' ability to experience similar states to those experienced by targets. This theme is often described as emotional resonance and is constituted of sub-themes such as 'sharing representations' and 'sharing feelings'. Finally, the fourth theme is labelled *self-other differentiation* and is related to the observers' ability to display a sense of agency, making it clear that the source of their thoughts and emotions remains another person and not themselves. This theme is constituted of sub-themes such as 'self-distinction' and 'differentiation of feelings'. Researchers are increasingly starting to consider these four themes as a whole rather than four independent categories, noticing that – in Gestalt terms – the whole seems to be greater than the sum of its parts (Decety & Lamm, 2006; Preckel et al., 2018).

In their review, Cuff and colleagues (2016) put forth the developing consensus on the theoretical underpinnings of empathy by highlighting the emerging unified views of the literature on a series of theoretical questions. A first question is whether empathy involves a cognitive or affective component, or both. As shown in the previous subsections and the recent review of Eklund and Meranius (Eklund & Meranius, 2021), more and more authors agree that empathy seems to involve both a cognitive and an affective component, and that these two components often coexist in daily situations where empathy arises.

A second question is whether the emotions generated through empathy are congruent or incongruent, that is, whether the emotions felt by the observers are or are not identical to those felt by the targets. Most research on the topic agrees that empathy is related to a certain degree of congruency, but empathizers are unlikely to display emotions identical to the target's emotions. Indeed, many factors may intervene, such as observers' accuracy regarding their own emotions (Batson, 2009) or simply observers' empathic abilities (Ickes, 2009). This results in less accurate empathy, where the emotions felt by observers are not identical, but rather resemble those felt by targets. In extreme cases of poor empathic abilities, where observers fail to detect the correct emotion in targets, this may even entail incongruency.

A third question is whether the target of empathy needs to be present or not. Research has shown that empathy can be triggered during situations in which the target is not directly present. For example, empathy can be triggered by reading a statement concerning a target, written down by another person (Blair, 2005). Imagination may also trigger empathy (Pelligra, 2011). Thus, empathy seems to require a target, but not direct presence of said target.

A fourth question concerns the self-other distinction, and whether there exists a complete division between the observers and the targets, or whether some self-other merging is at work. Research shows that some degree of self-other distinction is required for empathy to exist (Decety & Sommerville, 2003), with this process being considered as a fully-fledged component of empathy by some authors (Tousignant et al., 2017). In the absence of this distinction, the process triggered would be emotional contagion rather than

empathy, with observers failing to identify that they are not the source of such emotions. However, although a self-other distinction is required to some extent, empathy is also related to a merging with targets. Indeed, when measured with neurophysiological measures, research shows that empathy for pain activates the same brain regions involved in one's own perception of pain. As stated by Cuff and colleagues (2016, p.149) : 'This merging aids empathy by providing a bridge between the self and other'. Thus, empathy seems to involve both self-other distinction and self-other merging.

A fifth question relates to whether empathy should be considered a trait or as a state. Many authors speak of empathy as an ability, suggesting that it can be considered as a trait, with levels varying across people as measured by scales such as the Interpersonal Reactivity Index (Davis, 1983). Conversely, other authors include terms such as 'situation' when discussing empathy, to convey the idea that empathy can be influenced by the context and should therefore best be considered as a state. Both conceptualizations coexist, with empathic accuracy varying as a function of individuals and their specific characteristics (e.g., education, personality, or more largely genetic differences; Derntl et al., 2010; Eisenberg & Morris, 2001; Thomas et al., 1997) as well as of contexts in which it takes place (e.g., perceived power or cognitive load, Galinsky et al., 2006; Rameson et al., 2012).

A sixth question concerns whether empathy is invariably linked to behavioural outcomes or not. It is true that a great deal of research supports the fact that empathy can trigger prosocial behaviours towards targets in need (Eisenberg & Miller, 1987). However, this need not always be the case, for example in a situation in which helping a target would go against one's values or put oneself at risk. Such situations in which empathy does not necessarily induce a behavioural outcome led some authors to suggest that empathy triggers a behavioural motivation rather than a behavioural outcome (Cuff et al., 2016; Tousignant et al., 2017).

A seventh question is whether empathy should be considered as an automatic or a controlled process. This question has been largely ignored in the first decades of research, in which empathy was mostly considered an automatic process, as supported by findings in neurosciences (Coricelli, 2005; Gallese, 2007; Zaki, 2014). However, more recent evidence suggests that empathy can be controlled in specific situations (for a review, see Zaki, 2014), highlighting the fact that empathy can be both an automatic and controlled process, depending on the situation in which it is examined.

4. Theories and models of empathy

Besides the multiplicity of definitions and conceptualizations, several theories and models of empathy have also been proposed (Decety, 2010; Decety & Jackson, 2004; Decety & Lamm, 2006; Engen & Singer, 2013; Preston & de Waal, 2002; Shamay-Tsoory, 2011; Zaki & Ochsner, 2012). These theories and models aim at going beyond the mere listing of the components of empathy and propose views on the nature of empathy as well as processes by which its components interact with each other and with other variables such as antecedents and outcomes. Perhaps two of the best-known theories regarding the origin

of empathy are the *theory of mind* (ToM) and the *simulation* theory[1]. Although we do not take a stance on the validity of each theory in this dissertation nor anchor our work in one theory or another, these theories touch upon the very nature of empathy. As such, we find it important to briefly discuss both theories in this section. The ToM posits that targets' mental states are not directly accessible and that observers hypothesize these mental states as a way of explaining and predicting a target's behaviours (Gopnik & Meltzoff, 1998). Shamay-Tsoory (2009, p. 216) stated that ToM 'is actually a 'theory' of mind because beliefs and desires form the basic theoretical constructs that we combine through a system of rules to predict and explain the behaviours, thoughts, and feelings of other people'. ToM finds support in the activation of brain areas such as the medial prefrontal cortex, a brain area often related to mentalizing and cognitive empathy (Dvash & Shamay-Tsoory, 2014)

On the other hand, proponents of the simulation theory argue that observers can access a target's mental states through identification and embodiment of these mental states (Gallese & Goldman, 1998). The simulation theory thus relies more heavily on a first-person perspective and understands empathy as (un)consciously trying to match a target's mental state. Simulation theorists find support in the presence of mirror neurons, a class of neurons often associated with emotional resonance and affective empathy (Pfeifer & Dapretto, 2009), although the role of these mirror neurons in empathy might be less straightforward than initially theorized (Bekkali et al., 2021; Heyes & Catmur, 2022). In their neurophysiological model of empathy, Dvash and Shamay-Tsoory (2014) argue that ToM and simulation theory can be reconciled as the focus on different aspects of empathy, namely cognitive and emotional empathy. According to the authors, emotional empathy is the ability to feel emotions close or identical to those felt by a target. This facet of empathy seems to be in line with the embodiment of targets' emotional states hypothesized by the simulation theory. On the other hand, the authors define cognitive empathy as the ability to understand the thoughts and emotions of targets and argue that this facet is served by a ToM, as observers are also making hypotheses regarding their mental state.

Turning away from the nature of empathy, a number of authors proposed models of empathy aiming at better understanding the relations between antecedents, outcomes, and the different theorized components of empathy. In the sake of conciseness, we will only present recent models that we deem relevant to our work, as they put forth the relation between targets characteristics and empathy. The first model is called the Dual Route Model of Empathy, and has been developed by Yu and Chou (2018). In this model, authors not only conceptualize affective and cognitive empathy as two interacting facets of empathy, influencing each other in a bidirectional way, but they also integrate factors influencing these two facets. Specifically, they propose that prior knowledge moderates the relation between a social target and both affective and cognitive empathy, whereas attention only moderates the link between a social target and cognitive empathy. They also propose that affective and cognitive empathy both influence prosocial behaviours. Building on past work, the model proposed by Gehlbach and Mu (2023) further discusses the role of the target in modulating empathy, specifying that the characteristics of the target are also of importance, such as the culture of the target, bias against this target, or whether this target is

[1] Recently, some authors have developed new models and theories that are accounted for neither by the ToM nor by the simulation theory (Blanchet, 2020; Jacob, 2011). However, these models are either very recent or being criticized, and more research is needed to integrate such models in the global landscape of empathy. We thus refrain from discussing such models here.

attributed a mind. Next, they highlight the role of motivation in empathy, both as a trait in the form of the propensity of an observer to empathize, and as a state in the form of context or effort required.

This role of motivation in empathy is central in the motivated empathy model of Zaki (2014), in which empathy is conceptualized as comprising three components. The first component is called *mind perception* and is defined as the recognition of a target's internal states. As the two other components cannot take place without the target being attributed a mind, this component comes as a prerequisite to the two following components. The second component is called *experience sharing* and is defined as the ability to adopt the target's sensory, motor, visceral and/or affective states. This component is akin to emotional and other resonance described in the previous section. Finally, the third component is called *mentalizing*, and is defined as the ability to make inferences about a target's thoughts, intentions, beliefs, and emotions. Zaki argues that experience sharing and mentalizing can be independent processes at times but grants that they often coexist and even compete in some situations.

Importantly, Zaki's model proposes that empathy is a motivated phenomenon, and that motivation can be considered an antecedent, impacting all three components listed above. The motivation can be a motivation to approach empathy (i.e., putting oneself in a situation in which one could expect to empathize with a target), with facilitators such as positive affect of the target (e.g., joy), affiliation or social proximity with the target, and social desirability of being perceived as an empathic person; or a motivation to avoid empathy, with hindrances such as target's pain, perceived costs (e.g., cognitive, emotional, or financial), or intergroup competition. This motivation can impact both lower-level processes of empathy, such as those observed in neurosciences through neurophysiological measures, as well as higher level processes of empathy, such as those observed in self-reported measures. Two main mechanisms are proposed as a way to understand how motivation can modulate empathy: motivation and goals can bias information processing as a first mechanism, and both the observers' and targets' emotion regulation as a second mechanism. Importantly, Zaki highlights that motivation and goals need not be explicit to affect empathy, and that emotions can not only be modulated after they are felt, but also before and during the entire process of empathizing with a target. In turn, Zaki states that 'observers' motivation to experience or avoid empathy can manifest as a *reduction* or *intensification* of empathy that has already occurred and also as a *prevention*, *initiation*, or *modulation* of the initial experience of empathy' (2014, p. 1613, emphasis in the original text).

To avoid or approach empathy, observers can rely on several strategies. One example of such a strategy is situation selection, whereby observers will actively avoid situations eliciting empathy, such as avoiding a street if observers believe that they have a high chance of walking by beggars. Conversely, observers may try to actively approach situations eliciting empathy, for instance by going towards a group of colleagues that seem to be celebrating an achievement. Of note, observers may also try to avoid situations triggering positive affects and approach situations triggering negative affects, such as someone deliberately listening to a suffering person's testimony. Other strategies can involve attention modulation, for instance people may shift their attention away from a

target, or modulate their appraisal of a target's emotion, for example by down tuning the perceived intensity of a target's emotions.

To sum up, the literature reviewed in this chapter shows that empathy is a complex phenomenon. Not only did we encounter many different definitions across time, but empathy also has been assessed through an extensive range of measures, ranging from neurophysiological measures to self-reported questionnaires. Fortunately, research on empathy seems to be heading towards a more unified view of empathy (Eklund & Meranius, 2021). Across domains, the bulk of research agrees that we can understand empathy as comprising two main components: an affective component, related to the ability to partly or fully adopt a target's state, and a cognitive component, related to the ability to understand and make inferences on the content of a target's mind. A growing number of researchers agree that specific processes such as mind attribution, altruistic motivation, and self-other distinction are proximal to the concept of empathy, but their existence as independent components of empathy is less clear, and more research is needed to better understand their (in)dependence. Last but not least, recent views suggest that empathy seems to be a motivated phenomenon across all its subcomponents and levels (Zaki, 2014).

Working toward a unified view of empathy may also be achieved by investigating empathy across multiple fields of psychology at once. For instance, some authors have worked in an integrative manner on empathy both within the framework of neurosciences and psychopathology, for example investigating the (absence of) markers of neural empathy in a variety of psychological disorders (Gonzalez-Liencres et al., 2013). Another example of transversal work is the recent emergence of social neurosciences, a research effort integrating neurosciences tools and measurements into the investigation of intergroup empathy (Amodio & Cikara, 2021; Decety & Ickes, 2009; Zaki & Cikara, 2015). Such cross-disciplinary work forces researchers to rethink their definition and conceptualization of empathy, as they must integrate different visions of empathy, synthesizing research, methods, models, and approaches that did not relate to each other previously.

Interestingly, some authors (Hall & Schwartz, 2019; Levy, 1997) have argued for researchers to stop using the word *empathy*, and rather clearly specify which concept is being investigated, as shown in Table 1. We do not fully share this point of view. We believe that keeping the term *empathy* is important, but rather than relying on this term to refer to specific components, we believe that researchers should start considering this term as a field of study – in the same way that social psychologists investigate *social perception* through multiple measures (e.g., traits ratings or behavioural observations) and at different levels (e.g., interpersonal or intergroup). Additionally, we believe researchers in the field of empathy must start systemically specifying as precisely as possible which component or process of empathy they investigate. Consequently, in each empirical chapter of this doctoral dissertation, we tried to be as precise as possible regarding the phenomena we were investigating.

5. Empathy in the context of our work

In light of the literature discussed in this chapter, it is clear that merely mentioning that one works on empathy is not precise enough. In our view, it is therefore crucial to clarify what we consider as empathy in the context of our work. We largely base our vision off the

recent work aiming at clarifying the concept of empathy (Cuff et al., 2016; Eklund & Meranius, 2021). That is, we consider that empathy comprises two main components. The first component is of affective nature, and could be defined as a congruent sharing in a target's state, be it emotional, sensory, or motor. This affective component is akin to the Affective Empathy component of Yu and Chou's dual route model of empathy (2018) as well as the experience sharing component of Zaki's motivated empathy model (2014). Importantly, this definition encompasses multiple phenomenon described in Batson's (2009) taxonomy, namely the adoption of a posture or matching of a neural response (Concept 2), coming to feel as a person feels (Concept 3) and feeling for another person's suffering (Concept 8). As such, researchers should define as much as possible which specific process they investigate.

The second component is of cognitive nature, and could be defined as the explicit reasoning about a target's emotions or mental states. This cognitive component is akin to the Cognitive component of Yu and Chou's dual route model of empathy (2018), and the mentalizing component of Zaki's motivated empathy model (2014). This cognitive component encompasses multiple phenomenon put forth in Batson's (2009) taxonomy as well, namely knowing another person's internal state (Concept 1), intuiting oneself into another's situation (Concept 4), and imagining how another is thinking and feeling (Concept 5) or how one would think and feel in the other's place (Concept 6)[2].

In our view, it is clear that both components coexist and coactivate in many situations. In addition, we do not consider additional factors (e.g., mind attribution, self-other differentiation or prosocial behaviours) as components, but rather as antecedents and outcomes of empathy. Turning to the mechanisms of empathy (i.e., antecedents, outcomes, and relations between the components), we do not frame this work within a specific model. That said, we strongly share the view of Zaki (2014) that empathy is a motivated (and as such, contextual) phenomenon, and that this motivation varies as a function of a multiplicity of factors such as costs or relationships. Importantly, this motivation can regulate empathy in a conscious and deliberate way, but also in a less conscious and less deliberate way. For instance, one may make the conscious choice of making a detour when seeing a homeless person begging further down the street, but after a few days, this detour may become an automatic and 'by default' choice. Finally, the two components and the phenomenon they encompass can be explored in various ways, for example by looking at the neural *vs*. self-reported level, at positive *vs*. negative emotions, and including the direct presence of the target *vs*. not. We will detail at the end of Chapter 3 which components and phenomenon we explore in each empirical chapter.

In this chapter, we reviewed literature on empathy, highlighting its seemingly complex history across multiple domains such as philosophy, psychology, and neurosciences. We presented recent research effort trying to get a better understanding of this phenomenon and discussed recent reviews proposing unified visions of empathy. In the next chapter, we

[2] We do not consider Batson's seventh concept (feeling distress at another person's suffering) as a distinct phenomenon, but rather we see this phenomenon as a more extreme case of the eight concept (feeling for another person who is suffering), due for instance to a lack of self-other differentiation.

explore the crucial role of social factors in modulating the expression of empathy at the individual, interpersonal and intergroup levels.

Chapter 3.

The social moderation of empathy: Links with individual, interpersonal and intergroup factors

Chapter 3. The social moderation of empathy: Links with individual, interpersonal and intergroup factors

In this chapter, we present a selection of findings illustrating how a series of psychological factors influence and are influenced by empathy[1]. We start by detailing different social factors influencing the expression of empathy, related to observers, targets as well as their relations. We then focus on the relation between group membership and empathy and discuss ingroup bias as well as the impact of specific outgroup memberships. We close the chapter with a discussion of the importance of empathy in intergroup relations.

1. Individual and interpersonal moderators of empathy

Empathy is a social concept by nature. Above and beyond the social elements constitutive of its definition, empathy can be considered as a cornerstone of human relationships (Schulz, 2017). That is, humans evolved as social beings, and navigating the social world would have proved immensely difficult, if not impossible, without the ability to take the perspective of and understand a companion's – or a rival's – thoughts and emotions (Decety et al., 2016). It is therefore not surprising that a very large bulk of research on empathy focused on its relationship with a series of social and psychological factors. Part of this research effort looked at factors solely related to the individual showing empathy – we call them *observers* in what follows. In the following section, we describe a series of individual and interpersonal moderators for two reasons. First, it offers a first view into how empathy can interact with or be influenced by psychological factors. Second, we measured some of these factors as covariates in our empiric work, making it all the more important to understand their relations with empathy.

For instance, psychological disorders such as Asperger syndrome or borderline personality disorder are related to lower levels of cognitive empathy compared to individual from a control group (Dziobek et al., 2008; Harari et al., 2010). Research also showed that personality traits such as agreeableness and openness, two of the Big Five personality traits, are strongly and positively related to the expression of empathy (Melchers et al., 2016; Mooradian et al., 2011). Observers' self-esteem is also related to the expression of empathy, although the direction of this relation is not clear: some findings point towards a positive relation between empathy and self-esteem (e.g., L. Huang et al., 2019) whereas others did not find significant relations between self-esteem and empathy (e.g., Cone, 2016). Another individual difference, namely social dominance orientation (SDO) – the tendency to prefer a strict social hierarchy – shows a negative relation with empathy, with high SDO observers displaying less empathy (Nicol & Rounding, 2013; Sidanius et al.,

[1] Of note, a large portion of the literature detailed in this chapter measured empathy by means of self-reported questionnaires capturing both the cognitive and affective components. In the interests of conciseness, readers can consider that a factor influences both components unless stated otherwise.

2013). Likewise, Right Wing Authoritarianism (RWA), a related but distinct concept defined as radicalized support for the established authorities, also relates negatively to empathy (Choma et al., 2020; S. T. J. Hudson & Uenal, 2023).

The role of gender on empathy is a particularly interesting question. Indeed, empathy is subject to a very strong preconception – both in researchers and laypeople – that women are more empathic than men (Bluhm, 2017). Although research relying on self-report measures generally seems to confirm this claim (Christov-Moore et al., 2014), this gender difference disappears when social expectations of gender roles are made salient (Pang et al., 2023a, Study 3). At the neural level, mixed findings emerged when relying on neural measurements of empathy (e.g., Han et al., 2008; Taylor et al., 2022). A meta-analysis from Lamm and colleagues (2011) found no support for a gender difference in empathy in fMRI studies. Additionally, a recent highly-powered set of studies relying on Bayesian analyses of the data found no gender difference in empathy through EEG measurement as well (Pang et al., 2023a). All in all, most recent findings and reviews on this topic suggest that gender does not *de facto* entail a difference in empathy, but rather that the observed effects of gender on empathy are largely due to social expectations (Bluhm, 2017; L. K. Taylor et al., 2022).

Beyond factors merely related to the observers, modulations of empathy also emerge from factors pertaining to the relation between an observer and a target, such as differences in status. Indeed, lower- compared to higher-status observers generally show a higher tendency to empathize (for a review, see Piff et al., 2018). Furthermore, the status of the target also plays a role. To illustrate, Feng and colleagues (2016) had participants complete a bogus perceptual task, which systematically resulted in a medium score for each participant. After the task, participants viewed superior- or inferior-status targets – as operationalized by a higher or lower score than them – subjected to painful stimulations. The authors found that the pain endured by superior-status targets triggered less activation in the 'pain matrix' compared to a confrontation with inferior-status targets. Additionally, recent work highlighted that the negative relation between empathy and SDO discussed above is exacerbated when the target is a lower-status target (S. T. J. Hudson, 2020; S. T. J. Hudson et al., 2019), but reverts to positive when the target is a higher-status target (Lucas & Kteily, 2018)

Power is another well-studied example of a moderator of empathy stemming from the relation between observers and targets (e.g., Galinsky et al., 2006; Longmire & Harrison, 2018; Woltin et al., 2011; for a review of power on cognitive perspective taking see Galinsky et al., 2016). As a case in point, Van Kleef and colleagues (2008) had pairs of participants complete a power assessment scale and write down a short text relating difficult and painful events that happened to them in the past five years. Participants then discussed each other's events in turns. Results showed that participants feeling the most (vs. the least) powerful displayed lower (greater) levels of affective empathy when listening to another participant's distressing event. Although power is mostly associated to reduced empathy, it can also lead to enhanced cognitive empathy when it is related to a sense of obligation towards targets (Galinsky et al., 2016). At the neural level, observers' power did not moderate the affective empathy for pain (as measured on the N2 component), but only most (vs. least) powerful participants showed cognitive empathy for pain as measured on the P3 component (Galang et al., 2021). As stressed by the authors, more work on the

relation between power and neural empathy is warranted to better understand what underlies these results. Finally, Blader and colleagues (2016) found that when status is defined as entailing esteem and respect and power is defined as control over resources, both are related to opposite outcomes on cognitive empathy: observers' high status is related to higher levels of cognitive empathy whereas observers' high power is related to lower levels of cognitive empathy. Such results are in line with Todd and Tamir's (2024) recent observation that respect and admiration reduce the egocentric bias in mentalizing (i.e., the tendency to attribute one's own thoughts and states to a target) whereas control over resources amplifies this egocentric bias.

Not surprisingly, similarity between observers and targets also plays a role, with (dis)similar targets triggering more (less) empathy (for reviews, see Stürmer & Siem, 2017; Zaki & Ochsner, 2016, but see also Batson et al., 2005). For example, Houston (1990) found that participants sharing a similar emotional state to a target (i.e., a high sensitivity to dejection) displayed more empathic concern towards this target. This greater empathic concern can also be observed when similarity stems from occupation or ideology (McKeever, 2015; Stevens et al., 2021). In addition, having lived through similar experiences to a target can also lead to greater empathy towards them. For example, Preis and Kroener-Herwig (2012) assigned participants to one of two conditions: they either received a painful stimulation (their phalanx being strongly pressed by a weight) or a painless stimulation (their phalanx being lightly touched by a weight). Participants submitted to a painful stimulation expressed greater empathy toward targets submitted to the same stimulation compared to participants submitted to a painless stimulation. Of course, these findings generalise to real-life events, as for instance women who experienced (vs. did not experience) sexual assault (Barnett et al., 1986) or giving birth (Hodges et al., 2010) showed greater empathy towards women experiencing the same events. This greater empathy for similar targets can also be observed at the neural level (Majdandžić et al., 2016). Finally, closeness to a target, a related but distinct factor, is related to greater empathy as well (Bucchioni et al., 2015; Grynberg & Konrath, 2020; López-Solà et al., 2020), whereas strong negative feelings towards a target are negatively related to empathy (Levy et al., 2016). That being said, some work on the cognitive component of empathy found the opposite pattern, with similarity, affinity and familiarity to a target triggering more egocentric bias (Damen et al., 2019; Sassenrath et al., 2014; Simpson & Todd, 2017; A. R. Todd et al., 2011; for a review see A. R. Todd & Tamir, 2024). Clearly, more work is required on this topic to unveil the boundary conditions that render similarity an empathy-enhancing or empathy-inhibiting factor. Table 1 summarizes the various moderators of empathy at both the individual and interpersonal levels.

Levels	Factors
Individual	Psychological disorders
	Personality traits
	Self-esteem
	SDO and RWA
	Gender
Interpersonal	Status
	Power
	Similarity
	Closeness

Table 1. Summary of the individual and interpersonal moderators of empathy discussed in the chapter.

2. Empathy in an intergroup context

The relation between an observer and a target often goes beyond purely interpersonal aspects and involves the perception of (dis)similar group membership. A very robust finding, across a multitude of methods, is the emergence of an ingroup bias in empathy, also known as *parochial empathy*. On the affective component, this greater empathy towards members of an ingroup compared to members of an outgroup has been observed both at the self-reported and behavioural level (Fourie et al., 2017; Klimecki, 2019; Stürmer & Snyder, 2009) as well as at the neural level (S. Han, 2018; Molenberghs, 2013; Molenberghs & Louis, 2018). For instance, Bruneau and colleagues (2015, Study 1) randomly assigned participants to two fictitious groups, the Eagles or the Rattlers. Participants then saw vignettes of events happening to either a member of their group or a member of the other group and reported the degree to which they displayed affective empathy towards the target, as operationalized by congruent affects. Results showed that participants clearly reported feeling more affective empathy for ingroup members compared to outgroup members, illustrating this parochial empathy phenomenon.

At the neural level, Xu and colleagues (2009) showed that seeing the pain of an ingroup member compared to an outgroup member leads to a higher degree of activation of the 'pain matrix', in particular the anterior cingulate cortex. In addition, parochial empathy is also apparent in the time course of empathy: outgroup (vs. ingroup) targets' pain triggers less affective (on pre-P3 components such as N2-N3) and cognitive (on P3 and LPP

components) empathy, although this difference is less robust on cognitive empathy (Granjon et al., 2023; S. Han, 2018). Interestingly, a recent study showed that it is possible for participants to display a higher degree of empathy towards the pain of both in- and outgroup targets if they are determined to do so (Caspar et al., 2024). However, this increase in empathy emerges only when the two groups are not presented together (i.e., in a between-subjects design). When presented together (i.e., in a within-subjects design), determination to be more empathic only resulted in more empathy towards the ingroup targets. Of note, labelling a target as ingroup vs. outgroup has a stronger impact on affective empathy levels than the perceived morality of the target (Hatami et al., 2016).

As mentioned above, parochial empathy has been observed on both the cognitive and affective components and through a series of methods and measurements including self-reports and behavioural methods (Montalan, 2012; Pang et al., 2023b; Stürmer et al., 2005; Tarrant et al., 2009), functional magnetic resonance imaging (Azevedo et al., 2013; Hein et al., 2010; Richins et al., 2019), transcranial magnetic stimulation (Avenanti et al., 2010), electroencephalogram (Caspar et al., 2023; Gutsell & Inzlicht, 2012; Sessa et al., 2014), and skin conductance responses (Forgiarini et al., 2011). Furthermore, parochial empathy arises both for existing groups (Cikara et al., 2011a; Stürmer et al., 2006) and for minimal groups (S. T. J. Hudson et al., 2019; Montalan, 2012), and can also be observed in children (Masten et al., 2010). Such ingroup favouritism in empathy is not without consequences. As a case in point, affective parochial empathy is related to reduced altruism and greater approval of passive harm towards outgroup targets (Bruneau et al., 2017). This affective parochial empathy also entails a higher degree of situational (vs. dispositional) attributions as well as reduced prison sentences when judging a felony committed by in- vs. outgroup targets (Johnson et al., 2002). As another example, it is associated with more favourable pain treatment decisions, such as prescribing higher doses of pain medication or more intensive physical therapy to ingroup targets compared to outgroup ones (Drwecki et al., 2011).

Interestingly, a large portion of the work highlighting parochial empathy focused on the affective component, measuring pain perception or how good/bad participants would feel towards a target. Turning to the cognitive component, the picture is not that clear. In an unpublished doctoral dissertation, Behler (2019) developed and validated the Trait Parochial Empathy Scale, a novel tool to measure parochial empathy. She found that a four-factor solution best characterized this scale, with the four factors being Empathic Accuracy, Motivated Empathy, Affective Sharing, and Non-Empathic Responding. Interestingly, results consistently showed an ingroup bias on all four subscales, showing that participants not only report higher degrees of affective empathy, but also a stronger cognitive empathy (in terms of accuracy about and motivation to adopt a target's thoughts and beliefs). Such findings point towards the presence of parochial empathy on the cognitive component as well, namely a self-reported greater accuracy and ease to adopt a target's perspective. That being said, many studies highlight that, when trying to adopt or reflect upon a target's thoughts and beliefs (i.e., mentalizing), participants display higher levels of egocentric bias when the target is an ingroup member compared to an outgroup member (for a review, see A. R. Todd & Tamir, 2024). In other words, participants rely too heavily on self-related information in their inference of an ingroup member's perspective, rendering it sometimes less accurate for an ingroup compared to an outgroup member. Taken together, these findings suggest that while people do display cognitive parochial empathy in the form of

more motivation and higher perceived accuracy for ingroup members, empathic accuracy towards an ingroup member is rather riddled with egocentric biases.

Over the past decades, a large body of evidence suggested that parochial empathy can be modulated by a series of factors, either related to observers or to targets. For example, believing that one's ability to empathize is innate and constant (a so-called fixed mindset) leads to higher ingroup bias, whereas believing that empathy can be acquired and developed (a so-called growth mindset) reduces affective parochial empathy and enhances motivation to empathize with an outgroup target (Schumann et al., 2014). To echo findings covered in the previous section, induced similarity with an outgroup target reduces the emergence of parochial empathy (Harjunen et al., 2022). Personality traits can also influence this ingroup bias, as highlighted by recent work showing that there is a relation between parochial empathy and SDO, with individuals higher in SDO presenting a larger ingroup bias on affective empathy (S. T. J. Hudson et al., 2019). Additionally, when the authors rendered group boundaries salient by having participants answer racial identification items, the difference in empathy between ingroup and outgroup targets proved even larger for high SDO observers. Identification with the ingroup also seems to play an important role in the emergence of parochial empathy. For example, Johnson and Lecci (2020) showed that White participants strongly (vs. weakly) identifying with their racial ingroup demonstrated lower affective empathy towards a Black victim. Time spent in another country also reduces parochial empathy when facing this country's citizens. To illustrate, Zhou and colleagues (2022) found that White participants who had been living for a longer period of time in China (6 to 36 weeks) displayed significantly less ingroup bias (i.e., a smaller difference in empathy between White and Asian targets) compared to White participants whose stay in China did not exceed 4 weeks. This reduction of parochial empathy emerged even though all participants reported a similar level of ingroup identification. Lastly, the administration of oxytocin, a hormone involved for instance in social bonding, reduces neural manifestations of parochial empathy (Sheng et al., 2014).

In addition to moderators related to observers, a series of targets' characteristics also influence parochial empathy. For instance, asking to judge whether a target is feeling pain (vs. judging whether a stimulation is painful) reduces the ingroup bias on EEG measures by a process of target individuation (Sheng & Han, 2012, Study 2). Furthermore, temporarily including a racial outgroup target in the same group as an observer also seems to serve as a way to mitigate this ingroup bias on affective empathy (Sheng & Han, 2012, Study 3). A further means of individuating a target and thus reducing parochial empathy is to present observers with information related to a target (e.g., physical descriptions such as hair or eye colour) and particularly information related to the mental states of the target (e.g., that they love reading) significantly reduces the ingroup bias on affective empathy (Bruneau et al., 2015, Study 3).

Besides a target's outgroup membership, one particularly interesting characteristic influencing empathy is the difference of status between one's group and the outgroup as well as the degree of perceived competition between both groups. Indeed, a series of efforts showed that when seeing a member of a rival group experiencing pain or having bad luck, not only do people display less empathy but they also display a strong counter-empathic reaction, labelled 'Schadenfreude' based on a German term translating as the feeling of joy at others' misfortune (Cikara et al., 2011b; S. T. J. Hudson, 2020; Lanzetta & Englis,

1989). Not only do observers explicitly report feeling less negative feelings when witnessing the misery of a competitive outgroup target compared to a non-competitive outgroup target, but they also report more positive emotions (Leach et al., 2003; R. H. Smith et al., 2009). Witnessing such events also triggers the zygomaticus major, a muscle related to the act of smiling (Cikara & Fiske, 2012). This satisfaction at another's distress is also observable at the neural level: watching a rival sports team fail during a match activates the ventral striatum, a brain region linked to subjective pleasure (Cikara et al., 2011a), and the pain of competitive political outgroup members triggers less activation in late components of empathy (as measured by an EEG) than the pain of non-competitive political outgroup members (Ozkara, 2021). Beyond the role of competition and threat in Schadenfreude, research from Brambilla and Riva (2017) found that target's perceived morality also plays an important role – proving even more predictive of counter-empathic reaction than a target's competence or sociability, two facets of the fundamental dimensions related to status and competition (Abele et al., 2021). Although simply smiling at others' misfortune does not seem that bad, the implications of such counter-empathic reactions go beyond the activation of the zygomaticus major, as they are directly related to a higher willingness to harm targets (Cikara & Fiske, 2011, 2013) and remain present even after the outgroup loses its competitive status (Cikara et al., 2014). On a positive note, reducing the perceived entitativity of both the in- and outgroups leads to a significant reduction in counter-empathic reactions (Cikara et al., 2014).

Clearly, research on Schadenfreude points towards the importance of considering the specific identity of the outgroup when investigating empathy, namely the outgroup related stereotypes and its location in the bias map (see Chapter 1; Cuddy et al., 2007). As stated by Cikara and Fiske (2011, p. 3971): "It seems that the effect of group membership on empathy is more nuanced than merely ingroup versus outgroup responses". However, a striking observation is that a sizeable share of the research on empathy in the intergroup context focused on parochial empathy (Behler & Berry, 2022). A second limitation associated with the research efforts on intergroup empathy resides in the absence of direct comparisons between various outgroups. Indeed, in the scarce instances where multiple outgroups were included in the design, they either belonged to the same quadrants of the Stereotype Content Model (SCM; Fiske et al., 2002, see Chapter 1) or were compared with an ingroup target – rather than to each other (Cikara & Fiske, 2011). A recent study conducted by Aue and colleagues (2021) aimed at exploring the differential effect of targets' group membership in specific SCM quadrants on self-reported empathy. They presented participants with targets from all four quadrants of the SCM and measured self-reported cognitive and affective empathy towards these targets. Results showed that participants indicated more cognitive empathy for warmer compared to colder targets, but they indicated no difference as a function of targets' perceived competence. Turning to affective empathy, they observed an identical effect of targets' perceived warmth (i.e., more affective empathy for warmer targets), but an opposite effect regarding targets' perceived competence: participants reported a higher (lower) degree of affective empathy for more incompetent (more competent) targets. These results suggest that the exact position of an outgroup in terms of specific quadrant moderates the expression of cognitive empathy, whereas expression of affective empathy is only qualified by an outgroup's perceived warmth.

Although the work by Aue and colleagues informs about the transversal importance of the warmth dimension, an important limitation is that the authors only relied on self-reported measures of empathy, which are known to be heavily influenced by social desirability (Sassenrath, 2020). This could prove an issue, particularly when considering that some social groups are the target of protection, with people refraining from expressing negative or derogatory views about such targets (e.g., people with disabilities, see Aubé et al., 2023; Rohmer & Louvet, 2012, 2016, 2018). It is therefore possible that people refrained from indicating lower levels of empathy towards such group, in a desire to appear socially desirable. In addition, empathy itself is seen as a desirable trait (Krumpal, 2013). These two considerations make it clear that relying solely on self-reported measures to investigate empathy is not the best option. It is a shame, given the variety of methods to investigate empathy (e.g., neural or behavioural measures).

The same limitation applies to the work by Cikara and Fiske (2012). Although these authors compared targets from the four quadrants of the SCM, they relied on two measurements, namely single-item self-reports of empathy, suffering from the same sensitivity to social desirability, and activation of the zygomaticus major, which only measures display of positive emotions but does not inform whether participants share the targets' negative emotions. To the best of our knowledge, no other work directly compared empathy expressed towards members of outgroups from specific quadrants of the SCM.

3. The importance of studying empathy towards stigmatized targets

In the previous section, we made it clear that research on empathy towards stigmatized targets is lacking. That said, an important question remains as to why is research on empathy towards stigmatized targets so crucial? Throughout the previous chapters, we briefly touched upon the consequences that the presence (or absence) of empathy entails. However, empathy also plays a key role in shaping the development and maintenance of positive intergroup relations. Among other things, empathy proves to be an important mediator of the positive outcome of intergroup contact on prejudice and perception (Paluck et al., 2021; Pettigrew & Tropp, 2008). Many authors showed that a higher degree of empathy – either chronic or induced – is related to a great number of positive outcomes in intergroup relations (Batson, 2010; Davis, 2015; McAuliffe et al., 2020; Weisz & Cikara, 2021), such as more positive outgroup attitudes and prejudice reduction (Batson et al., 1997; Finlay & Stephan, 2000; Q. Huang et al., 2021), including on indirect measures (A. R. Todd & Burgmer, 2013), more prosocial behaviours (Batson et al., 2002; Decety et al., 2016; Shih et al., 2009), stronger support for immigration policies (Moore-Berg et al., 2022), and more support for hate-speech prohibition (Soral et al., 2022).

This positive effect of empathy on intergroup relations has been found for a variety of target groups, including minimal groups (Galinsky & Moskowitz, 2000), racial groups (Vescio et al., 2003), elderly people (Galinsky & Ku, 2004), or lower-status and stigmatized groups (Batson et al., 2002; Herrera et al., 2018) – to give but some examples (see Batson & Ahmad, 2009; Dovidio et al., 2010; Stephan & Finlay, 1999; Vanman, 2016). Such interventions can also be implemented with children (L. K. Taylor & Glen, 2020). A compelling aspect of empathy-inducing interventions lies in their ability to foster a variety of positive outcomes whilst keeping group inequalities and discriminations salient

(A. R. Todd et al., 2012). Finally, longitudinal evidence suggests these positive outcomes are persistent (Clore & Jeffery, 1972; Devine et al., 2012). As such, a lack of – or lower levels of – empathy towards stigmatized targets compared to other SCM targets could play a role in the derogatory perception they suffer, but research on this topic is lacking.

That said, despite these and other positive effects of bolstering empathy towards social groups, it is also important to point out critical limitations of affective and cognitive empathy inductions. Indeed, empathy-inducing interventions have also been found to produce null results (Davis et al., 2004; Gallegos, 2024; Vorauer & Sasaki, 2009; Zaki & Cikara, 2015) or even to backfire (Sassenrath et al., 2016, 2022), due to a series of factors. For example, if a target is perceived as morally threatening, adopting their perspective leads to negative outcomes. As a case in point, Mooijman and Stern (2016) showed participants pictures of male same-sex couples having sexual intercourse and asked both liberals and conservative participants to imagine one of the men's experience. They found that this perspective taking exercise generated more negative attitudes towards gay couples among conservative than liberal participants. Although similarity mostly breeds empathy as shown in this chapter, feeling too similar to a target can lead to a high degree of personal distress when empathizing with a person in pain (Salles et al., 2024). Likewise, failing to distinguish between oneself and the target (i.e., losing the sense of self) negates any positive outcome of empathy (Krol & Bartz, 2022). Target's prototypicality can also interfere, as shown by Skorinko and Sinclair (2013). These authors found that adopting the perspective of strongly stereotypical (vs. less stereotypical) targets reinforces rather than decreases stereotypes. Sherman and colleagues (2020) observed a similar outcome when asking White US participants to adopt the point of view of prototypical Native American targets: Although positive effects of this intervention could be observed on attention and language (e.g., more time spent watching targets' faces compared to their jewellery; more emotion-related words used when describing photographs of targets), participants reported equal to higher level of stereotypes compared to a control condition.

In their review, Todd and Galinsky (2014) suggest that in order for an empathy-based intervention to be successful, one must be mindful of a series of factors intervening at three distinct levels. At the first level are observer-related characteristics, with factors dampening or reversing the positive effects of empathy, such as low self-esteem or strong ingroup identification. At the second level are target-related characteristics, with factors curtailing empathy including an intense dislike of a target or a target being deemed too stereotypical. Finally, at the third level are contextual factors such as a strong competitive setting, power differences or open conflict. One must therefore be mindful that empathy is not a panacea for all conflicts and negative intergroup relations. However, research on this topic globally underlines the potential of empathy as a powerful lever to improve intergroup relations.

The present chapter presented an overview of social factors related to empathy at the personal and intergroup levels. As we have seen, group membership is especially likely to alter levels of empathy, as illustrated by the literature on parochial empathy. Another message is the clear lack of direct comparisons between different outgroups when investigating empathy. Although it clearly transpires that people empathize more with ingroup than with outgroup targets, the extent to which members of different outgroups elicit different degrees of empathy remains largely unknown and thus constitutes an

important question for future research, particularly when considering that not all outgroups are perceived the same. Specifically, groups perceived as lacking both competence and warmth are victims of strong negative and dehumanizing perception (see Chapter 1), suggesting that observers could lack empathy – or motivation to empathize – towards such targets compared with other social targets. To the best of our knowledge, this assumption has only been tested twice (Aue et al., 2021; Cikara & Fiske, 2012), and this work effort is limited to self-reported measures investigating empathy in a binary way (i.e., "how good/bad would you feel"). This leaves open the question as to whether a lack of empathy towards LCLW targets can be observed on other types of measures (e.g., behavioural or neural) and other facets of empathy (e.g., visual perspective taking or pain perception). As of now, knowledge pertaining to the influence of stigmatized group membership on empathy clearly needs to be expanded. This is all the more important considering that empathy proves an important mechanism in leveraging positive intergroup relations.

In the next empirical chapters, we will present a series of empirical efforts that we conducted to expand current knowledge on differential empathy towards outgroups varying in terms of warmth and competence (i.e., the two fundamental dimensions of social perception; Abele et al., 2021; Fiske et al., 2002).

In this theoretical introduction, we reviewed the literature pertaining to the content of group stereotypes, and described the stigma associated with belonging in the low competence low warmth quadrant in Chapter 1. Then, we proposed an integrative review of the research on empathy in Chapter 2 and detailed what social factors can influence empathy in Chapter 3.

Having laid down the rationale of our work, we now present three empirical chapters investigating our hypotheses by looking at the role of quadrant membership on empathy by means of different approaches.

In Chapter 4, we look at the perceived cognitive cost of empathy as well as the preference to empathize *vs.* describe targets as a function of targets' SCM quadrant membership, by means of the Empathy Selection Task.

In Chapter 5, we turn to visuospatial perspective taking and investigate whether targets' SCM quadrant membership is related to observers' efficiency to adopt the visual perspective of a target.

In Chapter 6, we measure brain activity related to empathy for pain by means of an electroencephalogram. In the first study, we seek to replicate and extend findings on parochial empathy. In the second study, we look at the role of targets' outgroup quadrant on empathy for pain.

Finally, we present a discussion of our findings in Chapter 7.

Chapter 4.

Are observers differentially motivated to empathize with stigmatized targets? An investigation using the Empathy Selection Task

Research shows that people do not spontaneously show empathy towards stigmatized outgroups, and especially not towards groups lacking both competence and warmth as described in the Stereotype Content Model. However, people do prove capable of empathizing with such targets when required. We hypothesized that this discrepancy is due to a lower motivation to empathize with such stigmatized targets, reflected by people perceiving higher cognitive costs when doing so. In a series of four preregistered studies (N_{total}=719), we tested this hypothesis by contrasting low competence/low warmth stigmatized groups with other groups in an Empathy Selection Task and measuring participants' perceived cognitive costs of empathizing. Results replicate previous findings that people prefer to avoid empathy due to its perceived cognitive costs. However, targets' group membership unexpectedly did not moderate effects. We propose a series of potential explanations for the absence of group membership moderating effects and suggest avenues for future works.

Reference

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Chapter 4. Are observers differentially motivated to empathize with stigmatized targets? An investigation using the Empathy Selection Task

Empathy is the ability to feel and understand the emotional and cognitive experience of a target (Batson, 2009; Eklund & Meranius, 2021). It is an essential component of social interactions as it plays a crucial part in developing, maintaining and improving intergroup relations (Pettigrew & Tropp, 2008; Soral et al., 2022; A. R. Todd & Galinsky, 2014; Vanman, 2016). Although people experience empathy on a daily basis (Depow et al., 2021), conflict at the intergroup level often precludes its emergence towards outgroups (Cikara & Van Bavel, 2014; Richins et al., 2019). Even in the absence of conflict, people may fail to show spontaneous empathy towards members of specific outgroups, namely those that are low on the two fundamental dimensions of group perception, competence and warmth (Fiske et al., 2002; Judd et al., 2005). Indeed, members of these groups are often victims of strong derogation resulting in the absence of empathy shown towards them (Harris & Fiske, 2006; Kteily & Bruneau, 2017). This reaction is all the more surprising that people possess a spontaneous ability to empathize even with objects and non-human entities (see Harris & Fiske, 2011). Moreover, observers seem perfectly capable of adopting the viewpoint of and empathising with such low competence low warmth targets when explicitly required to do so (Batson et al., 2002; Moore-Berg et al., 2022).

One account for people's lack of spontaneous empathy when facing these specific targets is that they lack the necessary motivation to do so. In other words, they simply see no reason to invest the effort into trying to feel and understand the experience of low competence low warmth targets. We explore the viability of this account by assessing people's motivation to empathize with low competence low warmth targets using the Empathy Selection Task (Cameron et al., 2019). In addition, we also explore the cognitive cost that people perceive to be associated with empathy related to such targets.

1. Dehumanized groups in the Stereotype Content Model

Building on extant research on social evaluation, the Stereotype Content Model (SCM; Fiske et al., 2002; for recent reviews, see Abele et al., 2021; Koch et al., 2021) proposes that stereotypes are the product of groups' interdependence as well as their hierarchical relations. These structural relations lead to perceptions of different degrees of warmth, indicating whether a group aims to cooperate or compete, and competence, indicating whether a group has the ability to carry out its intents. These two dimensions are considered orthogonal, thus making up a four-quadrant space encompassing all social groups (Cuddy et al., 2007, 2009; Lindqvist et al., 2017). Many groups show a mixed pattern of warmth and competence, coming across as high on competence but low on warmth (HCLW; e.g., bankers or politicians) or low on competence but high on warmth (LCHW; e.g., disabled

people or blue-collar workers). Some groups are also perceived as being high on both dimensions (HCHW; generally, one's ingroup or groups one collaborates with) while still others are low on both dimensions (LCLW; e.g., homeless people or drug addicts). Research on the SCM showed that groups from the different quadrants trigger different emotions: HCHW elicit pride, HCLW elicit envy, LCHW elicit pity, and LCLW – our groups of interest – elicit disgust. In addition, membership in these quadrants also shapes observers' behavioural tendencies, with people's intentions to help or harm a group member being related to the group's level of competence and warmth (Cuddy et al., 2007).

As it turns out, groups belonging to the LCLW quadrant seem to be victims of extreme derogation, with observers dehumanizing them and denying them emotions, thoughts, and feelings (Fiske, 2013; Kteily et al., 2015; Rudert et al., 2017; Vaes & Paladino, 2010). For instance, fMRI findings consistently show that contrary to what occurs for groups from the three other quadrants, members of LCLW groups do not activate brain regions related to social cognition – but instead trigger stronger activation in brain areas related to disgust (Harris & Fiske, 2006, 2007). Interestingly, Harris and Fiske (2011) additionally observed that brain areas related to attention and conflict resolution were also more active for members of LCLW compared to other groups. In their view, this could be a sign that people *do* perceive these targets' mind, but also actively dehumanize them. Such a denial of mental states has been observed at an explicit level, with participants using fewer verbs referring to mental states when describing the daily life of LCLW compared to other social targets (Harris & Fiske, 2009) and also directly ascribing less mental states to LCLW targets (Cameron et al., 2016). This perception of LCLW groups as less 'truly social' agents can also be observed at the behavioural level, with people more willing to sacrifice LCLW group members compared to other social targets in moral dilemmas (Awad et al., 2018; Cikara et al., 2010). Taken together, these findings clearly suggest a lack of empathy towards LCLW targets.

2. Motivated empathy and its costs

Empathy is a pivotal aspect of human relations, but its specific nature is complex and continues to be debated in the literature (Batson, 2009; Hall & Schwartz, 2022; Wispé, 1986; Zaki, 2014). It is mostly conceptualized as comprising three main components, namely *mind perception*, referring to observers' attribution of mental states to the target, *experience sharing*, referring to observers' mimicry of the target's states (including feelings), and *mentalizing*, referring to observers' ability to understand a target's intentions, beliefs, or emotions (Weisz & Cikara, 2021). These components are not mutually exclusive and recent research suggests that they all are at stake in situations involving empathy (Eklund & Meranius, 2021; Zaki, 2014).

Crucially, all three components of empathy are considered context-dependent and contingent upon observers' motivation (Zaki, 2014). Such motivation can vary as a function of several factors, and most notably the costs and rewards involved with empathizing. Indeed, empathy may entail costs such as financial expenses through prosocial behaviours like donations (Shaw et al., 1994), or through concessions in negotiations (Galinsky et al., 2008). A consideration of such financial costs can reduce one's motivation to empathize with targets. However, empathizing can also lead to rewards, such as stronger social bonds (Pickett et al., 2004) or a positive self-image (Sassenrath, 2020; Schumann et al., 2014),

which likely boost people's motivation to empathize. As Zaki (2014) details in his Motivated Empathy Model, these costs and rewards likely influence observers' motivation regarding each of the three components of empathy.

Motivational considerations were also recently put forward by Gehlbach and Mu (2023) in their Social Perspective Taking (SPT) model. In this model, the authors argue that SPT comprises four distinct phases: (a) the Target Perception phase, during which mind attribution takes place; (b) the Motivation phase, which includes calibration of required effort; (c) the Strategic Approach phase, which entails selecting strategies to gather information; and finally (c) the Evaluation Phase, which consists of evaluating the accuracy of one's perspective taking.

Interestingly, both models acknowledge the central role of motivation in empathy and detail its (un)favourable impact on subcomponents of empathy (e.g., mind attribution). They also both highlight the role of cost perception on people's motivation to empathize. Empathy can thus be assumed to depend on observers' motivation, which is itself shaped by considerations of costs and rewards associated with empathizing.

Recently, Cameron et al. (2019) set out to empirically investigate whether empathy entailed costs in and of itself, and particularly cognitive costs. Specifically, they hypothesized that in the absence of both a reward that could motivate people to empathize and tangible costs that could demotivate them, empathy should be directly related to perceived cognitive costs that could decrease observers' motivation to empathize. This, in turn, should generally lead observers to avoid putting themselves in a situation of being asked to empathize. To test this hypothesis, they constructed the Empathy Selection Task. In this task, participants are confronted with a series of targets expressing positive or negative emotions. Participants face two choices, illustrated by two decks of cards. On each of a total of 40 trials, they need to choose between either physically describing the target in an objective manner (the *Describe* deck) or feeling and reporting the target's emotion (the *Feel* deck). Depending on their choice, participants must write a few words or sentences either describing the targets or reporting their emotions. At the end of the task, participants report their perception of the cognitive costs associated with each deck using four items of the National Aeronautics and Space Agency (NASA) Task Load Index (Hart & Staveland, 1988). Results consistently indicate that in the absence of a clear reward people prefer to avoid empathy (i.e., the *experience sharing* component; Zaki, 2014), with participants choosing to describe targets rather than to empathize with them in around 70% of the trials. Moreover, this lack of motivation to empathize with targets goes hand in hand with higher perceived cognitive costs attributed to the *Feel* task compared to the *Describe* task. These findings confirm that empathy is cognitively costly and suggest that perceived cognitive costs influence people's motivation to put themselves in situations requiring their empathy.

3. Current work

Research shows that people show less empathy towards LCLW targets than other social targets, partly due to a lesser attribution of mind. This pattern is puzzling in light of the fact that people spontaneously attribute a mind to objects and other non-human entities (i.e., anthropomorphism; Harris & Fiske, 2011; Waytz et al., 2010). Moreover, when explicitly asked to empathize with LCLW targets, people are not only capable of doing so, but even

show prosocial behaviours towards these targets (Batson et al., 2002). One account of this apparent contradiction may be that whereas people initially attribute a mind to LCLW targets, they also seem to be actively denying it (Harris & Fiske, 2011). This denial seems to be motivated by an anticipated call for help by LCLW targets, which renders salient anticipated emotional costs and exhaustion (Cameron et al., 2016). In short, although observers are quite capable of empathizing with LCLW targets, they may lack the motivation to do so, presumably because they associate higher costs of doing so for these compared to other social targets. This line of reasoning doves well with Dunn et al.'s (2019) proposal that cognitive costs are mainly a function of the perceived probability of making errors during a task, as well as the perceived time required to perform it[1]. When required to empathize with LCLW (i.e., generally dehumanized) targets, observers may anticipate such perceived cognitive costs of empathizing with LCLW compared to other social targets, thereby reducing observers' motivation to do so.

We decided to test the viability of this account using the Empathy Selection Task proposed by Cameron et al. (2019). This task ensures the tangible costs (e.g., time or money) that usually preclude the emergence of empathy are not at stake (Cameron et al., 2016; Shaw et al., 1994). At the same time, the task is also devoid of possible rewards associated with showing empathy. For these reasons, the Empathy Selection Task stands as a prime candidate to investigate our hypothesis that LCLW group membership has an impact on participants' motivation to show empathy – and their assumed associated cognitive costs of doing so.

We hypothesized that in the Empathy Selection Task, participants would prefer to physically describe a target (*Describe* deck) rather than to feel and report a target's emotions (*Feel* deck), thereby replicating the findings of Cameron et al. (2019). In statistical terms, this translates to a significant intercept in a logistic regression model with the choice as a dependent variable. In addition, we predicted that observers would be less motivated to empathize with LCLW targets compared to targets from the other quadrants identified by the Stereotype Content Model. This should show in an even lower probability of choosing the *Feel* deck for LCLW targets compared to other targets, translated to a significant main effect of target's group membership in a logistic regression model. Turning to the perceived cognitive costs of empathy, we also expected to replicate Cameron et al.'s (2019) findings that people report higher perceived cognitive costs for the *Feel* deck compared to the *Describe* deck (i.e., a main effect of type of task on cognitive costs in a regression model). Here too, we expected a moderation by targets' group membership (i.e., an interaction between type of task and group membership in a regression model), such that participants would report even higher perceived cognitive costs for the *Feel* deck when it involved LCLW targets compared to other social targets.

We tested these hypotheses in a series of four preregistered and high-powered experiments. In Experiment 1, we contrasted LCLW targets with HCLW targets. We

[1] As suggested by a member of the jury, a set of additional sentences could provide more support for this claim: "Indeed, given observers' tendency to dehumanize LCLW targets, one could argue that observers empathize less often with LCLW, raising the perceived probability of making errors compared to other social targets In addition, empathizing with a LCLW target would require observers to inhibit the mind denial process, which could render empathizing with LCLW targets more time-consuming compared to empathizing with another social target."

selected HCLW targets as our first comparison group because targets from groups belonging to this quadrant do not elicit ingroup bias as many HCHW targets do, but at the same time they are not dehumanized as LCLW targets often are. In Experiment 2, we contrasted LCLW targets with HCHW targets to maximize the social distance between targets. In Experiment 3, we opted for a full design and contrasted LCLW targets to targets from all three other quadrants (i.e., HCHW, HCLW, LCHW). In Experiment 4, we again contrasted LCLW to HCHW, but the design included imposed-choice conditions by forcing participants to perform either *Describe* trials or *Feel* trials. We preregistered all experiments. All preregistration documents, data and R scripts as well as supplementary material are available on the OSF:

https://osf.io/cnwsb/?view_only=10f49c959e6946cfa724476f5717bfb0.

4. Experiment 1

4.1. Method

Participants and design. A total of 90 French-speaking participants took part in a 32-minute-long (median time) experiment on Prolific Academic in exchange for 3.50£. We randomly assigned participants to one of the conditions of a 2 (Quadrant: LCLW targets N=44 vs. HCLW target N=46) by 2 (Type of task: Feel vs. Describe) design, with the first factor varying between participants and the second within them. We excluded 10 participants who erred on more than 30% of questions randomly asking them to report if a trial's target belonged to a LCLW or HCLW group[2]. The final sample thus comprised 80 participants (M_{age}=30.62, SD_{age}=10.43, 40 women) with equal numbers in each condition.

Power calculation. Cameron et al. (2019) reported a meta-analytic effect size for choice of task (*Describe* vs. *Feel*) of g=-.64. Based on this, we ran an a priori power analysis for the Quadrant × Type of task interaction using the PANGEA web app[3], with an effect size of d=.3, corresponding to a medium effect in updated guidelines of Cohen's d (Lovakov & Agadullina, 2021). This power analysis indicated that we needed at least 41 participants per condition to reach 80% power. To account for the possible loss of participants due to our exclusion criteria, we aimed for 90 participants.

Procedure. Participants gave their informed consent before random assignment to one of the two conditions. The procedure was identical in both conditions except that targets were labelled as members of LCLW or HCLW groups. Participants then read the instructions for the Empathy Selection Task (Cameron et al., 2019, 2022). They performed three training trials to make sure that they understood the task. This also allowed them to understand what their choices entailed, thus ensuring that the first test trials would not be based on random deck selection. Next, participants went through 42 test trials. In each trial, we displayed a target profession for one second (HCLW condition: economist, lawyer, or IT engineer; LCLW: garbage man, truck driver, or baggage handler; all professions were counterbalanced within conditions). We selected professions from an unpublished database

[2] The professions used were garbage person, truck driver, baggage handler for the LCLW quadrant; and economist, lawyer, IT engineer for the HCLW quadrant.

[3] https://jakewestfall.shinyapps.io/pangea; details of all power analyses can be found in Supplementary Material 1.

containing evaluations of 120 professions on multiple variables, including warmth and competence traits (Nils & Yzerbyt, 2022). Following profession presentation, participants saw the face of a target (all faces were White men taken from the Chicago Face Database as well as the Radboud Faces Database; Langner et al., 2010; Ma et al., 2015) displaying either a positively or negatively valenced emotion (e.g., fear or joy)[4]. Participants' task was to choose between writing down three words describing the target's facial expression in a neutral, objective way (*Describe* deck) or adopting the target's perspective and writing down three words describing what and how this target might feel (*Feel* deck). To ensure that participants paid enough attention to the targets' alleged social group membership (i.e., professions corresponding to LCLW or HCLW groups), they were asked 15 times at random to indicate the target's social group right after a trial. At the end of the task, participants completed the 4-item NASA Task Load Index (Cameron et al., 2019, 2022; Hart & Staveland, 1988), measuring to what extent they perceived the task as cognitively costly. Specifically, they indicated their agreement (1=*very low*; 5=*very high*) with four statements (e.g., "How mentally demanding was this trial?"). They did this separately for the *Describe* (α=.70) and the *Feel* (α=.59) tasks. For exploratory purposes, we also asked participants to complete a 10-item *Social Dominance Orientation* (SDO; Duarte et al., 2004) scale and to indicate their political orientation[5]. Finally, participants completed demographic questions, were debriefed, thanked, and compensated.

4.2. Results

For all experiments, we performed analyses using R (R Core Team, 2024) and the lme4 (Bates et al., 2015) and lmerTest (Kuznetsova et al., 2017) packages.

Empathy Selection Task. To examine our first hypothesis, we performed a logistic linear mixed model with Task Choice as our binary dependent variable (0=*Describe* task; 1=*Feel* task), and Quadrant (LCLW vs. HCLW) as a between-participant factor and participants and stimuli as random factors. The model intercept proved significant, Odds Ratio (*OR*)=0.39, z=-4.73, p<.001, indicating that, across conditions, participants were more likely to choose the *Describe* task than the *Feel* task (see Figure 1). This replicates previous findings by Cameron et al. (2019, 2022). However, contrary to our hypothesis, there was no main effect of Quadrant, *OR*=0.76, z=-0.675, p=.499.

[4] As including face valence as a factor did not show robust significant main effect nor any interaction with other factors across all four experiments, we report the analyses without taking into account valence. Interested readers can access analyses taking valence into account in the Supplementary Material 1.

[5] As no statistical analysis including SDO or political orientation emerged as significant, we do not report them here. Interested readers can access these results as well as other statistical indices regarding these scales in the Supplementary Material 1.

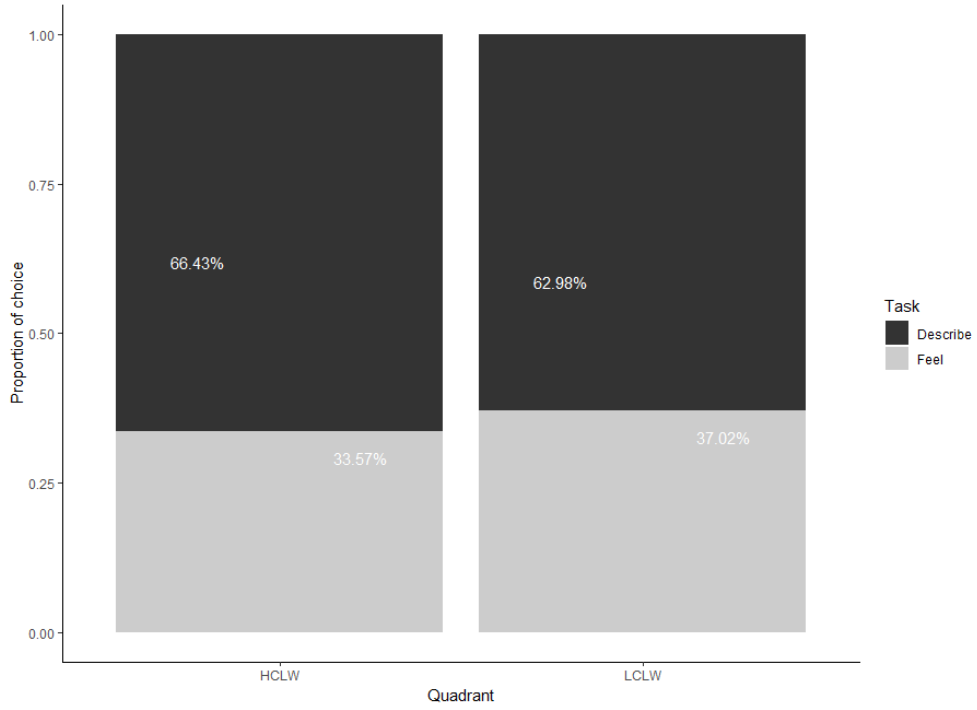

Figure 1. Proportion of choices for Describe vs. Feel tasks as a function of Quadrant.

NASA Task Load Index. To investigate our second hypothesis, we submitted scores on the NASA Task Load Index to a 2 (Quadrant: LCLW vs. HCLW) x 2 (Type of task: *Describe* vs. *Feel*) mixed model analysis, with Quadrant varying between participants and participants as random factor. There was a main effect of Task, $F(1, 558)=8.11$, $p=.005$, $\eta_p^2=.011$, indicating that participants perceived the *Feel* task as cognitively more demanding than the *Describe* task, regardless of the target's social group (see Figure 2). This again replicates previous findings from Cameron et al. (2019, 2022). There was no main effect of Quadrant on Score of NASA Task Load Index, $F(1,78)=0.29$, $p=.592$, $\eta_p^2<.001$. Contrary to our hypothesis, no significant interaction emerged, $F(1,558)=1.92$, $p=.167$, $\eta_p^2=.003$.

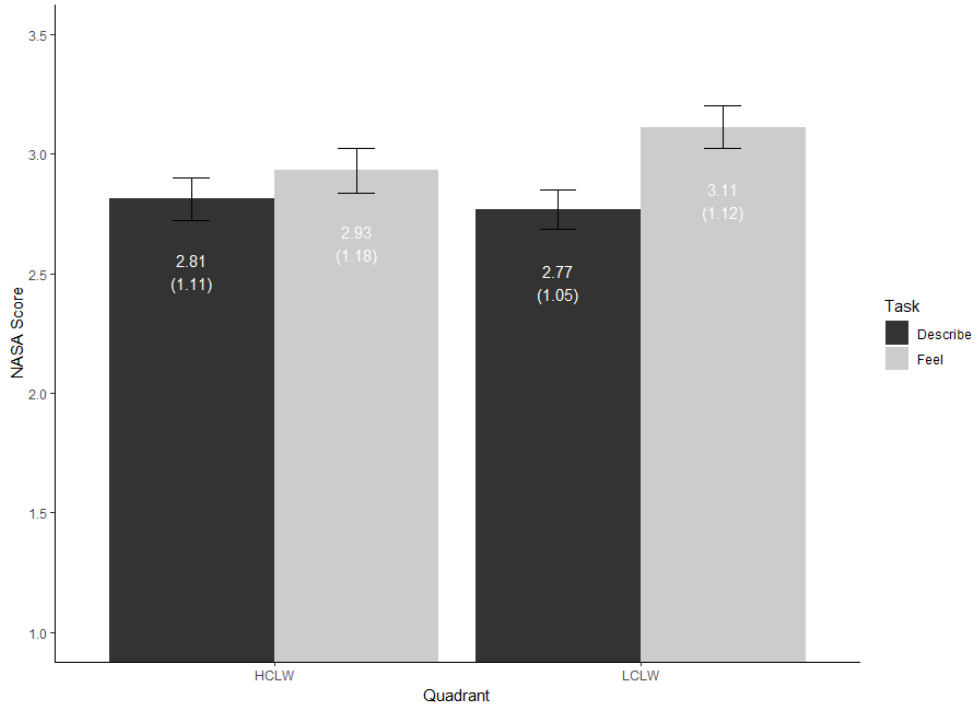

Figure 2. Scores on the NASA Task Load Index as a function of Quadrant and Type of task. Values are means (standard deviations). Bars represent standard errors.

4.3. Discussion

Although we replicated previous findings showing that people are less motivated to empathize with a person than to merely describe their facial expression and that they perceive empathizing with (vs. describing) targets as more cognitively taxing (Cameron et al., 2019, 2022), we did not find evidence for a moderating effect of targets' social group membership based on the SCM (i.e., a difference of motivation to empathize with LCLW vs. HCLW targets). Although there might indeed be no differences in people's motivation to adopt various social targets' perspectives, the absence of moderation by targets' group membership may also originate from specific features of our procedure. For one thing, we used a between-participants design, presenting participants with targets from a single quadrant in each condition. This type of design is not representative of daily life interactions, where one encounters a variety of social targets in short periods of time. A lack of motivation to adopt LCLW targets' perspectives may well only emerge when LCLW targets are contrasted with social targets belonging to other quadrants. In line with this interpretation, research showing that LCLW are dehumanized relied on designs presenting multiple social targets in a within-participants design, and thus in a comparative context (Cikara et al., 2010; Harris & Fiske, 2006, 2007, 2009, 2011).

A second limitation of our procedure is its low ecological validity. Indeed, we relied on a very controlled approach, with target faces being identical between conditions and targets' social group membership (conveyed by their LCLW or HCLW professions) appearing for a very short period as a textual cue without bearing on the subsequent task. As it turns out, there is evidence for a strong relationship between visual cues and group stereotypes, with people having a clear visual representation of what prototypical members of specific groups look like (Dotsch et al., 2008; Schmitz et al., 2024). Some participants did not find specific professions-target faces associations believable due to their visual stereotypes, and this may have played a role in our results.

In Experiment 2, we changed these critical features in our procedure: We adopted a within-participants design, relied on faces that were pretested as fitting the respective professions, and kept targets' profession cue visible throughout each trial. Additionally, we contrasted LCLW targets and HCHW targets, thus maximizing their differentiation.

5. Experiment 2

5.1. Method

Participants and design. A total of 120 French-speaking participants took part in a 52-minute-long (median time) experiment on Prolific Academic in exchange for 5.25£. Both Quadrant (LCLW targets vs. HCHW targets) and Type of task (Feel vs. Describe) varied within participants. We again excluded 13 participants who erred on more than 30% of questions randomly controlling their attention paid to targets' social group. The final sample thus comprised 107 participants (M_{age}=29.26, SD_{age}=10.64, 49 women).

Power calculation. Based on a previous study we conducted relying on an identical design[6] and suggesting an effect of d=.1, we ran simulations using the package *simr* (Green & MacLeod, 2016). This power analysis indicated that we would need at least 100 participants to reach 80% power. To account for the possible loss of participants due to our exclusion criteria, we collected data from 120 participants.

Procedure. The procedure was identical to the one used in Study 1, except that targets' faces were pretested as fitting the professions they were associated with, that the targets stemmed from the LCLW quadrant (truck drivers, garbage collector, telemarketer) versus the HCHW quadrant (physiotherapist, veterinarian, paediatrician; all faces were taken from the 10k US Adults Faces Database for this as well as subsequent experiments; Bainbridge et al., 2013), that participants saw targets from both quadrants, and that targets' professions were visible throughout each of overall 48 trials. Participants again reported their perceived cognitive costs on the NASA Task Load Index (Cameron et al., 2019, 2022; Hart & Staveland, 1988; *Describe* task: α=.87; *Feel* task: α=.85).

5.2. Results

Empathy Selection Task. To investigate our first hypothesis, we performed a logistic linear mixed model with Task Choice as our binary dependent variable (0=*Describe* task;

[6] As we obtained similar results for the two studies, we only report here the results of the most powered study for the sake of briefness. We report the results of the other study in Supplementary Material 2.

1=*Feel* task), Quadrant (LCLW vs. HCHW) as a within-participant factor and participants and stimuli as random factors. The model intercept proved significant, Odds Ratio (*OR*)=0.37, *z*=-5.57, *p*<.001, confirming that, across conditions, participants were more likely to choose the *Describe* task compared to the *Feel* task (see Figure 3). This again replicates Cameron et al.'s (2019, 2022) findings. However, contrary to our hypothesis, there was no main effect of Quadrant, *OR*=0.98, *z*=-0.141, *p*=.888.

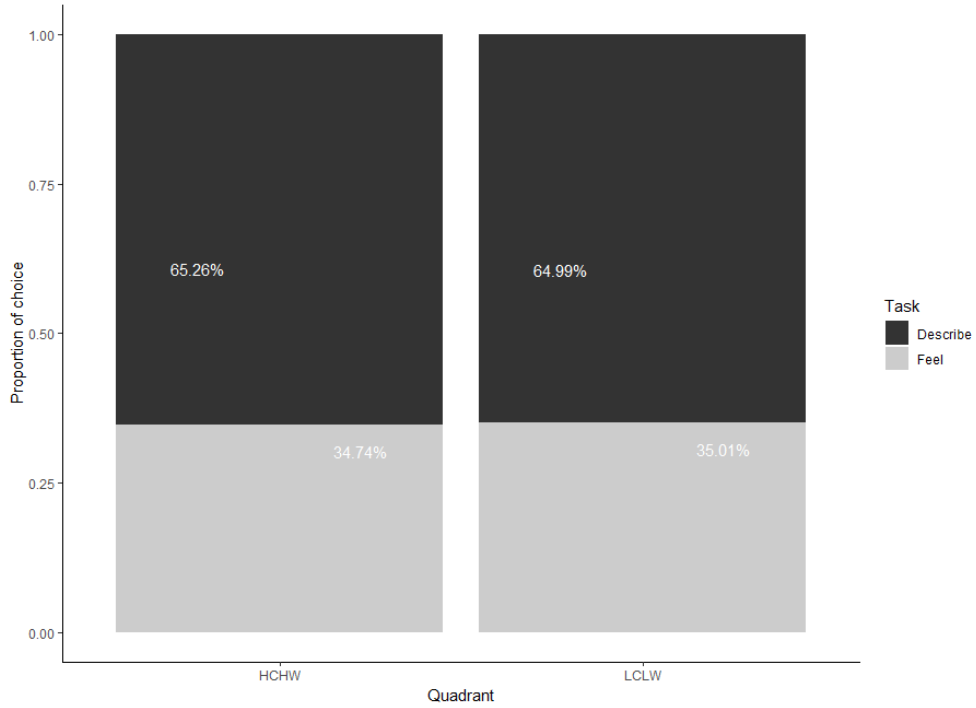

Figure 3. Proportion of choices for Describe vs. Feel tasks as a function of Quadrant.

NASA Task Load Index. To investigate our second hypothesis, we submitted the scores on the NASA Task Load Index to a 2 (Quadrant: LCLW vs. HCHW) x 2 (Type of task: *Describe* vs. *Feel*) mixed model analysis, with both factors varying within participants and participants as random factor. Surprisingly, the data failed to replicate Cameron et al. (2019, 2022) as there was no main effect of Task, $F(1, 1602)=0.15$, $p=.703$, $\eta_p^2<.001$ (see Figure 4). We found a main effect of Quadrant, $F(1,1602)=4.03$, $p=.045$, $\eta_p^2=.002$, indicating that overall, people perceived higher cognitive costs for the LCLW targets compared to the HCHW targets. However, the predicted two-way interaction was not significant, $F(1,1602)=0.08$, $p=.780$, $\eta_p^2<.001$.

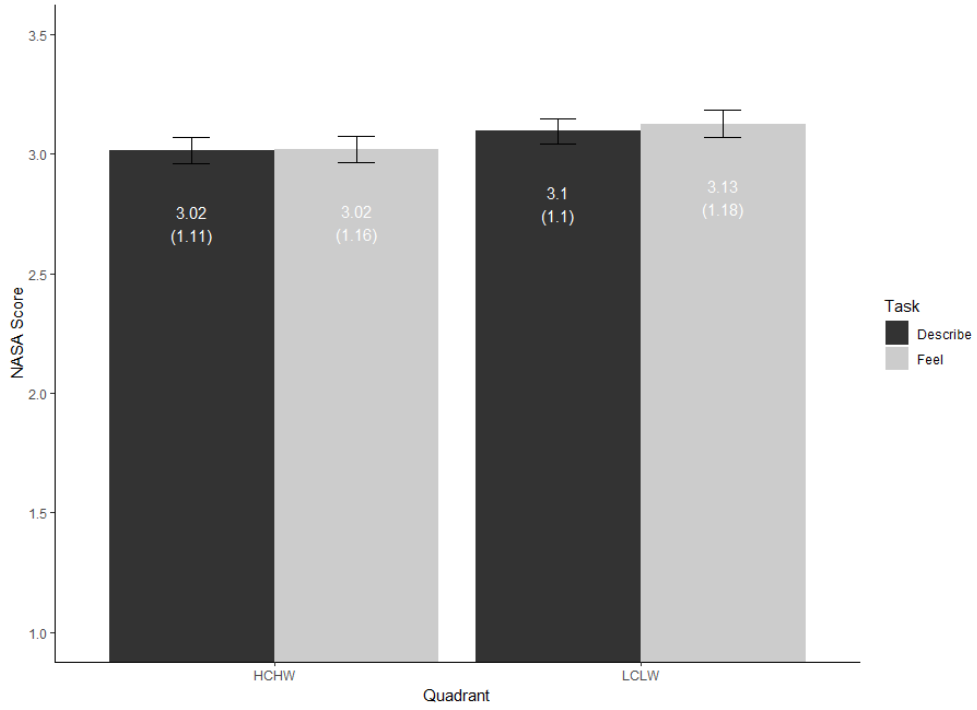

Figure 4. Scores on the NASA Task Load Index as a function of Quadrant and Type of task. Values are means (standard deviations). Bars represent standard errors.

5.3. Discussion

As in Experiment 1, we replicated Cameron et al. (2019, 2022) findings that participants prefer the *Describe* task over the *Feel* task, indicating that people are less motivated to empathize with a target compared to describing this target. However, they did not report higher cognitive costs for the *Feel* task than for the *Describe* task. Although there was a main effect of targets' group membership on perceived cognitive costs, this effect was unexpected and does not emerge again in the following studies. As such, we refrain from discussing it here.

As in Experiment 1, we did not find evidence for people having a lower motivation to empathize with LCLW compared to other targets. Having said this, targets' faces with positively- or negatively-valenced facial expressions were visible when participants had to choose between the *Feel* or *Describe* task. Because participants were primed with empathy in the instructions, facing such emotional targets may already have triggered *experience sharing* (Engen & Singer, 2013). This could have contributed to blurring the differences between targets as participants were already subjected to cognitive costs to some extent, leading the choice to be made independently of cost considerations.

We considered these limitations in Experiment 3, and only showed targets' faces *after* participants had made their deck choice. In addition, we also opted for a design that

included targets from all four SCM quadrants (i.e., comparing LCLW targets to those of the three other quadrants proposed by the SCM; Fiske, 2015, 2018). Finally, Experiments 1 and 2 had participants describe targets' facial expressions, thus requiring them to focus on targets' emotions, which may have led to them spontaneously empathising. To prevent this possibility, we modified the instructions for the *Describe* trials and asked participants instead to describe the physical appearance targets (e.g., age, eye, and hair colour, etc.).

6. Experiment 3

6.1. Method

Participants and design. A total of 360 English-speaking[7] participants took part in the 33-minute-long (median time) experiment on Prolific Academic in exchange for 3.70£. We randomly assigned participants to one of three between-participants conditions, in which LCLW targets were contrasted with either HCHW (N=112), HCLW (N=125), or LCHW (N=123) targets. Type of task (*Feel* vs. *Describe*) again was a within-participants factor. We excluded 62 participants who erred on more than 20% of questions randomly controlling for their attention to targets' social group – we reduced the threshold as the random question was only displayed 8 times throughout the task. The final sample thus comprised 298 participants (M_{age}=41.6, SD_{age}=13.84, 147 women) with N=92 in the LCLW vs. HCHW condition, N=109 in the LCLW vs. HCLW condition and N=97 in the LCLW vs. LCHW condition.

Power calculation. Given the changes in the design, we ran an a priori power analysis for our first order interaction using the package *simr* (Green & MacLeod, 2016), with an effect size close to a small effect (d=.1, based on a sensitivity analysis performed on our previous studies). This power analysis revealed that we would need 100 participants per condition to reach 80% power. To account for the possible loss of participants due to our exclusion criteria, we collected 360 participants in total. However, due to the strictness of our exclusion criteria, we slightly fell short of the intended number of participants in the LCLW vs. HCHW and LCLW vs. LCHW conditions.

Procedure. The procedure was identical to that of Study 1, with the following exceptions. First, LCLW targets (drug addict, welfare recipient) were contrasted with either HCHW (athlete, teacher), HCLW (politician, rich) or LCHW (disabled, blue-collar) targets. Second, no faces were shown during task choice. Third, there were only 24 trials in total (i.e., 12 trials per quadrant). Apart from choosing decks, participants again reported perceived cognitive costs on the NASA Task Load Index (Cameron et al., 2019, 2022; Hart & Staveland, 1988; *Describe* task: α=.86; *Feel* task: α=.82).

6.2. Results

Empathy Selection Task. To investigate our first hypothesis, we performed a logistic linear mixed model by regressing Task Choice (0=*Describe* task; 1=*Feel* task) on a set of

[7] We turned to English-speaking participants in Experiment 3 and 4 as we could not reach our desired sample size with French-speaking Prolific users not having participated in Experiments 1 and 2. Therefore, all social groups and faces used were again pretested for English-speaking participants.

Helmert contrasts, with C1 being our contrast of interest by comparing LCLW targets to all three other targets, C2 comparing LCHW targets to both HCLW and HCHW targets, and C3 comparing HCLW to HCHW targets. We included participants and stimuli as random factors. The model intercept proved significant, *OR*=0.22, *z*=-11.57, *p*<.001, confirming that, across conditions, participants were more likely to choose the *Describe* task compared to the *Feel* task (see Figure 5). As before, this replicates Cameron et al.'s (2019, 2022) findings. We also found a main effect of C1, *OR*=0.87, *z*=-2.02, *p*=.043, but surprisingly this effect was opposite to the predicted direction in that participants preferred the *Feel* task for LCLW targets compared to targets from all three other quadrants. No other contrast proved significant, all *z*s<0.933, all *p*s>.351

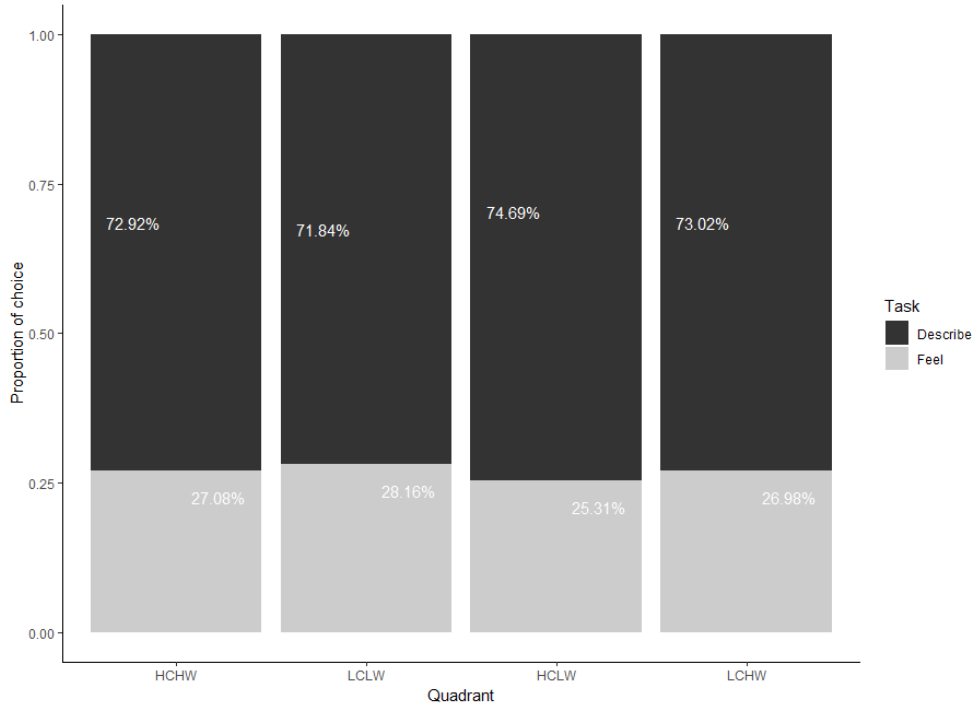

Figure 5. Proportion of choices for Describe vs. Feel tasks as a function of Quadrant[8].

NASA Task Load Index. To investigate our second hypothesis, we performed a mixed model analysis by regressing NASA Task Load Index scores on the same set of Helmet contrasts as above, with C1 being our contrast of interest (comparing LCLW targets to all three other targets), as well as on Type of task (*Describe* vs. *Feel*) and all contrast by task type interaction. We included participants as random factor. Replicating Cameron et al. (2019, 2022), we found a main effect of Task, $F(1, 4463.3)=256.48$, $p<.001$, $\eta_p^2=.039$.

[8] Here and as for Figure 6, the LCLW bars on the graph represent the mean for LCLW targets across all conditions.

Again, participants evaluated the *Feel* task as cognitively more demanding than the *Describe* task (see Figure 6). No contrast nor any interaction was significant, all *F*s<0.86, *p*s>.354.

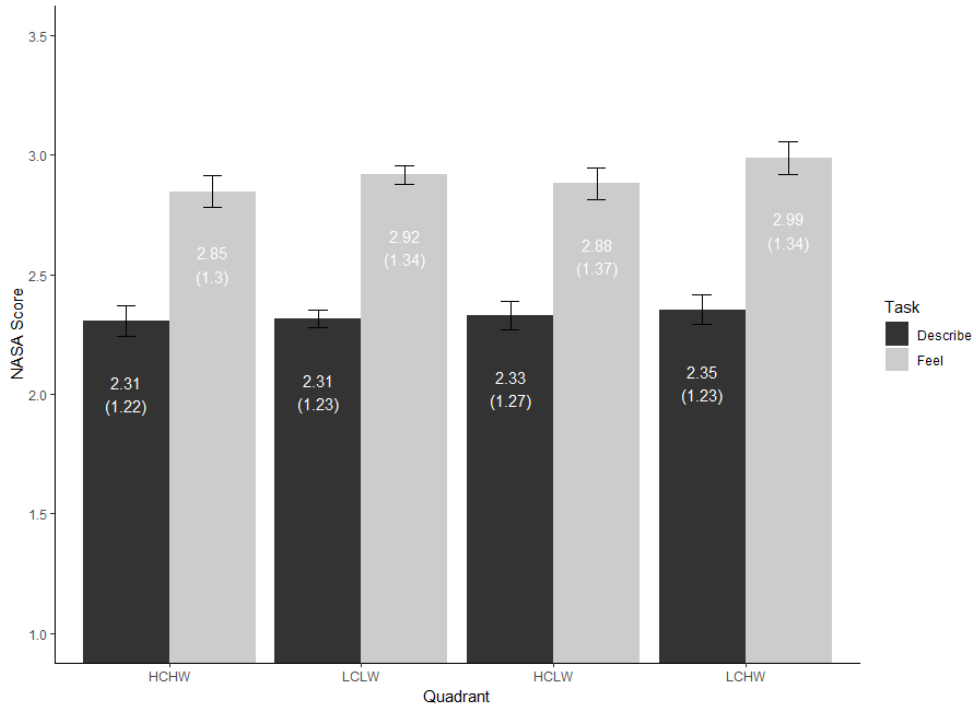

Figure 6. Scores on the NASA Task Load Index as a function of Quadrant and Task. Values are means (standard deviations). Bars represent standard errors.

6.3. Discussion

We again replicated Cameron et al.'s (2019, 2022) findings, with participants preferring the *Describe* over the *Feel* task and reporting higher cognitive costs for the *Feel* task. We also observed a significant main effect of target group membership on task choice. However, this effect ran counter to our hypothesis, with participants being more likely to choose the *Feel* task for LCLW targets compared to those of other quadrants. As it did not emerge in previous nor subsequent studies, we refrain from discussing it here.

Taken together, our findings suggest that membership in a stigmatized LCLW group does not influence observers' motivation to empathize with such targets, nor their perceived cognitive costs related to doing so. In all previous experiments participants could choose freely between describing or empathizing with a given target. Arguably, they may have focused most on this choice, reducing any potential impact of targets' group membership. This may explain why we systematically observed a main effect of the type of task, an

effect that was not qualified by target group. To address this limitation, Experiment 4 restricted the possibility to choose by assigning participants to one of three between-participants conditions. They either saw both the *Describe* or *Feel* task (choice of task was imposed at each trial), saw only *Feel* trials, or saw only *Describe* trials. Furthermore, Manipulating an independent variable within or between participants can produce different results (Erlebacher, 1977). As such, presenting both tasks as a within- and between-subject factor allows increasing the robustness of our findings.

7. Experiment 4

7.1. Method

Participants and design. A total of 243 English-speaking participants took part in the 36-minute-long (median time) experiment on Prolific Academic in exchange for 6.00£. We randomly assigned them to one of three between-participants conditions. They either had to perform both *Describe* or *Feel* trials but choice was imposed (N=117), to perform only *Describe* trials (N=62) or to perform only *Fee*l trials (N=64). Targets' group membership (LCLW vs. HCHW) was a within-participants factor. We excluded 9 participants who erred on more than 25% of questions randomly controlling the attention they paid to targets' social group – we raised the threshold compared to Experiment 4 as we displayed the question 12 times throughout the task. The final sample thus comprised 234 participants (M_{age}=39.68, SD_{age}=14.25, 115 women) with N=110 in the choice condition, N=60 in the *Describe* only condition and N=64 in the *Feel* only condition.

Power calculation. Given the changes in the design, we ran an a priori power analysis for our first order interaction using the package *simr* (Green & MacLeod, 2016), with an effect size close to a small effect (d=.1). This analysis revealed that we would need at least 66 participants per condition to reach 80% power. To take into account the possible loss of participants due to our exclusion criteria, we collected data on 240 participants. However, due to the strictness of our exclusion criteria, we slightly fell short of the intended number of participants in the *Describe* only and *Feel* only conditions.

Procedure. The procedure was identical to Study 3, with the following exceptions. First, we contrasted LCLW targets (drug addict, welfare recipient, homeless) with HCHW targets (athlete, teacher, professional). Second, we imposed the type of task (*Describe* vs. *Feel*) to the participant. Third, after each trial, we asked participants to indicate their perceived cognitive trial costs using the Effort subscale of the NASA Task Load Index (i.e., "How mentally demanding was this trial?", "How hard did you have to work to accomplish your level of performance in this trial?"; *Describe* task [within]: α=.90; *Feel* task [within]: α=.91; *Describe* task [between]: α=.95; *Feel* task [between]: α=.96). This allowed securing more data points as each participant answered these two items 24 times rather than only once at the end of the study, and it ensured more accurate answers (Kühnen, 2010).

7.2. Results

NASA Task Load Index Effort subscale. We performed a mixed model analysis by regressing scores on the NASA Task Load Index Effort subscale on Quadrant (LCLW vs. HCHW), Type of task (*Describe* vs. *Feel*), Design (Between-subject vs. Within-subject),

and all interactions. We included participants as random factor. We once again found a main effect of Task, $F(1, 235.85)=6.36$, $p=.012$, $\eta_p^2=.009$, replicating Cameron et al.'s (2019, 2022; see Figure 7) findings. Once again, and contrary to our hypothesis, no other effect emerged, all other Fs<3.44, all other ps>.065.

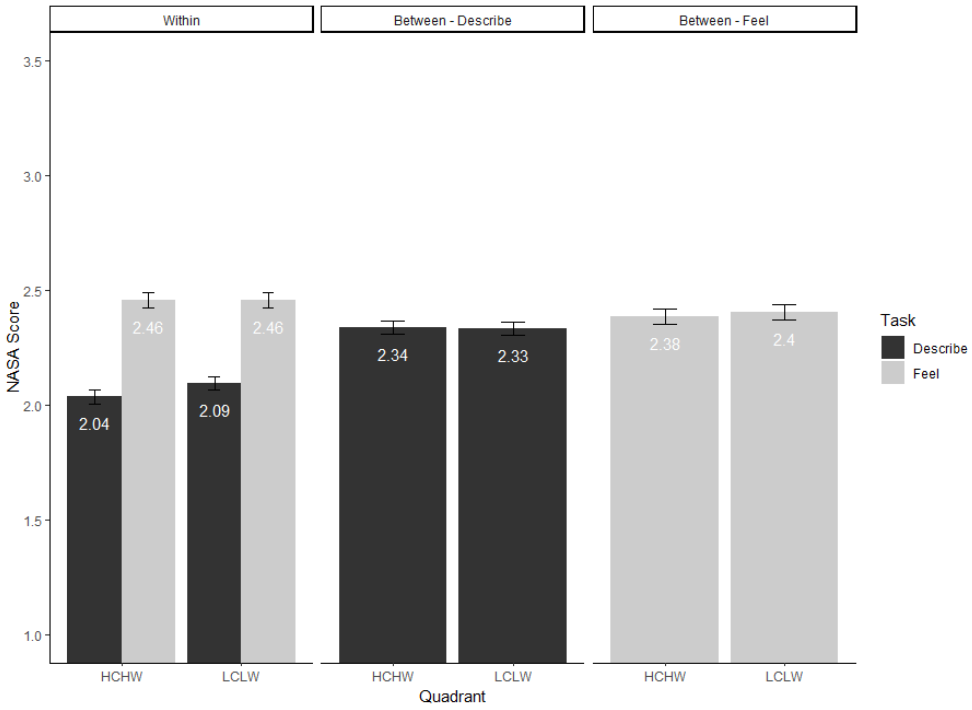

Figure 7. Scores on the NASA Task Load Index as a function of Quadrant, Task and Design. Values are means (standard deviations). Bars represent standard errors.

8. General Discussion

People display empathy on a daily basis and this phenomenon is at the heart of interpersonal and intergroup relations (Batson & Ahmad, 2009; Depow et al., 2021; Finlay & Stephan, 2000; Pettigrew & Tropp, 2008). Empathy often even expands beyond human targets, with people being able to empathize with non-human entities or objects (Geiselmann et al., 2023; Harris & Fiske, 2011; Waytz et al., 2010). It is therefore all the more surprising that past research found people to be devoid of empathy when presented with specific outgroups, namely the so-called low competence low warmth groups characterized in the Stereotype Content Model (Cikara et al., 2010; Cuddy et al., 2009; Fiske et al., 2002; Harris & Fiske, 2006, 2009). Because people indeed have the capacity to empathize with such targets (Batson et al., 2002), a reasonable conjecture is that this reduced empathy stems from a lack of motivation to empathize, possibly due to higher

perceived cognitive costs. We tested this possibility in a series of four preregistered and well-powered studies, using the Empathy Selection Task. In this task, participants choose between describing or empathizing with a series of targets. All four experiments replicated findings by Cameron et al. (2019), with participants significantly preferring to describing social targets rather than empathizing with them. They also reported perceiving higher cognitive costs when empathizing with compared to describing targets.

We also predicted a moderation of this effect by targets' social group. However, in none of the experiments did this moderation materialize. This is surprising in light of previous work showing that observers actively dehumanize LCLW targets and attribute them less mental states (Cameron et al., 2016; Harris & Fiske, 2009; Vaes & Paladino, 2010). As such, empathizing with LCLW targets should require more effort (cognitive costs), which is why we expected to observe a reduced motivation to empathize with such targets in the first place. Instead, our results suggest that people are not differentially motivated to empathize with stigmatized LCLW targets when no further tangible costs are potentially involved and that their empathy with these targets is not related to differences in perceived cognitive costs. In our view, a social desirability bias could be a potential explanation for this absence of a moderating effect. Indeed, when faced with LCLW targets, people can be motivated to appear unprejudiced, with this motivation being internal (e.g., concerns with egalitarianism), external (e.g., fear of social sanctions), or both (Bamberg & Verkuyten, 2022; Costarelli & Gerłowska, 2015). In addition to these motivations, appearing unprejudiced is perceived as a desirable social trait (Krumpal, 2013). Therefore, when facing LCLW targets, participants may have been motivated to perform approximatively the same amount of *Describe* and *Feel* trials to come across as non-prejudiced. This may also explain why participants indicated similar perceived cognitive costs pertaining to all types of targets.

Having said this, a subset of earlier research efforts putting forward the lack of empathy towards LCLW targets also relied on measures of higher-level processes subjected to social desirability (e.g., Cameron et al., 2016; Rudert et al., 2017). In addition, although empathy is seen as a desirable social trait and participants usually rely on impression management in empathy task (Sassenrath, 2020; Schumann et al., 2014), people have been found to show a consistent preference for not empathizing when given a choice (Cameron et al., 2019, 2022). Moreover, we note that we obtained the same results regardless of whether group membership was manipulated within or between participants – even though participants should be more concerned with social desirability in the former than in the latter case (i.e., when the goal of the experiment is more difficult to gauge). Overall, this suggests that the role of social desirability explaining our results may not be as straightforward as one would expect, and more research is warranted.

One way future work could shed light on the role of social desirability in motivated empathy towards LCLW targets would be to rely on the *bogus pipeline* paradigm, in which participants are made to believe that researchers can distinguish honest from socially desirable responses (Aguinis & Henle, 2001; Jones & Sigall, 1971; Roese & Jamieson, 1993). Using such a paradigm would allow to look at whether participants show no difference between LCLW and other social targets even when under the impression that researchers have access to their real preferred choice. Another strategy that future research could adopt to rule out the potential role of social desirability would be to measure

objective cognitive costs, relying for instance on task-evoked pupillary responses (Sevilla et al., 2014), or through electroencephalogram and event-related potential paradigms (Brouwer et al., 2012). This would allow observing whether the two measures converge or if participants report lower perceived cognitive costs compared to the actual cognitive costs they experienced – hinting to the presence of social desirability.

Additional factors could explain the fact that targets' group membership did not moderate motivation to empathize and perceived associated cognitive costs. First, the absence of tangible costs in the context of the task may have played a role. Indeed, people anticipate a higher degree of exhaustion and of emotional costs when actually expecting to engage with a stigmatized target or to perform prosocial behaviours (Cameron et al., 2016). In the absence of such expectations, as is the case in the Empathy Selection Task, feeling what a LCLW target may feel should not prove cognitively costlier than doing so for another social target. One could additionally argue that, in light of dehumanization itself seeming to be effortful for people (Harris & Fiske, 2011), the absence of additional costs could lead to participants not engaging in dehumanization. In other words, because dehumanization is itself costly, participants may have refrained from doing so as they were not expecting to interact with the targets. In turn, participants could have felt equally motivated to empathize with LCLW or other social targets. One way that future work could look at this is to integrate prosocial behaviours in the Empathy Selection Task paradigm (e.g., by asking participants to donate a part of their endowment; see Brethel-Haurwitz et al., 2020).

Second, it could also be that targets' social group did not prove relevant during the task. Stated differently, describing the emotions of a target on the sole basis of their facial emotion may not leave much room for the social group to exert any influence. Consequently, future work could try and adapt the task to render social cues more relevant for the required written answers.

Third, we relied on professions to convey outgroup membership. Although we pretested these professions to ensure their respective location in the SCM quadrants (Nils & Yzerbyt, 2022), social groups classically used in research on the dehumanization of LCLW targets did not rely on professions (e.g., drug addicts; Cikara et al., 2010; Fiske et al., 2002; Harris & Fiske, 2011). One might thus argue that the LCLW professions we focused on may not have been sufficiently disliked to elicit dehumanization and disgust. Our data does not allow us to dismiss this possibility. At the same time, recent work on so-called *dirty jobs* showed that people derogate and dehumanize many professions that can be classified as LCLW, including professions that we relied on such as garbage collectors or telemarketers (Baldissarri et al., 2022; Terskova & Agadullina, 2019; Valtorta et al., 2019). Future work will need to further explore possible downstream consequences for empathy.

Fourth, we presented participants with targets expressing a variety of emotions during the EST. People also experience empathy when confronted with others expressing positive emotions (De Vignemont & Singer, 2006) and valence of emotion does not seem to influence people's perceived cognitive cost of or motivation to show empathy (Cameron et al., 2019; see also our Supplementary Material 1). However, many findings on intergroup empathy pertain to people empathizing (or not) with targets who are experiencing pain or who are suffering in other ways (S. Han, 2018; McAuliffe et al., 2020; Molenberghs & Louis, 2018). Arguably, empathizing with targets in pain or suffering compared to targets

who do not imposes potential higher emotional costs, such as feelings of personal distress triggered by being confronted with such targets (Bekkali et al., 2021). By relying on targets displaying a variety of positive and negative emotions, the EST might have inadvertently diluted costs associated with empathy, thereby reducing the gap between LCLW and other social targets. Future research needs to further investigate the role of pain and suffering in people's perception of cognitive cost associated with empathy.

Finally, the absence of (in)tangible rewards in the EST could prove to be a double-edged sword and an important limitation of this task as it may make the emergence of group differences more difficult. Indeed, one strength of the EST, which is to investigate empathy in a highly controlled environment, comes at the cost of it stripping empathy from any possible rewards such as the opportunity for social connection or feelings of personal accomplishment. Presumably, this renders empathizing more burdensome and less pleasant (A. M. Ferguson et al., 2021). In other words, if empathizing with a target does not entail any positive (social) outcome, people might simply avoid it altogether, and thus regardless of the targets' group membership.

Other limitations not directly linked to the EST should be acknowledged. First, our samples were taken from France and US populations, which are both WEIRD countries (Henrich et al., 2010). Although the Stereotype Content Model is considered to hold across cultures (Cuddy et al., 2009), the relation between empathy and culture may be more complex (Jami et al., 2023). It will be important for future work to consider samples from other countries and cultures for the sake of generalisability. Second, we did not ask participants to provide their perception of each social group used during the Empathy Selection Task. Although we pretested all social groups to ensure that they were seen as belonging in the expected respective quadrants, some participants may have not shared such perceptions, especially regarding LCLW groups. As such, this may have prevented the emergence of effects relying on group membership. Future work could provide participants with a series of pretested social groups, but nonetheless and additionally ask them to evaluate these groups on competence and warmth. This would allow selecting groups idiosyncratically, thus ensuring that the social groups are seen as belonging to the expected quadrants by each participant. Third, we presented participants with faces taken from various face databases (Bainbridge et al., 2013; Langner et al., 2010; Ma et al., 2015). These databases contain strictly controlled stimuli, either devoid of any social cue such as stereotypical clothing or mostly focused on faces. Although it allowed us to investigate our hypothesis in a highly controlled environment, our work may have overlooked the strong relation between group perception and visual cues pertaining to group membership (Dotsch et al., 2008; Todorov et al., 2015). Future research would do well to consider visual stereotypical components in their design to increase ecological validity.

9. Conclusions

People seem to dehumanize LCLW targets, but at the same time remain capable of empathizing with such targets when asked to. We hypothesized that a reduced motivation to empathize with LCLW compared to other social target groups, along with larger perceived associated cognitive costs, could explain this discrepancy. We tested this hypothesis in a controlled setting across four highly-powered experiments. In contrast to our prediction, we did not find that targets' group membership moderated people's motivation to empathize in

the Empathy Selection Task, nor their perceived cognitive costs of doing so. Taken together, our findings suggest that when no tangible costs of empathy are involved, empathizing with LCLW targets does not prove costlier than empathizing with other social targets.

Our work contributes to deepening the knowledge on empathy directed towards LCLW targets. Our data point to similar levels of motivation and perceived cognitive costs for LCLW targets compared to other social targets, at least in a controlled environment where potential tangible costs are absent. We suggest future work extends these results by looking at the importance of real-life social cues, as well as the perception of expected prosocial behaviours on the motivation to empathize with LCLW targets and its related cognitive costs.

Chapter 5.

Influence of Membership in Outgroups Varying in Competence and Warmth on Observers' Level-2 Visual Perspective Taking

Visual perspective taking (VPT), the ability to adopt another person's viewpoint, entails two distinct processes, Level-1 (L1)-VPT and Level-2 (L2-VPT), referring to the ability to perceive whether and how a target sees an object, respectively. Whereas previous efforts investigated the impact of targets' social characteristics on L1-VPT, the present work is the first to do so regarding L2-VPT. Specifically, we investigate the impact of targets' membership in outgroups varying in perceived competence and warmth, the two fundamental dimensions of social perception. Participants in four experiments engaged in a L2-VPT task. Avatars belonged to a low competence low warmth group (LCLW; e.g., the homeless) or to a high competence low warmth group (HCLW; e.g., bankers) in Experiments 1-3, and to a LCLW or high competence high warmth group (HCHW; e.g., female students) in Experiment 4. Participants answered as quickly as possible whether a cued number matched a number present in a scene from either their own or the avatar's perspective. We consistently found support for the presence of both egocentric and altercentric interference, but this was not modulated by group competence and warmth, suggesting that membership in outgroups varying in competence and warmth does not influence L2-VPT. We discuss the findings' implications in light of recent views on VPT.

Reference

Vanbeneden, A., Woltin, K. A., & Yzerbyt, V. (2022). Influence of membership in outgroups varying in competence and warmth on observers' Level-2 visual perspective taking. *British Journal of Psychology*, *113*(4), 938-959. https://doi.org/10.1111/bjop.12579

Chapter 5. Influence of membership in outgroups varying in competence and warmth on observers' Level-2 visual perspective taking

Imagine eating out and noticing a friend with sauce on what is their right cheek for you. To ensure they find the exact spot, you say 'You have sauce on your left cheek'. Your friend grabs a napkin to wipe it off. This scene illustrates one of many situations in which we successfully put ourselves in others' shoes. Perspective taking, the ability to adopt another person's viewpoint, is central to human interaction, with children at the age of 14 months already showing signs of this ability (Moll & Tomasello, 2004; Sodian et al., 2007).

The present work focuses on visual perspective taking (VPT): the inference of a target's visual point of view (Samson et al., 2010; Surtees et al., 2012). We investigate if and how a target's outgroup membership influences observers' ability to infer *how* this target sees an object (i.e., Level-2 rather than Level-1 VPT; Surtees et al., 2012). To do so, we build on the Stereotype Content Model, delineating the way people appraise social groups in their environment (Fiske et al., 2002; for a recent review of social evaluation models, see Abele et al., 2021). As such, we seek to extend knowledge in both literatures by investigating whether membership in outgroups varying in competence and warmth influences observers' L2-VPT.

1. Visual perspective taking

VPT entails two distinct levels (Flavell et al., 1981; Michelon & Zacks, 2006). The first level (L1-VPT) has been mostly studied using the dot-perspective task (Flavell et al., 1981; Samson et al., 2010). Typically, participants see an avatar facing left or right in a scene, with dots displayed in front of or behind the avatar, or in both locations. Participants' task is to indicate how many dots are visible, either from their own or the avatar's perspective. Answers under the instruction to adopt the avatar's perspective provide a direct measure of VPT, given the clear mission to embrace the other person's point of view. Answers when instructed to take one's own perspective offer an indirect measure of VPT. Indeed, the intrusion of the avatar's perspective corresponds to a spontaneous adoption of the latter's point of view. Response times and errors vary as a function of the adopted perspective and the congruency between what participants and the avatar see. When they both see the same number of dots (i.e., congruent trials), response times and errors are the lowest for both perspectives. In contrast, when they do not see the same number of dots (i.e., incongruent trials), error rates are the highest. Regarding response times, two types of interference emerge on incongruent trials. When participants answer from the avatar's perspective, the difficulty to inhibit their own viewpoint increases response times compared to congruent trials (i.e., *egocentric* interference). This egocentric interference on a measure of VPT suggests that answering from others' perspectives is effortful (Keysar et al., 2003; Qureshi et al., 2010; Samson et al., 2010; Surtees et al., 2012, 2016). Interestingly, when

participants answer from their own perspective, response times also increase compared to congruent trials. This so-called *altercentric* interference reveals spontaneous processing of the avatar's perspective, which is inhibited in order to answer from one's own (Furlanetto et al., 2016; Nielsen et al., 2015; Samson et al., 2010); but see Cole et al., 2020).

L1-VPT is influenced by factors related to both participants (e.g., emotions, Bukowski & Samson, 2016; Todd & Simpson, 2016; self-reported empathy, Sulpizio et al., 2015), and avatars (e.g., social relevance, Nielsen et al., 2015; group membership, Ferguson et al., 2018; Simpson & Todd, 2017). However, results regarding the latter are inconsistent. For instance, using the L1-VPT dot-task Simpson and Todd (2017) found egocentric interference for ingroup (vs. outgroup) avatars on incongruent trials, but no difference based on group membership in altercentric interference. Conversely, and also using the dot-task, Ferguson and colleagues (2018) found that for adult participants, the presence of a child (vs. adult) avatar – an outgroup member – reduces altercentric interference for incongruent trials but does not affect egocentric interference. Both studies demonstrate avatars' group memberships influencing L1-VPT, but differ as to whether this entails egocentric or altercentric interference.

L2-VPT refers to the ability of observers to perceive *how* a target sees an object and is generally investigated using a paradigm developed by Surtees and colleagues (2012). Participants see an avatar facing them and sitting behind a table, and a number either on the wall next to the avatar or on the table. Beforehand, participants are presented with the word 'self' or 'other', indicating whose perspective to adopt, followed by a number. Their task is to decide as quickly as possible if the presented number matches the one seen by the person whose perspective they had to adopt. Importantly, whereas some numbers are non-ambiguous (i.e., they are perceived similarly from either perspective and location; 0 and 8), others are ambiguous (i.e., they are perceived differently depending on location and perspective; 6 and 9). In some trials, visual perspectives of participants and avatars are congruent (e.g., a 9 on the wall is a 9 for both), but in other trials they are incongruent (e.g., a 9 on the table is a 9 for the participant but a 6 for the avatar; see Figure 1).

Error rates increase when the number is ambiguous and displayed on the table. Participants take longer when adopting avatars' perspectives and particularly so on incongruent (vs. congruent) trials, indicating egocentric interference. Like for L1-VPT, the presence of egocentric interference suggests that answering from a target's perspective is effortful. Interestingly, Surtees and colleagues (2012) did not find altercentric interference. However, in a different set of studies using a similar paradigm, Surtees and colleagues (2016) did find such evidence, but only in a 'mixed' condition, where blocks of trials contained both 'self' *and* 'other' trials (vs. a 'blocked' condition, where blocks contained only 'self' *or* 'other' trials). Also, recent work relying on real confederates as targets found altercentric interference in 'blocked' conditions (Elekes et al., 2016, 2017; Freundlieb et al., 2017, 2018). These results suggest that L2-VPT entails a deliberate and cognitively demanding process when adopting the avatar's point of view, as evidenced by egocentric interference (Janczyk, 2013; Surtees et al., 2013, 2016). At the same time, L2-VPT also reveals the spontaneous adoption of the avatar's point of view, as evidenced by altercentric interference. The lack of altercentric interference in 'blocked' conditions in Surtees and colleagues' (2016) work might be explained by cartoon avatars (vs. real confederates) not sufficing for spontaneous L2-VPT to emerge in 'blocked' conditions. Notwithstanding this,

the question remains as to why altercentric interference failed to emerge previously in 'mixed' conditions (i.e., in Surtees et al., 2012).

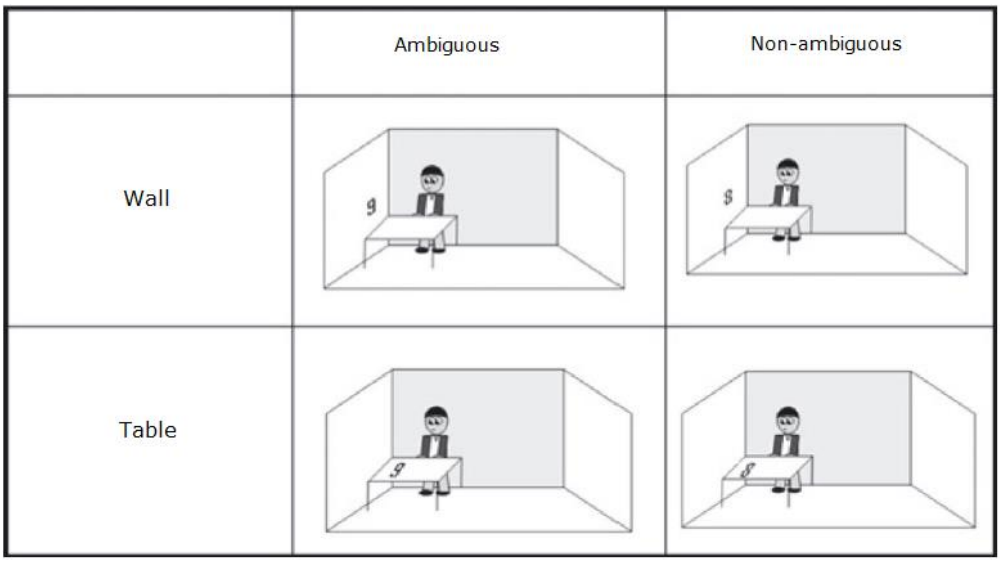

Figure 1. Visual description of the L2-VPT task. The lower-left scene illustrates an incongruent trial (where the number is perceived differently from the participant's or the avatar's perspective), while the lower-right, top-right and top-left scenes illustrate congruent trials. Adapted from "Direct and indirect measures of Level-2 perspective-taking in children and adults", by Surtees, A., Butterfill, S. A., & Apperly, I. A., 2012, British Journal of Developmental Psychology, 30(1), 75–86. Copyright 2012 by John Wiley and Sons.

Research identified several moderators of L2-VPT linked to participants. For example, time pressure (A. R. Todd et al., 2019) and sleep deprivation (Deliens et al., 2018) reduce efficiency. No research to date considered moderators linked to avatars. Moreover, the limited efforts to examine the impact of avatars' group membership on L1-VPT relied exclusively on an ingroup/outgroup distinction. This is particularly unfortunate because work on group perception suggests that not all outgroups are perceived and treated similarly, as documented by abundant work on the Stereotype Content Model and related models (Fiske, 2015; Fiske et al., 2002; Yzerbyt, 2016; see Abele et al., 2021).

2. The Stereotype Content Model

The Stereotype Content Model (Fiske et al., 2002) delineates the way stereotypes derive from the nature of groups' interdependence as well as from their hierarchical relations. These structural relations trigger perceptions of varying degrees of warmth – providing information on the intent of a group (i.e., cooperation or competition) – and competence – providing information on the ability of a group to carry out its intent. Moreover, the model

proposes that these two dimensions of group perception are orthogonal, forming a four-quadrant space (Cuddy et al., 2007, 2009; Lindqvist et al., 2017). Specifically, some groups come across as high on competence but low on warmth (HCLW, e.g., bankers); others are perceived as low on competence but high on warmth (LCHW, e.g., disabled people). Still other groups are seen as high on both dimensions (HCHW, e.g., one's ingroup or groups one collaborates with) or low on both (LCLW, e.g., homeless people). These perceptions of groups' competence and warmth trigger different emotions: HCHW elicits pride, HCLW elicits envy, LCHW elicits pity, and LCLW elicits disgust. Moreover, these perceptions are linked to different behavioural intentions, with tendencies to help or harm groups varying as a function of their perceived levels of competence and warmth (Cuddy et al., 2007). Such findings illustrate the necessity to refine a simple *outgroup* distinction by considering outgroups' levels of competence and warmth.

Research reveals that members of low competence low warmth groups do not necessarily come across as truly social agents but are dehumanized instead. For instance, using the well-known trolley dilemma (participants choose between saving several targets on a trolley track by sacrificing a target on another track), Cikara and colleagues (2010) showed that people more easily sacrificed members of LCLW groups to save people belonging to groups in other quadrants. Similarly, Harris and Fiske (2006, 2007) confirmed previous findings indicating that people explicitly associate LCLW groups with disgust (Fiske et al., 2002), and showed that in people presented with exemplars belonging to these groups, brain areas associated with social cognition (disgust-related areas) are less (more) likely activated. Participants also used fewer 'mental state' verbs when describing a day in the life of LCLW targets compared to targets from other groups (Harris & Fiske, 2009). Moreover, people are more likely to consider LCLW targets as animals (Vaes & Paladino, 2010), judge it morally more acceptable to ostracize LCLW targets (Rudert et al., 2017), and attribute less mental states to LCLW targets (Cameron et al., 2016). Overall, members of LCLW groups tend to be dehumanized and denied mental states and human-specific abilities. As Harris and Fiske (2011) noted, these results are surprising given that people normally show a spontaneous ability to embrace a target's perspective, even when this target is an animal. Based on the activation of brain regions related to attention and conflict resolution when people face such targets, these authors argue that whilst people perceive these targets' humanity, they actively dehumanize them and pay less attention to such targets.

3. The current work

We conjectured that a simple *outgroup* label may not reflect the nuances of group perception, nor their implications with respect to such processes as (visual) perspective taking. Accordingly, we aimed to extend previous work by examining for the first time whether people's direct L2-VPT, i.e., when they answer under the instruction to adopt the avatar's perspective, proves sensitive to outgroup's level of competence and warmth. Because direct L2-VPT requires resources (Janczyk, 2013; Surtees et al., 2016), it should reduce people's ability to inhibit prejudice (Crandall & Eshleman, 2003), making the paradigm suitable to investigate the impact of prejudice on VPT. We used the same procedure as Surtees and colleagues (2012), with the important modification of avatars

always being outgroup members and the nature of this outgroup in terms of competence and warmth levels varying across trials.

Based on previous work (Cameron et al., 2016; Cikara et al., 2010; Fiske et al., 2002; Harris & Fiske, 2006, 2007, 2009, 2011; Rudert et al., 2017) we hypothesized that LCLW group membership would deteriorate observers' direct L2-VPT, revealing stronger egocentric interference. That is, compared to targets from other quadrants, people should be less efficient in answering from a LCLW target's point of view on incongruent trials which require actively adopting targets' perspectives (Surtees et al., 2013). Indeed, because on congruent trials observers and targets see the same thing, observers may rely solely on their own perspective to answer, rendering avatars' group irrelevant. To the extent that people actively dehumanize LCLW targets, they can be expected to not only turn their attention away from such targets (Harris & Fiske, 2011) but also to attribute them less mental states (Cameron et al., 2016). This in turn would render more difficult inhibiting their own perspective in order to adopt targets' perspectives.

Experiments 1 and 2 investigated the impact of LCLW targets on direct L2-VPT, albeit with different designs. Given the inconclusive results regarding the presence of altercentric interference in the original paradigm (Surtees et al., 2012), we also sought to replicate Surtees and colleagues' original paradigm in Experiment 1. In Experiments 3 and 4, we replaced neutral avatar drawings (see Figure 1) with prototypical pictures of targets to increase ecological validity. In addition, the avatars' social group in the 'self' trials was now conveyed visually, which allowed checking the impact of LCLW targets on indirect L2-VPT, i.e., when participants answer under the instruction to stick to their own perspective. Experiments 1-3 contrasted LCLW targets with targets high on only one of the two dimensions (e.g., HCLW targets). Experiment 4 contrasted LCLW targets with targets from high competence high warmth (HCHW) groups to maximize social distance.

All data, material and R scripts are available on the following link:

https://osf.io/7t4zj/?view_only=6f0db97e307e4a14bb31b8a58b026a15.

4. Experiment 1

In addition to investigating the impact of avatars' outgroup memberships on direct L2-VPT, we also investigated previous discrepancies regarding the presence of altercentric interference in similar versions of the L2-VPT task (Surtees et al., 2012, 2016). Accordingly, we created two conditions. In the *no social group* condition, participants took part in a replication of Surtees and colleagues' (2012). In the *social groups* condition, the avatar belonged to a LCLW (i.e., drug addict) or a HCLW group (i.e., politician). We opted against LCHW groups because research shows that these resemble LCLW groups when it comes to indirect measures (Rohmer & Louvet, 2012, 2016). To convey avatars' group membership in the *social groups* condition, we replaced the 'other' cue with the avatars' group membership (i.e., 'drug addict' or 'politician').

In both conditions, we expected to replicate Surtees and colleagues' (2012) findings of lower efficiency in the incongruent (vs. congruent) trials for the 'other' perspective (i.e., egocentric interference). With recent work supporting the presence of similar differences between (in)congruent trials for the 'self' perspective (i.e., altercentric interference) in

conditions akin to this paradigm (Elekes et al., 2016, 2017; Freundlieb et al., 2017, 2018; Surtees et al., 2016), we also expected to find this. In the *social groups* condition, we additionally expected egocentric interference to vary as a function of avatars' social group. Specifically, we expected participants to experience more difficulties taking the perspective of LCLW targets and predicted less efficiency in the other-incongruent trials (i.e., egocentric interference) for the LCLW compared to the HCLW avatar. It was not possible to investigate the impact of group membership on altercentric interference because neither the written cue nor the avatar conveyed any information regarding the avatar's social group in the 'self' trials.

4.1. Method

Participants and design. A total of 125 psychology students took part in exchange for partial course credit. The experiment (and all following experiments) took approximately 25 minutes to complete. Deletion of one duplicated participation resulted in a final sample of 124 (M_{age}=20.2, SD_{age}=2.23, 112 women). Participants were randomly assigned to one of two between-participants conditions (social characteristics: no social group N=66 vs. social groups N=58). The *no social group* condition involved a 2 (number type: non-ambiguous=0 and 8 vs. ambiguous=6 and 9) x 2 (location: wall vs. table) x 2 (perspective: self vs. other) repeated measures design. The *social groups* condition involved the same 2 (number type) x 2 (location) design crossed with a *3* (perspective: self vs. HCLW vs. LCLW) repeated measures design.

Power calculations. Because no prior research examined the impact of different social groups on direct L2-VPT, we adopted a conservative approach and ran a power analysis based on a small effect size (Judd et al., 2017). We conducted our power analysis (here and in all following experiments) for a 2 x 2 x 3 repeated measures design using the PANGEA webapp[1], and aimed for 90% power (Lakens, 2022), which indicated that we needed at least 50 participants to detect a small effect (d=.2) in the *social groups* condition. To account for potential dropouts and participants not seriously engaging with the task, here and in following experiments we recruited more participants than required.

Procedure. Participants were tested online using the PsyToolkit platform (Stoet, 2010, 2017). After providing informed consent, they read the instructions. To ensure careful reading, each instruction screen had a minimum reading time before participants could go on. Next, the program randomly assigned participants to conditions. In the *no social group condition*, on each trial participants first saw a fixation cross for 750ms. Subsequently, they saw a cue indicating whether they were to adopt their own perspective (if the cue, displayed for 750ms, was 'self') or the avatar's perspective (if the cue was 'other'). Again for 750ms they then saw one of four numbers (0,8,6,9) followed by a black screen for 500ms. Finally, they saw the same scene as in Surtees and colleagues (2012): an avatar sitting at a table and a non-ambiguous or ambiguous number either on the wall or the table (see Figure 1). Participants were to decide as quickly as possible if the number presented earlier matched the number seen by the target whose perspective they had to adopt. They were to press "O" ("N") if this was (was not) the case. The location of the table, the avatar, and the number

[1]https://jakewestfall.shinyapps.io/pangea; details of all power analyses can be found in respective Supplementary Materials

were counterbalanced (left vs. right of the scene). Participants in the *social groups condition* went through the same procedure, but either had to adopt their own perspective if the cue was 'self', or the avatar's if the cue was the avatar's social group (i.e., 'politician' or 'drug addict').

After these instructions, participants could continue after they correctly answered six consecutive practice trials. Participants who made more than 15 mistakes in the overall 30 maximum number of practice trials were briefly interrupted with additional examples to make sure they understood the instructions before moving on to the test trials. After practice trials, participants completed 128 test trials. To ensure that the addition of group labels did not influence whether participants perceived the avatars as social agents or not, they had to indicate their perception of the avatars as social agents (1=*totally disagree*, 5=*totally agree*). Finally, they provided demographic information and were debriefed, compensated, and thanked.

4.2. Results

We conducted all analyses using R (R Core Team, 2022) with the lme4 (Bates et al., 2015) and lmerTest (Kuznetsova et al., 2017) packages. Following Surtees and colleagues (2012), and as in all following experiments, we discarded the trials with non-matching cued and presented numbers, checked and excluded any participant who failed to perform above chance, and excluded trials for which the response time deviated more than 2.5 standard deviations from the mean (less than 1% of the remaining trials were excluded here and in all following experiments).

Perceived socialness of the avatar. The avatar was perceived as a social agent on a similar level in the *no social group* (M=4.29, SD=0.89) and the *social groups* condition (M=4.15, SD=1.06), as shown by Welch's t-test, $t(112.08)=0.75$, $p=.454$ $\eta_p^2<.01$.

Egocentric and altercentric interference. Following previous guidelines (Simpson & Todd, 2017; Surtees et al., 2012), here and as in all following experiments we excluded failed trials from analyses. We conducted all analyses on the inverse efficiency score (IES; Simpson & Todd, 2017). This score is obtained by dividing the mean response times by the rate of correct answers, thus considering both speed and accuracy in a single index, with higher (lower) scores indicating lesser (greater) efficiency to answer from the target's perspective. However, across experiments, we also analyzed response times and errors separately (both measures consistently yielded identical results to the IES; see Supplementary Material 1).

We submitted the IES to a 2 (social characteristics: no social group vs. social groups) x 2 (number type: non-ambiguous=0,8 vs. ambiguous=6,9) x 2 (location: wall vs. table) x 2 (perspective: self vs. other) mixed model analysis with the avatar's social characteristics varying between participants (see Figure 2). The main effects of number type, location, and perspective were significant, confirming that participants were less efficient when the number was ambiguous, $F(1, 7327.57)=1181.30$, $p<.001$, $\eta_p^2=.10$, on the table, $F(1, 7327.48)=419.68$, $p<.001$, $\eta_p^2=.04$, and when they adopted the avatar's perspective, $F(1, 7327.80)=297.04$, $p<.001$, $\eta_p^2=.03$. There was no main effect of the avatar's social characteristics, $F(1, 121.45)=0.28$, $p=.595$, $\eta_p^2<.01$. We observed a significant perspective by avatar's social characteristics interaction, $F(1, 7327.80)=7.15$, $p=.008$, $\eta_p^2<.01$.

Participants were less efficient answering from the avatar's perspective in the *no social group* condition, $F(1, 7326.86)=114.81$, $p<.001$, $\eta_p^2=.01$, and even more so in the *social groups* condition, $F(1, 7328.60)=184.08$, $p<.001$, $\eta_p^2=.02$. No other two-way interactions emerged, all Fs<0.87, all ps>.351, all $\eta_p^2<.01$.

The number type × location × perspective interaction was significant, $F(1, 7327.77)=38.03$, $p<.001$, $\eta_p^2<.01$. Follow-up analyses indicated that the number type × location interaction was significant for the 'self' trials, $F(1, 7328.01)=55.00$, $p<.001$, $\eta_p^2<.01$. Specifically, for non-ambiguous numbers, there was no significant difference based on location, $F(1, 7326.72)=0.83$, $p=.363$, $\eta_p^2<.01$. In contrast, for ambiguous numbers participants proved less efficient when the number was on the table rather than on the wall, $F(1, 7329.08)=125.92$, $p<.001$, $\eta_p^2=.01$. This pattern reveals altercentric interference with a greater difficulty to answer from one's own perspective when what one sees does not correspond with what the avatar sees. Turning to the 'other' trials, the number type × location interaction also proved significant, $F(1, 7327.34)=261.56$, $p<.001$, $\eta_p^2=.02$. Specifically, for non-ambiguous numbers, participants were less efficient when the number was on the table rather than on the wall, $F(1, 7326.71)=8.83$, $p=.003$, $\eta_p^2<.01$. The same effect was even stronger for ambiguous numbers, $F(1, 7328.02)=642.66$, $p<.001$, $\eta_p^2=.06$. This pattern indicates egocentric interference with a greater difficulty to answer from the avatar's perspective when what one sees does not correspond to what the avatar sees.

The avatar's social characteristics × number type × location × perspective interaction was not significant, $F(1, 7327.77)=0.03$, $p=.862$, $\eta_p^2<.01$, suggesting that the observed altercentric and egocentric interferences were not moderated by the avatar's social characteristics.

Impact of the avatar's social group. Our main objective was to investigate whether participants had a harder time adopting the visual perspective of a LCLW compared to a HCLW target. To do so, we only considered data in the *social groups* condition for the trials in which participants answered from the avatar's perspective. We submitted the IES in these trials to a 2 (number type: non-ambiguous=0,8 vs. ambiguous=6,9) x 2 (location: wall vs. table) x 2 (perspective: politician vs. drug addict) repeated measures analysis (see Figure 3).

As before, significant main effects of number type and location confirmed that participants were less efficient when the number was ambiguous, $F(1, 1673.06)=423.80$, $p<.001$, $\eta_p^2=.14$, or on the table, $F(1, 1672.94)=174.59$, $p<.001$, $\eta_p^2=.06$. There was no effect of perspective, $F(1, 1672.03)=0.12$, $p=.734$, $\eta_p^2<.01$.

Not surprisingly, the number type × location interaction was significant, $F(1, 1672.69)=112.42$, $p<.001$, $\eta_p^2=.04$. Specifically, there was no significant difference in efficiency as a function of location for non-ambiguous numbers, $F(1, 1671.79)=3.57$, $p=.059$, $\eta_p^2<.01$, but for ambiguous numbers participants were less efficient when the number was on the table, $F(1, 1673.75)=272.20$, $p<.001$, $\eta_p^2=.10$. No other two-way interactions emerged, all Fs<2.23, all ps>.135, all $\eta_p^2<.01$.

Contrary to our hypothesis, the number type × location × perspective interaction was not significant, $F(1, 1671.91)=0.01$, $p=.910$, $\eta_p^2<.01$.

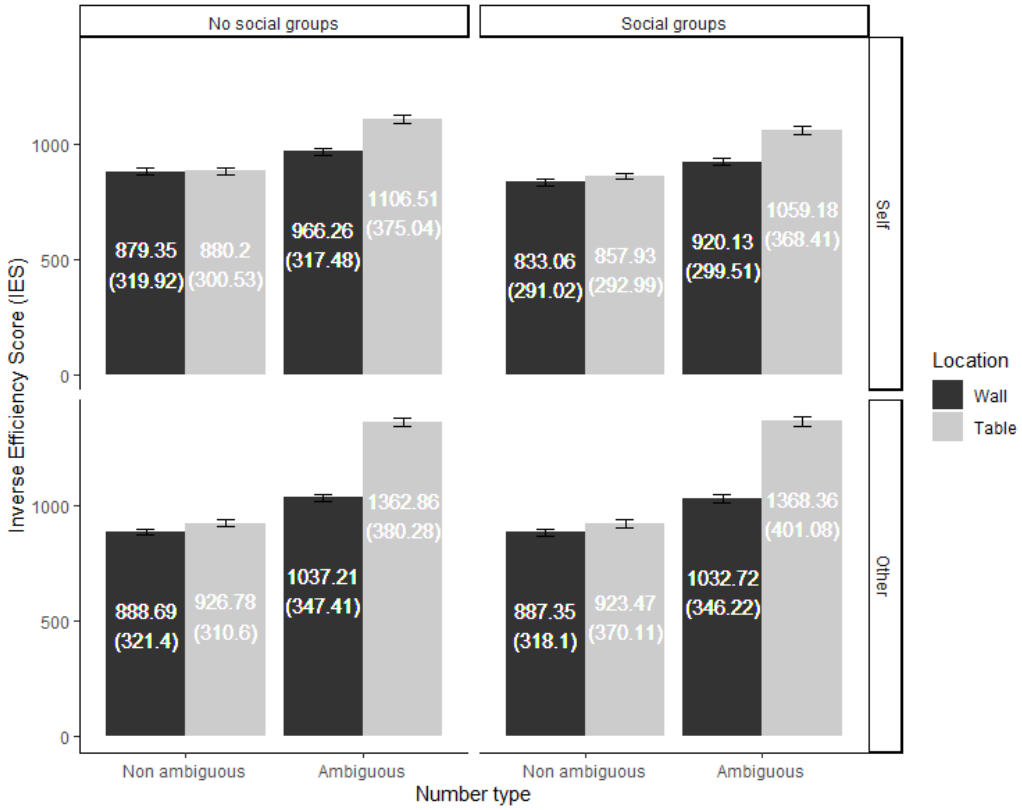

Figure 2. Graph of the inverse efficiency score (IES) as a function of the avatar's social characteristics, number type, location, and perspective. Values are means (standard deviations). Bars represent standard errors.

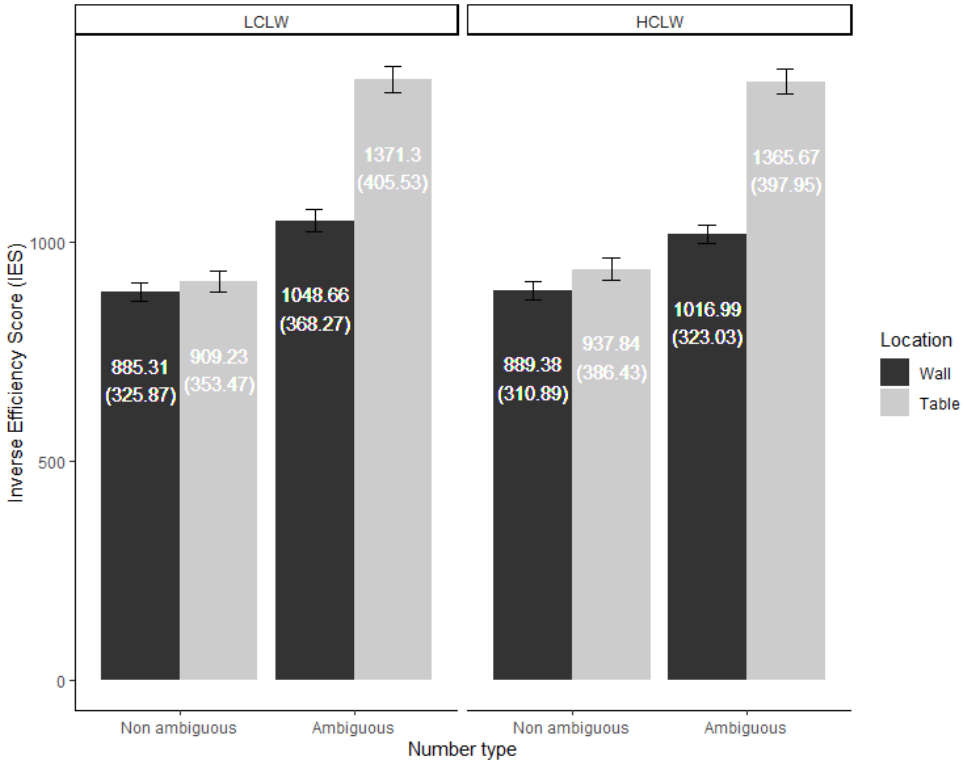

Figure 3. Graph of the inverse efficiency score (IES) as a function of number type, location, and perspective. Values are means (standard deviations). Bars represent standard errors. LCLW=low competence low warmth; HCLW=high competence low warmth.

4.3. Discussion

As expected, we observed egocentric interference (Surtees et al., 2012, 2016): participants were less efficient in answering from the perspective of the avatar on incongruent trials compared to congruent trials. This pattern emerged regardless of whether avatars' social group was cued or not. This dovetails with participants not perceiving a difference in avatars' socialness as a function of whether their group membership was mentioned or not.

More interestingly, and related to our first objective, we also observed altercentric interference (cf. Surtees et al., 2016) using the original design of Surtees and colleagues (2012). That is, participants proved less efficient in answering from their own perspective on incongruent compared to congruent trials. Again, this was the case regardless of whether avatars' social group was cued or not. Moreover, in line with Surtees and colleagues' (2016) findings, the altercentric interference was smaller than the egocentric interference.

The present results, obtained with a high-powered design, first confirm that spontaneous L2-VPT can indeed emerge in mixed blocks (i.e., blocks containing both 'self' and 'other'

trials) using cartoon avatars. Regarding our second objective, we did not find stronger egocentric interference for LCLW than HCLW avatars on incongruent trials. Interestingly, we obtained the same results in a replication study of the *social groups* condition (see Supplementary Material 2). Methodological shortcomings detailed below and addressed in Experiment 2 might have contributed to outgroup membership failing to influence egocentric interferences.

5. Experiment 2

In Experiment 1, half of the trials were 'self' trials, even though our focus was on the difference between the two versions of the 'other' trials. This may have led participants to focus more on the 'self' versus 'other' differentiation, thus minimizing their differentiation between 'politician' versus 'drug addict'. Additionally, the avatar was a member of only one of two social groups. Considering only one social group per quadrant of the Stereotype Content Model (Fiske et al., 2002) may have reduced the range of stereotypes activated in relation to the respective quadrant. Finally, we used social groups as a cue to define avatars' group membership, but participants never had to use this information. Accordingly, they might have paid little attention to avatars' group membership per se, focusing instead on whether the cue was 'self' or 'not self'. Experiment 2 addresses these potential shortcomings (see below). Again, we expected a difference in egocentric interference between the LCLW and HCLW targets. As in Experiment 1, difference in altercentric could not be investigated.

5.1. Method

Participants and design. A total of 71 students (M_{age}=20.72, SD_{age}=3.41, 60 women) took part in an experiment involving a 2 (number type: non-ambiguous=0 and 8 vs. ambiguous=6 and 9) x 2 (location: wall vs. table) x 3 (perspective: self vs. HCLW quadrant avatars vs. LCLW quadrant avatars) repeated measures design.

Power calculations. Because of the changes in the design, we conducted a new power analysis, which indicated that we needed at least 46 participants to achieve 90% power to detect a small effect (d=.2).

Procedure. The procedure was identical to Experiment 1, except for the following modifications. First, we dropped the no social group condition. Second, we increased the total amount of test trials to 192. Third, because our analyses rely only on 'correct' trials, only a third of these trials were 'incorrect' trials in order to enhance power. Fourth, given that our concern mainly resides in the difference between HCLW and LCLW groups, only a third of the 192 trials were 'self' trials. Fifth, we added two additional social groups in each quadrant, thus considering six social groups ('drug addicts', 'homeless', and 'welfare recipients' for the LCLW quadrant; 'politicians', 'lawyers', and 'managers' for the HCLW quadrant). Finally, immediately following 15 randomly chosen trials, we asked participants to indicate the identity of the avatar's social group to ensure they paid attention to this.

5.2. Results

Six participants erred on more than 20% of the random questions regarding the avatar's social group but excluding them from analyses did not change the results. Thus, we decided to keep them.

Inverse Efficiency Score. We submitted the IES to a 2 (number type: non-ambiguous=0,8 vs. ambiguous=6,9) x 2 (location: wall vs. table) x 3 (perspective: self vs. HCLW quadrant avatars vs. LCLW quadrant avatars) repeated measures analysis (see Figure 4). Significant effects of number type and location indicated that participants were less efficient when the number was ambiguous, $F(1, 8283.66)=1249.89$, $p<.001$, $\eta_p^2=.09$, or on the table, $F(1, 8283.65)=542.02$, $p<.001$, $\eta_p^2=.04$.

A set of planned contrasts allowed comparing the IES for 'self' versus 'other' (combining HCLW and LCLW avatars), as well as for the HCLW versus LCLW avatars. The 'self' versus 'other' contrast proved significant, $F(1, 8284.30)=192.60$, $p<.001$, $\eta_p^2=.01$. Participants were less efficient for the avatar than for themselves, regardless of avatars' social group. As in Experiment 1, we failed to find significant difference between LCLW and HCLW targets, $F(1, 8284.16)=1.63$, $p=.201$, $\eta_p^2<.01$, and no interaction including this contrast emerged, all Fs<0.14, all ps>.708, all $\eta_p^2<.01$.

The number type × location × 'self' versus 'other' contrast interaction was significant, $F(1, 8283.78)=23.13$, $p<.001$, $\eta_p^2<.01$. Follow-up analyses revealed that the number type × location interaction was significant for 'self' trials, $F(1, 8283.43)=42.19$, $p<.001$, $\eta_p^2<.01$. Specifically, for non-ambiguous numbers, there was no significant difference as a function of location, $F(1, 8282.50)<0.01$, $p=.965$, $\eta_p^2<.01$. However, for ambiguous numbers, participants proved less efficient when the number was displayed on the table rather than on the wall, $F(1, 8284.17)=77.27$, $p<.001$, $\eta_p^2<.01$.

Turning to 'other' trials, the number type × location interaction was also significant, $F(1, 8284.16)=442.45$, $p<.001$, $\eta_p^2=.03$. Specifically, for non-ambiguous numbers, participants were less efficient when the number was displayed on the table rather than on the wall, $F(1, 8282.56)=9.54$, $p=.002$, $\eta_p^2<.01$. This difference emerged even more strongly for ambiguous numbers, $F(1, 8285.51)=1017.07$, $p<.001$, $\eta_p^2=.07$.

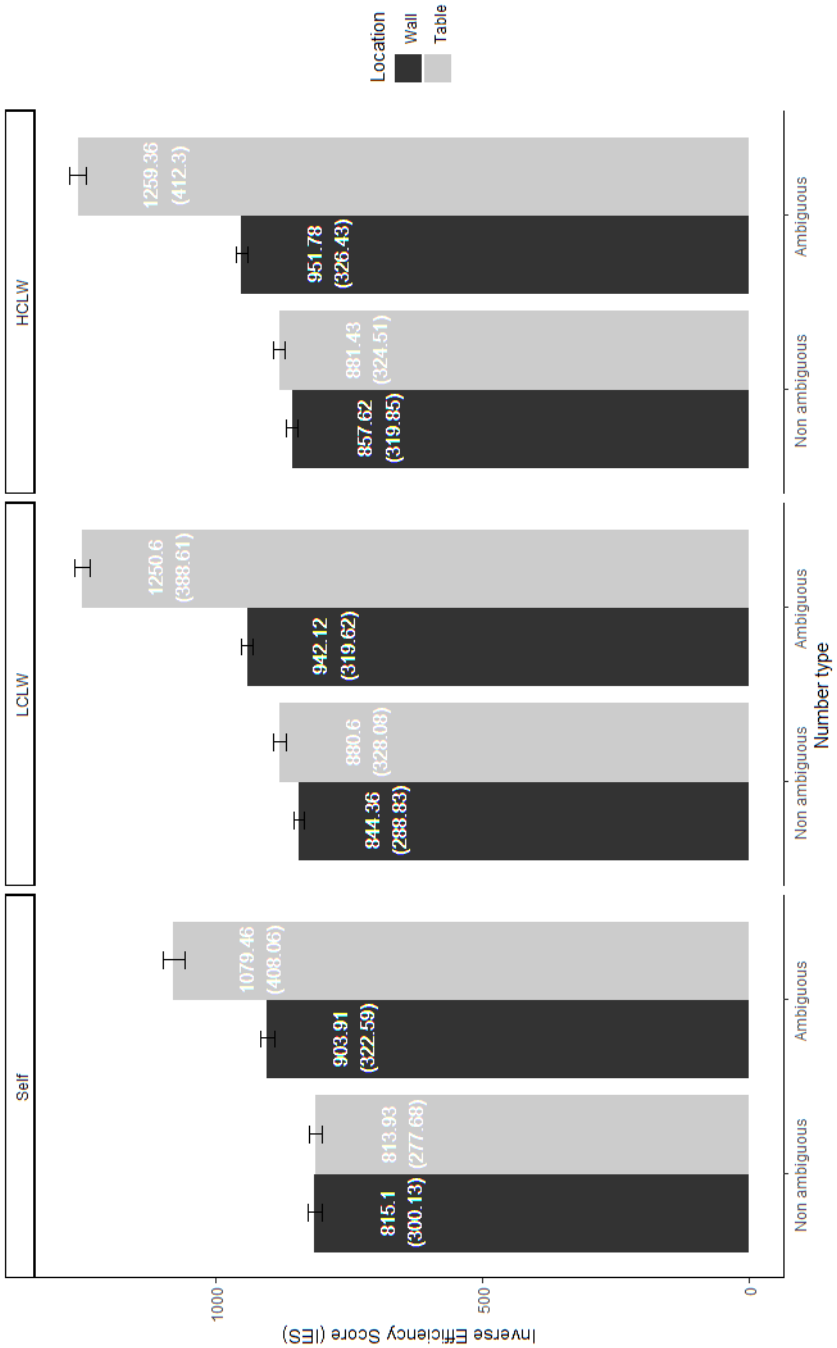

Figure 4. Graph of the inverse efficiency score (IES) as a function of number type, location, and perspective. Values are means (standard deviations). Bars represent standard errors. LCLW=low competence low warmth; HCLW=high competence low warmth.

5.3. Discussion

The results of Experiment 2 replicated the findings of Experiment 1 and of Surtees et al. (2012) regarding egocentric interference. Participants were less efficient when answering from the avatar's perspective for the incongruent trials compared to the congruent trials. Moreover, as in Surtees and colleagues (2016), we again found altercentric interference in that participants were less efficient in answering from their own perspective when the trial was incongruent (vs. congruent). As before, altercentric interference was smaller than egocentric interference. Together, these findings confirm that the L2-VPT task is a robust task to detect both egocentric and altercentric interference.

Once again, we did not find the predicted effect of avatars' social group on direct L2-VPT, despite addressing a series of limitations inherent to Experiment 1. We found no significant difference between the LCLW and the HCLW avatars, regardless of the scenes' characteristics. Furthermore, we obtained the same results in an additional study when not pressuring participants for time (using a design comprising elements from both Experiments 1 and 2; see Supplementary Material 3). These results suggest that targets' social group does not influence direct L2-VPT. However, issues relating to the ecological validity of the procedure may also account for the findings. We addressed them in Experiment 3.

6. Experiment 3

One remarkable feature of previous designs is that they failed to capitalize on the strong relationship between visual cues and group stereotypes (Dotsch et al., 2008; Schmitz et al., 2024). Indeed, we used visually neutral cartoon characters instead of real people, but in real life people draw different inferences from visual appearances (e.g., Harris & Fiske, 2006; Todorov et al., 2015). Using the same cartoon character in all trials, with only the verbal group cue varying may have blurred differences between the two groups. In Experiment 3, we aimed to achieve a more ecologically valid design by introducing six pictures depicting prototypical members of LCLW and HCLW groups (three per quadrant). We decided to use only one group per quadrant (i.e., 'drug addict' and 'banker'; cf. Experiment 1) but to alter pictures within each group, also because Experiment 2 suggested that having multiple groups did not change effects.

More importantly, using pictures rather than neutral avatars allowed for an investigation of the impact of targets' social group on indirect measures of L2-VPT, with avatars' social group in the 'self' trials now conveyed visually. Because indirect measures investigate the spontaneous processing of targets' perspectives, we did not expect a difference of altercentric interference as a function of targets' social group[2].

[2] Based on recent findings showing that spontaneous VPT requires targets having visual access to stimuli (Elekes et al., 2017; Freundlieb et al., 2017, 2018), one could alternatively hypothesize that membership in a dehumanized outgroup would impair observers' attention to the target (Harris & Fiske, 2011), which in turn would impair observers' ability to perceive that targets have visual access to the stimuli. This could result in a smaller altercentric interference for LCLW compared to HCLW targets. Fortunately, our statistical tests set out to test both hypotheses. We would like to thank an anonymous reviewer for suggesting relevant literature pointing to this alternative hypothesis.

Regarding egocentric interference, we once again expected lesser efficiency in the incongruent trials for the LCLW target compared to the HCLW target.

6.1. Method

Participants and design. A total of 60 participants (M_{age}=27.92, SD_{age}=7.69, 21 women) took part on Prolific Academic[3] in exchange for £3.05. The experiment involved a 2 (number type: non-ambiguous=0 and 8 vs ambiguous=6 and 9) x 2 (location: wall vs. table) x 2 (perspective: self vs. other) x 2 (group quadrant: HCLW vs. LCLW)[4] repeated measures design.

Power calculations. Considering the modifications in the design, a power analysis indicated that we needed at least 23 participants to achieve 90% power to detect a small effect (*d*=.2).

Procedure. Procedures were as before, with three modifications. First, we used pictures as avatars. Second, only a fourth of the trials were 'self' trials (as opposed to one-third in Experiment 2). Finally, participants were randomly asked to indicate targets' social group 30 times (as opposed to 15 times in Experiment 2).

6.2. Results

Inverse Efficiency Score. We submitted the IES to a 2 (number type: non-ambiguous=0,8 vs. ambiguous=6,9) x 2 (location: wall vs. table) x 2 (perspective: self vs. other) x 2 (quadrant group: HCLW vs. LCLW) repeated measures analysis (see Figure 5). Significant effects of type of number, location, and perspective indicated that, regardless of avatars' social group participants were less efficient when the number was ambiguous, $F(1, 7299.1)=636.41$, $p<.001$, $\eta_p^2=.06$, on the table, $F(1, 7299.14)=329.69$, $p<.001$, $\eta_p^2=.03$, and when answering from avatars' perspectives, $F(1, 7299.20)=44.27$, $p<.001$, $\eta_p^2<.01$. Contrary to expectations, but in line with our earlier results, there was no main effect of quadrant group, $F(1, 7299.10)=0.29$, $p=.59$, $\eta_p^2<.01$, and no interactions including this factor, all Fs<2.7, all ps>.096, all $\eta_p^2<.01$.

The number type × location × perspective interaction was significant, $F(1, 7299.11)=20.81$, $p<.001$, $\eta_p^2<.01$. Follow-up analyses revealed that the number type × location interaction was significant for 'self' trials, $F(1, 7299.13)=31.55$, $p<.001$, $\eta_p^2<.01$. Specifically, for non-ambiguous numbers, no significant difference in efficiency as a function of location emerged, $F(1, 7299.10)=2.60$, $p=.107$, $\eta_p^2<.01$. However, for ambiguous numbers participants were less efficient when the number was on the table, $F(1, 7299.20)=90.35$, $p<.001$, $\eta_p^2<.01$.

Turning to the 'other' trials, the number type × location interaction was also significant, $F(1, 7299.14)=379.37$, $p<.001$, $\eta_p^2=.03$. Specifically, for non-ambiguous numbers, participants proved less efficient when the number was on the table, $F(1, 7299.02)=6.93$,

[3] https://prolific.co/

[4] Neutral avatars in the previous experiments did not have a social group in the 'self' trials, and we thus relied on a 3-levels perspective factor. Here avatars' social group is marked even in the 'self' condition, and we could thus rely on a fully crossed 4 factorial design.

p=.009, η_p^2<.01. This pattern emerged even more strongly for ambiguous numbers, F(1, 7299.22)=897.45, p<.001, η_p^2=.08.

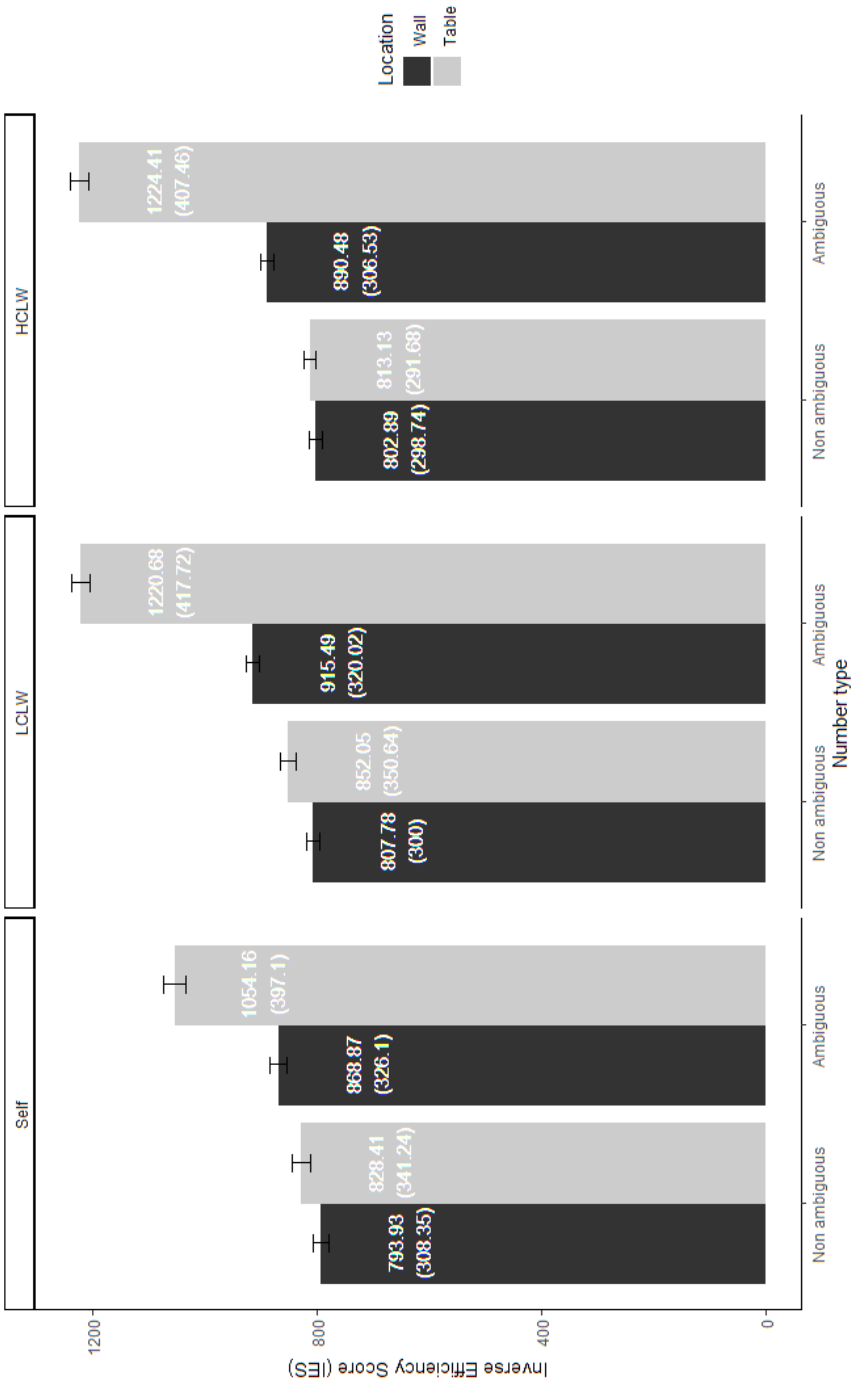

Figure 5. Graph of the inverse efficiency score (IES) as a function of number type, location, and perspective. Values are means (standard deviations). Bars represent standard errors. LCLW=low competence low warmth; HCLW=high competence low warmth.

6.3. Discussion

We replicated our previous results, as well as those of Surtees and colleagues (2016), regarding the presence of both altercentric and egocentric interference. Once again, altercentric interference was less marked than egocentric interference.

Using pictures conveying avatars' group membership instead of neutral avatars allowed us to investigate the potential impact of targets' social group membership on indirect L2-VPT. In line with our expectations and with previous results regarding spontaneous VPT (Elekes et al., 2016, 2017; Freundlieb et al., 2017, 2018; Surtees et al., 2016) we did not observe a significant difference in altercentric interference between LCLW and HCLW targets for the 'self' trials. Contrary to our hypothesis, but replicating our previous results, egocentric interferences between LCLW and HCLW targets on direct measures did not differ.

As explained above, we chose groups from the HCLW quadrant as a comparison because they constitute a less biased and more straightforward point of comparison with LCLW quadrant groups. However, it may be that the social distance between these groups is not large enough to generate differences in L2-VPT. Indeed, while being different on the competence dimension, both these targets come across as lacking warmth (Cuddy et al., 2007; Fiske et al., 2002). Consequently, and to maximize the distance between the target groups, Experiment 4 relied on HCHW group members as comparison.

7. Experiment 4

To maximize the distance between the targets taken into consideration, we replaced HCLW targets with HCHW targets differing on both fundamental dimensions. This additionally allowed testing for an alternative hypothesis grounded in the *social projection* literature. Because of the active dehumanization associated with LCLW targets (Harris & Fiske, 2006, 2007, 2011), we expected people to direct their attention away from such targets and in turn experience more difficulty in inhibiting their own perspective and to take on that of LCLW compared to HCHW targets. However, from a social projection perspective the opposite might prove true. Social projection refers to the process of believing that other people think, feel, and perceive similarly to ourselves (Krueger, 2007) and is especially strong for ingroup members (Robbins & Krueger, 2005). Consequently, if people believe that the more a target resembles them, the more this target will perceive things like them, then they should prove less efficient to take on the perspective of a socially close versus distant target when both perspectives diverge. In other words, from a social projection perspective inhibiting one's point of view for a socially close target (a HCHW (in)group member) could prove especially difficult. At the same time, it should be easier for people to inhibit their perspective for a socially distant target (a LCLW group member) because people should project less (Robbins & Krueger, 2005).

In summary, if inhibiting one's perspective is harder for a dehumanized target, we would expect stronger egocentric interference as a function of targets' social group in the incongruent trials, in the form of less efficiency for LCLW compared to HCHW targets. However, if inhibiting one's perspective is harder for a target perceived as socially closer to the self, we would expect the reverse pattern, with people being less efficient for HCHW

compared to LCLW targets. Such results would be in accordance with Simpson and Todd's (2017) findings that social projection impairs observers' direct L1-VPT. As in the previous studies, we did not expect a difference in altercentric interference as a function of targets' social group membership[5].

7.1. Method

Participants and design. A total of 34 psychology students (M_{age}=20.85, SD_{age}=2.56, 29 women[6]) took part in the study in exchange for partial course credit. The experiment involved a 2 (number type: non-ambiguous=0 and 8 vs. ambiguous=6 and 9) x 2 (location: wall vs. table) x 2 (perspective: self vs. other) 2 (group quadrant: HCHW vs. LCLW) repeated measures design.

Power calculations. A power analysis indicated that we needed at least 23 participants to achieve 90% power to detect a small effect (d=.2).

Procedure. The procedures were identical to Experiment 3, with two modifications. First, because most participants were female students, we replaced the HCLW group with a HCHW group ('female students'; the LCLW group remained 'homeless') to maximize the perceived social closeness and, in turn, social projection (Krueger, 2007). Second, we relied on two pictures per quadrant avatar instead of three.

7.2. Results

Inverse Efficiency Score. We submitted the IES to a 2 (number type: non-ambiguous=0,8 vs. ambiguous=6,9) x 2 (location: wall vs. table) x 2 (perspective: self vs. other) x 2 (quadrant group: HCHW vs. LCLW) repeated measures analysis (see Figure 6). Significant effect of number type, location, and perspective again indicated that, regardless of avatars' social group, participants were less efficient when the number was ambiguous, F(1, 4100.09)=388.79, p<.001, η_p^2=.06, on the table, F(1, 4100.06)=168.65, p<.001, η_p^2=.03, and when answering from avatars' perspective, F(1, 4100.08)=15.08, p<.001, η_p^2<.01. Again, and contrary to our expectations, there was no main effect of quadrant group, F(1, 4100.05)<0.01, p=.997, η_p^2<.01, and no interaction including this factor, all Fs<2.97, all ps>.085, all η_p^2<.01.

The number type × location × perspective interaction was significant, F(1, 4100.13)=9.03, p=.003, η_p^2<.01. Follow-up analyses revealed that the number type × location interaction was significant for 'self' trials, F(1, 4100.12)=22.89, p<.001, η_p^2<.01. Specifically, for non-ambiguous numbers there was no significant difference in efficiency as a function of location, F(1, 4100.04)=0.36, p=.546, η_p^2<.01. However, for ambiguous numbers, participants proved less efficient when the number was on the table, F(1, 4100.17)=54.18, p<.001, η_p^2<.01.

Turning to the 'other' trials, the number type × location interaction was also significant, F(1, 4100.08)=215.38, p<.001, η_p^2=.04. Specifically, for non-ambiguous numbers, there was no significant difference in efficiency as a function of location, F(1, 4100.06)=1.68,

[5] See Footnote 2

[6] The HCHW group avatars depicted female students; results do not differ when excluding men from the analyses.

p=.195, η_p^2<.01. However, for ambiguous numbers, participants were less efficient when numbers were on the table, F(1, 4100.09)=479.54, p<.001, η_p^2=.08.

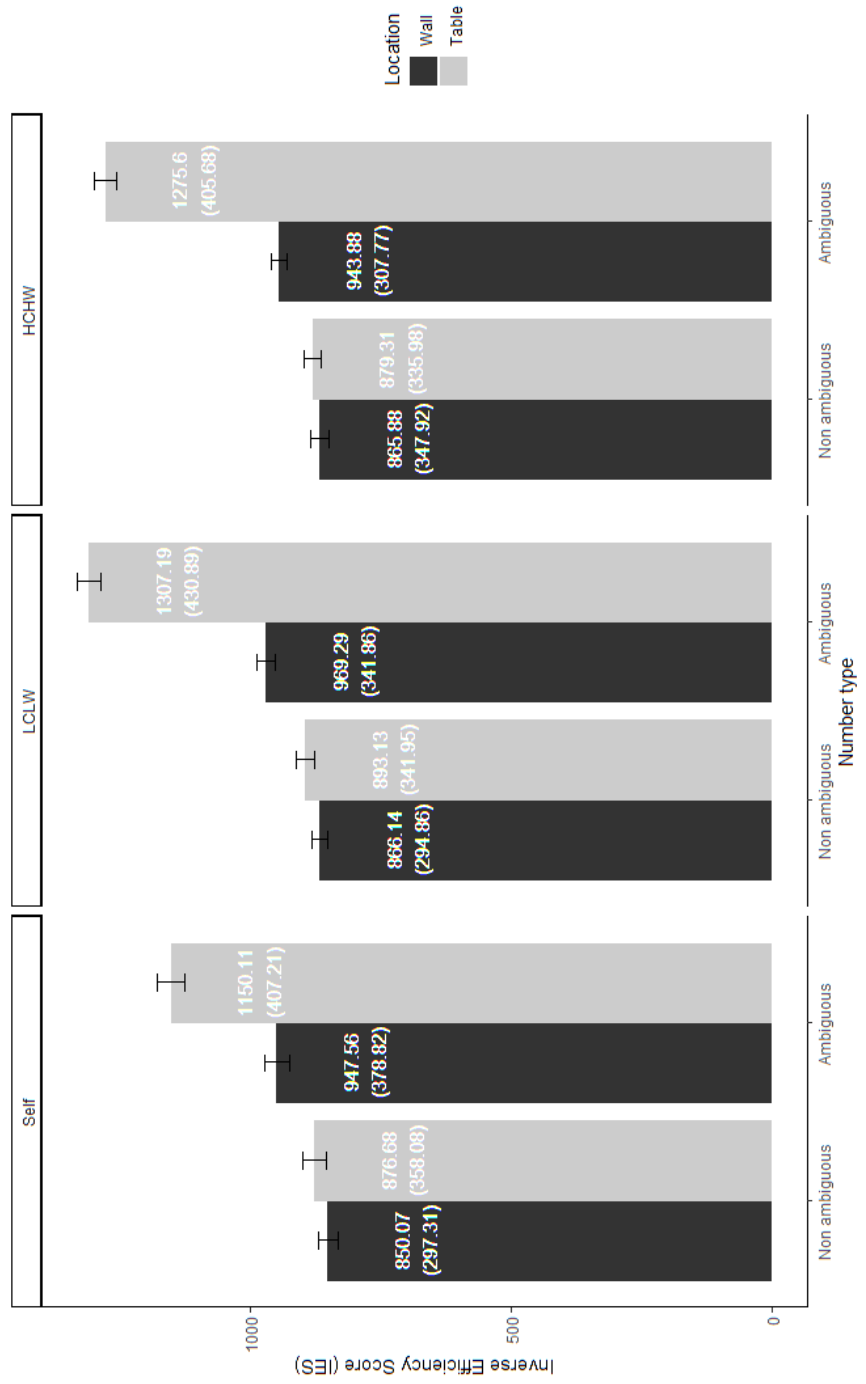

Figure 6. Graph of the inverse efficiency score (IES) as a function of number type, location, and perspective. Values are means (standard deviations). Bars represent standard errors. LCLW=low competence low warmth; HCHW=high competence high warmth.

7.3. Discussion

Experiment 4 sought to maximize differences between social targets by comparing HCHW (in)groups and LCLW outgroups. This modification allowed us to investigate both our original hypothesis (i.e., a higher egocentric interference for LCLW vs other outgroup members), as well as an alternative social projection hypothesis according to which people should prove less efficient when adopting the perspective of socially close targets (Krueger, 2007; Robbins & Krueger, 2005).

Once again, we replicated our and Surtees and colleagues' (2016) results regarding the presence of both altercentric and egocentric interference: participants had greater difficulties answering on incongruent trials compared to congruent trials, both when answering from their own (indicating altercentric interference) and from targets' perspectives (indicating egocentric interference). Again, altercentric interference was less marked than egocentric interference.

Contrary to our expectations, but in line with our previous results, there was no significant difference in egocentric interference between LCLW and HCHW targets. We thus found no support for our initial hypothesis, nor for an alternative social projection hypothesis. Once again, we failed to observe a significant difference in altercentric interference between LCLW and HCHW targets.

8. General Discussion

The present experiments explored the impact of others' membership in outgroups varying in competence and warmth on L2-VPT. In doing so, we went beyond a simple *outgroup* label (H. J. Ferguson et al., 2018; Simpson & Todd, 2017) by capitalizing on the Stereotype Content Model and relying on work suggesting that groups lacking both competence and warmth (LCLW) are less readily considered as social beings and more likely to be actively dehumanized (Cameron et al., 2016; Cikara et al., 2010; Harris & Fiske, 2006, 2007, 2009, 2011; Rudert et al., 2017). This active dehumanization should entail people attributing less mental states to and directing their attention away from such targets (Harris & Fiske, 2011), and in turn reduce people's inclination to take the perspective especially of members of such groups. Accordingly, we hypothesized that people would show larger egocentric interference in L2-VPT on trials in which their own perspective and that of LCLW group members diverged (i.e., incongruent trials) – compared to other social groups (HCLW groups in Experiments 1–3; HCHW (in)groups in Experiment 4).

As in past research (Surtees et al., 2012, 2016), we consistently observed egocentric interference such that participants proved less efficient when answering from targets' perspectives on incongruent compared to congruent trials. More interestingly, we also consistently observed altercentric interference in that participants were less efficient when answering from their own perspective on incongruent compared to congruent trials. In light of the systematic presence of altercentric interference across our highly powered experiments, including a direct replication of Surtees and colleagues (2012), its absence in

the original work (Surtees et al., 2012) seems likely due to some interfering factor (see Todd et al., 2019). Overall, our findings support the claim that people spontaneously consider targets' perspectives, even when it does not prove relevant for the task or when the target is an avatar (Elekes et al., 2016, 2017; Freundlieb et al., 2017, 2018; Surtees et al., 2016).

At the same time, we failed to find support for our hypothesis of a moderating influence of groups' level of competence and warmth on direct L2-VPT. Participants did not prove less efficient in answering while taking the visual perspective of LCLW compared to HCLW or HCHW targets. In Experiment 4, we also tested an alternative hypothesis informed by research on social projection (Krueger, 2007). Indeed, being socially especially close to a group (a HCHW group) might also impair observers' VPT ability because they project their own perspective to close others (Clement & Krueger, 2002). The data failed to provide support for this alternative conjecture. Furthermore, we did not find evidence for a moderating influence of groups' level of competence and warmth on indirect L2-VPT. Overall, the present findings suggest that targets' outgroup characteristics considered in the present work (i.e., competence and warmth) do not influence observers' L2-VPT efficiency. This is surprising in light of past work showing that mere outgroup membership negatively influences the less resource-demanding L1-VPT (H. J. Ferguson et al., 2018; Simpson & Todd, 2017).

An explanation for the absence of modulation of egocentric interference by targets' group characteristics can be found in Westra's (2017) suggestion that L2-VPT might only require relying on general knowledge but not actively adopting targets' perspectives: that a six is a nine when viewed from a 180° angle may be common knowledge for adult participants. But with no need to actually adopt targets' perspectives, there is no room for targets' social characteristics intervening. One way future research could circumvent this might be by relying on triple digit numbers or new perspective-dependent stimuli as well as broadening the range of possible answers beyond a simple *yes* vs *no*, thus increasing task difficulty. This should leave even less resources for participants to suppress their prejudice (Crandall & Eshleman, 2003) and render relying on general knowledge insufficient.

Regarding the absence of modulation of altercentric interference by targets' group characteristics, the submentalizing account (Heyes, 2014; Santiesteban et al., 2014) might offer an explanation. According to this account, spontaneous perspective taking is not triggered by social targets but is merely the unintentional processing of attentional cues, with participants not distinguishing between avatars but simply perceiving their directional attention (e.g., gaze or posture). Having said this, evidence for the submentalizing account is inconclusive, with some work showing that avatars' characteristics moderate the spontaneity of L1-VPT (Furlanetto et al., 2016; Nielsen et al., 2015).

Notwithstanding our contribution, some shortcomings remain. Firstly, we considered only a small number of groups, and some participants may have been confronted with groups they would not dehumanize, thus precluding the emergence of stronger interference. Future work could measure what specific LCLW groups participants would feel especially negative about, and idiosyncratically present such groups. This would ensure that each participant would actually perceive the avatars stemming from different social groups as members of LCLW groups. Moreover, the inclusion of more groups on such an idiosyncratic basis would ensure that the influence of each quadrant of the SCM (Fiske et

al., 2002) is tested based on several groups. Such an approach has obvious benefits. Indeed, more accurately representing the number of groups occupying the social space (Binggeli et al., 2014; Cuddy et al., 2009) broadens the range of activated stereotypes and allows for generalization.

Secondly, although we relied on pictures in our later experiments, one might question their ecological validity: pictures of drug addicts might not activate stereotypes the same way as seeing them in the streets. Although the literature on social perception shows that merely showing words or images associated with specific outgroups is enough to trigger different treatments, such as reduced empathy (Cikara et al., 2014; Xu et al., 2009), performing a VPT task with a real person as target differs from a similar task with avatars (Elekes et al., 2016, 2017). In light of the challenge of using real LCLW targets, using more immersive methodologies such as virtual reality could overcome such difficulties while improving ecological validity (Herrera et al., 2018).

Regarding the potential impact of social projection on VPT, the mere presence of socially close (in)group members in the L2-VPT task did not seem sufficient for group membership to impact observers' VPT, contrary to what has been observed regarding L1-VPT (H. J. Ferguson et al., 2018; Simpson & Todd, 2017). The absence of effect on our direct measure of L2-VPT is rather surprising for two reasons. First, direct L2-VPT is more cognitively demanding than direct L1-VPT (Surtees et al., 2013, 2016) and should thus leave less room to inhibit prejudice (Crandall & Eshleman, 2003). Second, we contrasted targets that are at a great social distance from one another (Cuddy et al., 2009). However, it could be that joint group membership perhaps was not salient or meaningful enough for participants in our design, which would have reduced or precluded the emergence of social projection (Robbins & Krueger, 2005). Still, such an interpretation seems unlikely as participants took part in our study as part of a methodology course and in the faculty of psychology lab, which together should have rendered salient a *student* identity. Research interested in testing a social projection account (Clement & Krueger, 2002; Krueger, 2007) could ensure ingroup membership salience as in previous work on L1-VPT (Simpson & Todd, 2017), or by manipulating mortality salience (Castano et al., 2002) or entitativity (Castano et al., 2003; Hogg et al., 2007)[7].

By examining the impact of outgroups' level of warmth and competence on L2-VPT, the current work contributes to the literature on visual perspective taking (Surtees et al., 2012, 2016) as well as work on the Stereotype Content Model (Abele et al., 2021; Cuddy et al., 2007, 2009; Fiske et al., 2002). Although previous research showed LCLW group members not being perceived as truly social agents, and that these damaging perceptions engender differential treatments (Cikara et al., 2010; Harris & Fiske, 2006, 2007, 2009, 2011), we did not find evidence of this being the case for neither direct nor indirect L2-VPT. Clearly, more work is required on both L1- and L2-VPT to understand if and under which conditions targets' membership in social outgroups – whether dehumanized or not – interferes with adopting others' visual perspective.

[7] As suggested by a member of the jury, an alternate version of this sentence could read: "Research interested in testing a social projection account (Clement & Krueger, 2002; Krueger, 2007) could ensure ingroup membership salience as in previous work on L1-VPT (Simpson & Todd, 2017), or by manipulating mortality salience (Castano et al., 2002) or entitativity (Castano et al., 2003; Hogg et al., 2007), as both these factors are positively related to ingroup membership salience."

Chapter 6.

Is empathy differentially modulated for members of different outgroups? An ERP investigation of the time course of empathy for pain towards (non) stigmatized groups

Research on the time course of empathy for pain made clear that people exhibit higher levels of empathy towards ingroup compared to outgroup members, known as parochial empathy (S. Han, 2018). However, little is known about the role of outgroup derogation in neural empathy for pain. Building upon decades of research on the Stereotype Content Model (Abele et al., 2021; Fiske et al., 2002) showing that members of low competence low warmth groups are dehumanized and denied mental states, we hypothesized that membership in a low competence low warmth quadrant would be related to lower levels of empathy for pain during a pain decision task, as measured by electrical brain activity. In a first study, we replicate previous findings, observing parochial empathy when contrasting high competence high warmth ingroup to low competence low warmth outgroup targets. In a second study, we relied on an impression formation task (Judd et al., 2005; Yzerbyt et al., 2008) and contrasted two fictitious outgroups, with one group being high on both competence and warmth and the other being low on both dimensions. We did not observe a difference in neural empathy for pain as a function of targets' outgroup quadrant. We discuss the implications of such findings for research on parochial empathy and suggest new avenues for research on intergroup empathy as a whole.

Reference

Vanbeneden, A., Granjon, M., Woltin, K. A., Rohmer, O., Maurage, P., & Yzerbyt, V. (in preparation). Is empathy differentially modulated for members of different outgroups? An ERP investigation of the time course of empathy for pain towards (non) stigmatized groups.

Chapter 6. Is empathy differentially modulated for members of different outgroups? An ERP investigation of the time course of empathy for pain towards (non) stigmatized groups

1. Introduction

Empathy is often defined as the process of sharing into a target's affective states (Decety & Ickes, 2009; Zaki, 2014). This ability is central in human interactions, as it underlies prosocial behaviours and fosters harmonious intergroup relations (Batson et al., 2002; Decety et al., 2016; Pettigrew & Tropp, 2008; Vanman, 2016). Recent efforts in social neurosciences indicate that empathizing with someone in pain is not an automatic process, but rather depends on a series of motivational factors such as group membership (for reviews, see Fourie et al., 2017; S. Han, 2018; Molenberghs & Louis, 2018). Past research on intergroup empathy mostly focused on *parochial empathy*, defined as a preferential empathy for ingroup compared to outgroup members. However, contrasting ingroup with outgroup targets leaves open a couple of questions, namely whether the observed parochial empathy is due to an ingroup preference or to outgroup derogation (Brewer, 1999), and whether differences in empathy would also emerge when contrasting two different outgroups. Indeed, all outgroups are not perceived and treated the same way, with some being the targets of strong derogatory stereotypes and others being subject to milder representations, as exemplified by more than two decades of work on the Stereotype Content Model (Abele et al., 2021; Fiske et al., 2002). Our work seeks to answer both questions by looking at the role of the presence of an ingroup for parochial empathy to emerge on one hand, and by contrasting targets belonging to stigmatized vs. non-stigmatized outgroups on the other hand.

The process of empathizing with a target in pain is a complex phenomenon that has been studied using a variety of neuroscientific tools such as functional magnetic resonance imaging (fMRI; Singer et al., 2004), electroencephalogram (EEG; Fan & Han, 2008), and transcranial magnetic stimulation (TMS; Avenanti et al., 2005) among others. To investigate how empathy unfolds, most studies presented participants with pictures or videos of targets either expressing pain (vs. not) or being subjected to painful (vs. painless) stimulations. The (non) painful aspect of the stimulation was conveyed either by facial expressions (Saarela et al., 2006), or by various body parts being punctured with a needle (vs. touched with a Q-tip; Avenanti et al., 2010; S. Han et al., 2009). This research shows that at the spatial level, empathy is related to the activation of the 'pain matrix', comprising the anterior cingulate cortex and the anterior insula (for meta-analyses, see Fallon et al., 2020; Fan et al., 2011; Lamm et al., 2011). At the temporal level, research relying on event-related potential (ERP) shows two distinct components implicated in empathy, which are qualified by specific time courses and labelled affective and cognitive empathy (De

Vignemont & Singer, 2006; Fan & Han, 2008; for a meta-analysis see Coll, 2018). Affective empathy, also called 'emotional resonance', is defined as the process of feeling what a target feels and materializes in the pre-P3 components, from 0 to 300 milliseconds of seeing a target in pain. Cognitive empathy is related to the process of understanding a target's feelings and is observed through the P3 and LPP components, which emerge from 300 milliseconds onwards after seeing a target in pain.

Recent work also highlighted the fact that empathy is not an automatic process, but instead is influenced by a series of factors such as cognitive load, emotional cost of empathizing, or competitiveness of the target (Rameson et al., 2012; Richins et al., 2019; Zaki, 2014; for a review see Weisz & Zaki, 2018). One such factor that has been examined more extensively is (in)group membership (Sessa et al., 2014; Xu et al., 2009; Zhou et al., 2022; for a review see S. Han, 2018). For example, Sheng and Han (2012) presented Chinese participants with Chinese (ingroup) or Caucasian (outgroup) targets subjected to painful vs. painless stimulations and recorded EEG responses. These authors observed lower differences in brain activation for painful vs. painless stimuli in the pre-P3 components (i.e., affective empathy) – specifically the N2-N3 component – when participants were confronted with outgroup compared to ingroup targets. In other words, they found a higher difference in voltage between the painful vs non-painful stimulations for the in- compared to the outgroup targets (for an illustration of the data, see Figure 1). Interestingly, there was no moderation of the cognitive component of empathy (P3) by group membership, suggesting that racial group membership does not moderate cognitive empathy in this paradigm. This pattern of parochial affective empathy on pre-P3 components but not on the later P3 and LPP components is a robust finding (Contreras-Huerta et al., 2014; Granjon et al., 2023; X. Han et al., 2016; Sheng et al., 2013, 2016; but see Caspar et al., 2023; Zhou et al., 2022).

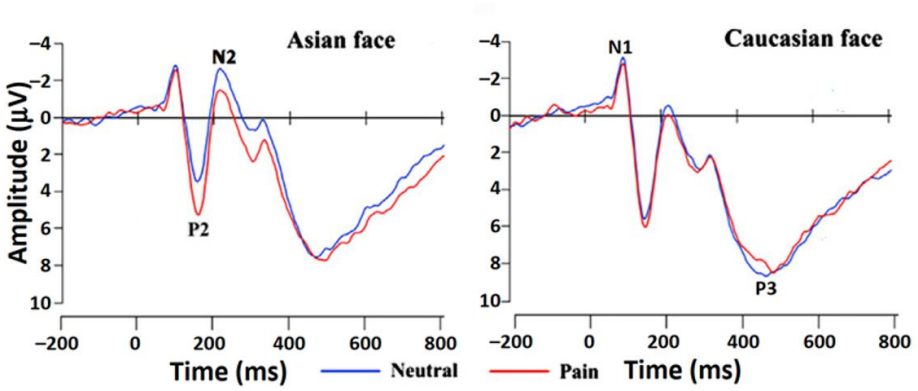

Figure 1. Illustration of averaged ERPs recorded at the electrode FCz. Adapted from "Manipulations of cognitive strategies and intergroup relationships reduce the racial bias in empathic neural responses", by F. Sheng & S. Han, 2012, *Neuroimage*, *61*(4), 791. Copyright 2009 by Elsevier.

Research exploring how empathy unfolds at the intergroup level largely focused on parochial empathy, with the majority of efforts contrasting racial ingroup and racial outgroup targets (but see Caspar et al., 2023; Granjon et al., 2023). In our opinion, this

focus on parochial empathy has two important limitations. First, such a design fails to inform on whether parochial empathy stems from an 'exceptionally' high empathy for ingroup targets, from a lower empathy towards outgroup targets, possibly due to strong stereotypes and prejudice, or both. Second, it does not inform about whether or not different outgroups elicit different levels of empathy. Indeed, two decades of work on the Stereotype Content Model (Cuddy et al., 2009; Fiske et al., 2002; for a review see Abele et al., 2021) made clear that not all outgroups are perceived and treated the same. According to the SCM, perceptions of social groups can be organized in a bidimensional space constituted by the dimensions of competence and warmth. As both dimensions of social perception are considered orthogonal, this bidimensional space divides four distinct quadrants from each other. Importantly, membership in specific quadrants entails radically different affective and behavioural reactions from observers (Cuddy et al., 2007). For example, groups high on both competence and warmth (HCHW, generally one's ingroup such as friends or family) elicit emotions of admiration and behaviours entailing active and passive facilitation. At the opposite side of this bidimensional space lie groups perceived as low on both dimensions (LCLW, such as drug addicts or alcoholics), which elicit emotions of disgust triggering active and passive harm (Valtorta et al., 2024). Turning to the other diagonal, groups perceived as high on competence and low on warmth (HCLW, such as bankers or lawyers) elicit envy leading to passive facilitation and active harm. Finally, groups perceived as low on competence and high on warmth (LCHW, such as disabled or elderly people) trigger pity which feeds into active facilitation but can also entail passive harm.

Above and beyond perceptions, affective reactions, and behavioural tendencies, a great many studies attest to observers' differential treatment in mental states attribution and empathy as a function of the quadrant that different target groups inhabit (Amodio & Cikara, 2021). In particular, a robust set of findings highlights the strong counter-empathic reaction that HCLW outgroups' pain or misfortune triggers (Cikara & Fiske, 2013; Ozkara, 2021). For example, Cikara and colleagues (2011) had fans of two competing baseball teams (Yankees *vs*. Red Sox) watch clips of baseball plays in which each team competed against the rival team or against a third, neutral team. Participants reported feeling less empathic towards the rival team's compared to their own team's failures, and corroborating these self-reports this was also reflected in the observed reduced activation of the anterior cingulate cortex and insula – brain areas related to empathy. Remarkably, participants also reported feelings of pleasure and joy at the rival team's failures, which was again supported in neural measures by the activation of the ventral striatum – a brain area related to the experience of subjective pleasure. This latter pattern of counter-empathic reactions presumably is fuelled by a perception of the outgroup as a competitive, threatening, and being of relatively high-status – elements characterizing groups from the HCLW quadrant (Durante et al., 2013). As another illustration of how a group's position in a specific quadrant relates to empathy, the bulk of research on the LCLW quadrant shows that observers display a tendency to attribute fewer mental states to members of such groups at the explicit level (Cameron et al., 2016; Harris & Fiske, 2009). Such results go hand in hand with the finding that, compared to other social targets, LCLW targets frequently trigger a lower activation of the medial prefrontal cortex (mPFC), a brain area related to mentalizing and social cognition (Harris & Fiske, 2006, 2007, 2009, 2011; Tan & Harris, 2021). Furthermore, observers often report feeling less empathy for LCLW targets (Batson

et al., 2002; Moore-Berg et al., 2022). Taken together, these findings indicate that membership in a specific quadrant proposed by the SCM not only entails different perceptions, emotional inclinations and behavioural tendencies but is also differentially related to observers' empathy towards such targets.

The objective of our work is to expand knowledge on both neural empathy and social perception on two fronts. First, we explored the differential time course of empathy for pain triggered by outgroups from different quadrants. A second objective was to collect preliminary evidence regarding whether parochial empathy is driven by an ingroup preference or by outgroup derogation (or both). To do so, we conducted two studies. In the first study, we sought to replicate and extend previous findings on parochial empathy by contrasting HCHW ingroup targets (psychologists) to LCLW outgroup targets (alcoholics). As research on parochial empathy for pain mostly relied on racial group membership and thus inevitably introduced distinctive visual cues allowing participants to identify such group memberships, an additional question remains as to whether the observed parochial empathy is partially driven by lower-level perceptual processes, such as by the attentional salience of racial outgroup targets (Bagnis et al., 2020). To prevent that moderation of empathy as a function of targets' group membership would merely stem from such perceptual processes, we relied on groups that could not be identified through visual cues. In the second study, we contrasted HCHW outgroup to LCLW outgroup targets. Doing so allowed investigating the possibility of a moderation of empathy as a function of which SCM quadrant outgroups are perceived to belong to. In addition, relying on the presence of two outgroups but no ingroup allowed us to look at whether a difference in empathy would emerge on the basis of derogation (Meconi et al., 2015). Observing a difference in empathy in this context would suggest that stereotypes partially underlie parochial empathy. In contrast, observing no difference could hint towards ingroup favouritism. We relied on fictitious groups and their location in the SCM quadrants was manipulated through an impression formation task (Judd et al., 2005; Kervyn et al., 2009; Schmitz et al., 2024). In both studies, we selected targets from the HCHW and LCLW quadrants to maximise the gap in stigma and prejudice, with the HCHW (LCLW) targets being the least (most) stigmatized targets in the SCM (Cuddy et al., 2009; Yzerbyt, 2016).

In both studies, we measured participants' event-related potentials by means of an EEG during a pain decision task. Regarding affective empathy, the N2 component has been shown to be the most sensitive to pain detection among the pre-P3 components (Coll, 2018). Building upon previous work, we decided to focus on the larger N2-N3 component to maximize chances of detecting effects for affective empathy (Granjon et al., 2023; Sessa et al., 2014). Although we measured early components such as the N1 or P2 components as well, the interpretation of these components as conveying empathic processes is still under debate (Sun et al., 2017). As such, we refrain from reporting and discussing results involving early components in the main text. We nevertheless report the results of these analyses in the supplementary material for interested readers. Regarding cognitive empathy, most research on parochial empathy did not observe a modulation of the late P3 component (Contreras-Huerta et al., 2014; X. Han et al., 2016; Sheng et al., 2017; Sheng & Han, 2012). We nonetheless included such components in our analyses but did not expect a moderation by social group. In both studies, we hypothesized a reduced empathy towards LCLW compared to HCHW targets' pain, operationalized as a higher brain activity for painful vs. painless stimulation for HCHW targets, but a smaller – or even absent –

difference between the painful vs. painless stimulations for LCLW targets. In sum, we expected a two-way interaction between type of stimulation and targets' group membership. Regarding behavioural responses (i.e., response time and accuracy during the Pain Decision Task), past work reported inconsistent results. That is, some work reported an interaction between the painful *vs.* painless aspect of the stimulation and the target's group (X. Han et al., 2016; Sheng et al., 2013), whereas other work did not find an interaction between these factors (Granjon et al., 2023; Sheng et al., 2016; Zhou et al., 2022) or simply did not report behavioural data (Caspar et al., 2023; Contreras-Huerta et al., 2014). As behavioural responses were not part of our main focus, we refrained from formulating hypotheses but nonetheless report our findings for interested readers. Finally, because some work found a relation between self-reported and neural empathy (Galang et al., 2021; Sessa et al., 2014), we also measured self-reported empathy in an exploratory way using the Interpersonal Reactivity Index (see the Supplementary Material; Davis, 1980).

All data, scripts, material and supplementary materials are available on the OSF: https://osf.io/g9xkv/?view_only=38d9b8be2bd34147977c4cb18c7efa9d.

2. Experiment 1

2.1. Power analysis and sample

Sample size. Based on previous work from Granjon and colleagues (2023) relying on a similar design and reporting an effect of d=1, we performed a power analysis using the PANGEA program (Westfall, 2015) for a 2 (Target: LCLW outgroup *vs*. HCHW ingroup) x 2 (Stimulation: painless *vs*. painful) design with both factors varying within participants, participants and targets as random, and a conservative expected effect size for the interaction of d=.5. This analysis indicated that we needed at least 10 participants to achieve 80% power. To account for a potential loss of participants or noise in the EEG signal and to secure high power, we aimed at collecting at least 30 participants.

Participants. A total of 34 French-speaking participants (27 women, 1 non-binary, M_{age}=19.67, SD_{age}=2.51) took part in the 90-minute experiment in exchange for a chance to win a touchscreen tablet (value 400€). Participants were undergraduate students either following a psychology cursus or with a minor in psychology. We sought to recruit participants studying psychology to capitalize on their identity as psychologists (i.e., our HCHW group in the experiment). We recruited them by means of flyers and announcements during courses.

2.2. Material

Group vignettes. To ensure that all participants activated similar categories when thinking about both groups, we presented participants with two vignettes. Each vignette gave a brief definition of either psychologists or alcoholics. These vignettes were pretested to confirm that they adequately conveyed stereotypes associated with each group, namely a perception of both high competence and high warmth for psychologists (e.g., "psychologists may spend hours preparing therapy sessions") and a perception of both low

competence and low warmth for alcoholics (e.g., "alcoholics may spend hours drinking alcohol"). see the Appendices for the vignettes.

Social evaluation traits. To measure the perception of each group we asked participants to indicate on a scale ranging from 1(=totally disagree) to 7(=totally agree) how most people would perceive members of both social groups, using 20 commonly used social evaluation traits (see Barbedor et al., 2024). Ten traits pertained to the competence dimension ($\alpha_{alcoholics}$=.92; $\alpha_{psychologists}$=.88), with five traits related to the ability facet (*competent*, *intelligent*, *capable*, *ingenuous*, *efficient*) and five traits related to the assertiveness facet (*confident*, *ambitious*, *resolute*, *persevering*, *determined*). Ten traits pertained to the warmth dimension ($\alpha_{alcoholics}$=.90; $\alpha_{psychologists}$=.88), with five traits related to the sociability facet (*kind*, *sociable*, *warm*, *agreeable*, *cordial*) and five traits related to the morality facet (*honest*, *moral*, *trustworthy*, *sincere*, *reliable*).

Status. As an additional measure of social perception, we asked participants to indicate where they would locate each group on a subjective socioeconomic status scale ranging from 1(=lowest status) to 10(=highest status).

Pain Decision Task. The set of faces used in the task originated from the Experimentum webapp (DeBruine et al., 2020), and comprised faces of 20 White men and 20 White women. Each face appeared twice throughout the task, once in a painful condition (i.e., a surgical needle touching their cheek) and once in a painless condition (i.e., a brush touching their cheek). Importantly, we created two versions of the task (A and B) so that each face was associated with one of the two groups in version A and with the other group in version B. We counterbalanced the versions of the task.

In each trial, participants briefly saw the target's alleged group membership (psychologist or alcoholic) for 250ms. This was followed by a fixation cross lasting a random amount of time from 800 to 1600ms. Then, they saw a target face during 250ms followed by a blank screen for a maximum of 1200ms. Participants' task was to answer as quickly as possible whether the target was experiencing a painful or painless stimulation using the S and L keys (counterbalanced). We presented participants with 16 training trials to ensure a good comprehension of the instructions. When participants performed correctly on most training trials (i.e., >80% correct), they went on with the in total 960 test trials, which were split into 12 blocks.

Interpersonal Reactivity Index. Here and in Study 2, we relied on the 28-item Interpersonal Reactivity Index (Davis, 1980) to measure participants' self-reported empathic abilities in an exploratory way (for results including this measure, see the Supplementary Material). Specifically, participants completed all four subscales of the IRI: The Fantasy (α=.73), Perspective Taking (α=.73), Empathic Concern (α=.54), and Personal Distress (α=.86) subscales.

2.3. Procedure

Upon their arrival at the lab, participants first read and signed an informed consent. Next, they read the two vignettes and indicated how most people would perceive each group based on these vignettes using social evaluation traits. Participants then went through the pain-decision task (PDT). Throughout the task, we measured participants' EEG activity. Between each block, participants could take a short break. After the PDT, participants

completed the IRI, and provided some demographics. Finally, we debriefed and thanked them.

EEG recording and analysis. We recorded EEG signal through a 64-electrode system (BioSemi, Amsterdam, The Netherlands), which we placed following the 10-20 system. We used two electrodes as ground electrodes, namely the Common Mode Sense active electrode and the Driven Right Leg passive electrode. In addition, we recorded horizontal and vertical electrooculography potentials bipolarly to control ocular artifacts. During data collection, we selected a sample rate of 512Hz and applied both a high- (0.16Hz) and low-pass (500Hz) filter online. Afterwards, we processed data with the help of the BrainVision Analyzer software (version 2.3; *BrainVision Analyzer*, 2022). We referenced data to the average of the two flat active electrodes located on the earlobes and filtered again, this time with a 0.5Hz high-pass forward and a 30Hz low-pass zero-phase filter. We excluded trials with incorrect answers and we epoched data from 100ms before to 3000ms after stimulus onset, with a baseline correction applied to the span of 100ms before stimulus onset. We relied on an independent component analysis (ICA)-based correction process to correct for ocular movements and get rid of residual artifacts (data ranging over ± 100 μV).

After visual inspection, we selected the following time windows for each component: 190–260ms for N2-N3, and 350–530ms for P3. Following standard procedure in such designs (Coll, 2018; Granjon et al., 2023; Sessa et al., 2014), we clustered electrodes in one region of interest and maximized component appearance by averaging activity in frontal electrodes for the N2-N3 components (Fz, F1/F2, F3/F4, FCz, FC1/FC2, FC3/FC4), and in frontal and central electrodes for the P3 component (Fz, F1/F2, FCz, FC1/FC2, Cz, C1/C2).

2.4. Results

For both experiments, we performed the analyses using R (R Core Team, 2024) and the lme4 (Bates et al., 2015) and lmerTest (Kuznetsova et al., 2017) packages.

Manipulation check. To check if participants perceived the psychologists as a high competence and high warmth group and the alcoholics as a low competence low warmth group, we submitted their social judgments of these groups regarding the 20 traits to a 2 (Target: alcoholic *vs.* psychologist) × 2 (Dimension: competence *vs.* warmth) linear mixed model, with both factors varying within subjects and participants and items as random effects. Confirming the success of our manipulation, we observed a significant main effect of Target, $F(1, 1384.1)=2108.27$, $p<.001$, $\eta_p^2=.572$, indicating that across both dimensions, psychologists were indeed perceived more positively than alcoholics. Additionally, an unexpected significant Target × Dimension interaction, $F(1, 1384.1)=6.45$, $p=.011$, $\eta_p^2=.004$, indicated that participants perceived psychologists as somewhat lower on competence (M=5.46, SD=1.22) than on warmth (M=5.77, SD=1.13), $F(1, 30.38)=5.37$, $p=.027$, $\eta_p^2=.007$. As to alcoholics, participants perceived similar levels of competence (M=2.63, SD=1.54) and warmth (M=2.62, SD=1.51), $F(1, 30.38)=0.02$, $p=.903$, $\eta_p^2<.001$.

Pain Decision Task. Given the inconsistency of results regarding the behavioural data collected through the Pain Decision Task, we mostly used it to capture EEG signals when facing painful vs. painless targets. We nonetheless report here and in Study 2 the analysis of the data for interested readers. We excluded incorrect trials from the analyses (7.06% of the trials) as well as trials exceeding ± 2 standard deviations from a participant's mean

response time of all correct trials (3.43% of the remaining trials). To consider both reactivity in terms of milliseconds and accuracy in reporting painful vs. painless trials in a single metric, we computed the Inverse Efficiency Score (IES; Townsend & Ashby, 1978, but see also Bruyer & Brysbaert, 2011) by dividing the response time by the rate of correct answers. As complementary analyses, we also report analyses of response time and error rate separately in the Supplementary Material. We submitted the IES to a 2 (Target: alcoholic *vs.* psychologist) × 2 (Stimulation: painless *vs.* painful) linear mixed models, with both factors varying within subjects and participants as random effect. No significant main effects or interaction emerged, Fs<0.73, ps>.392.

Event-Related Potential. To investigate our main hypothesis, we subjected mean area under the curve of each component to a 2 (Target: alcoholic *vs.* psychologist) × 2 (Stimulation: painless *vs.* painful) linear mixed models, with both factors varying within subjects and participants as random effect[1].

For the N2-N3 component, we observed a significant Stimulation effect, $F(1, 1323)=8.31$, $p=.004$, $\eta_p^2=.001$, indicating that painful stimuli triggered more activation than painless stimuli. There was no significant Target effect, $F(1, 1323)=1.08$, $p=.300$, $\eta_p^2<.001$. Contrary to our expectations, the expected Target × Stimulation interaction did not emerge, $F(1, 1323)=1.58$, $p=.209$, $\eta_p^2<.001$.

Turning to the P3 component, we observed a significant Stimulation effect, $F(1, 1187)=38.96$, $p<.001$, $\eta_p^2=.009$, indicating that painful stimuli triggered more activation than painless stimuli. There was no significant Target effect, $F(1, 1187)=3.23$, $p=.072$, $\eta_p^2=.001$. Interestingly, there was also a Target × Stimulation interaction, $F(1, 1187)=4.17$, $p=.041$, $\eta_p^2=.001$. Specifically, although the difference in activation between painful vs. painless stimuli proved significant for both targets, this difference was larger for psychologist targets, $F(1, 1187)=34.31$, $p<.001$, $\eta_p^2=.008$, than for alcoholic targets, $F(1, 1187)=8.82$, $p=.003$, $\eta_p^2=.002$.

2.5. Discussion

In this first study, we sought to replicate and extend previous findings on intergroup empathy by contrasting HCHW ingroup to LCLW outgroup targets. As expected, we did find a reduced empathy towards the pain of LCLW outgroup compared to HCHW ingroup targets, but this difference materialized on the late P3 component rather than the earlier N2-N3 component. One notable feature of our design is the fact that we relied on visually identical stimuli for both groups, whereas past work mostly relied on racial stimuli bearing different levels of attentional salience. This raises the question as to whether the difference in attentional salience between racial stimuli partly underlies the presence of parochial empathy on the N2-N3 component in previous work (Codispoti et al., 2006; Olofsson et al., 2008).

In Study 2, we turn our attention to empathy in the context of two outgroups varying on both competence and warmth. Specifically, we contrasted fictitious, newly created HCHW

[1] As much past work, neither participants' gender nor electrodes' hemisphere interacted significantly with our factors in both studies, either (for discussions on the role of gender in neural empathy, see Lamm et al., 2011; Pang et al., 2023). As removing these factors from our models did not change the results in any way, we thus present models not including these two factors.

to LCLW outgroup targets, allowing us to investigate whether or not outgroup derogation influences empathy.

3. Experiment 2

3.1. Power analysis and sample

Sample size. Previous work on parochial empathy from Granjon et al. (2023) relying on similar stimuli and statistical design showed an effect of d=1. Our first study relying on a similar design contrasting in- from outgroup targets yielded an effect of d=.78 for the Target × Stimulation interaction. Given that this study contrasted targets from two outgroups for the first time, we again based our power analysis on a more conservative effect size of interaction d=.5. Using the PANGEA program (Westfall, 2015), we performed a power analysis for a 2 (target's outgroup: HCHW vs LCLW) x 2 (stimulation: painful vs painless) design with both factors varying within participants and participants as random effect. This analysis indicated that we needed at least 14 participants to achieve 80% power[2]. To account for potential loss of participants or noise in the EEG signal, we aimed at collecting at least 30 participants.

Participants. A total of 35 French-speaking participants took part in this 90-minute experiment in exchange for 30€. We recruited participants through social media. Due to hardware issues, we lost the data from two participants. Additionally, we excluded one participant from the analyses due to a bad signal-to-noise ratio (i.e., EEG measurements varying excessively in amplitude over a short period of time). The final sample thus comprised 32 participants (N_{women}=21, M_{age}=24.16, SD_{age}=3.73).

3.2. Material

Impression formation task. At the beginning of the task, the nature of the HCHW and the LCLW groups was pseudo-randomly assigned (see below for details; *Blue* or *Green* group). The impression-formation task comprised 32 behaviours, adapted from Judd and colleagues (2005) and Yzerbyt and colleagues (2008). Among those 32 behaviours, we pseudo-randomly selected 24 behaviours for each participant, leading to 12 behaviours per group. For the HCHW group, five behaviours were indicative of competence, one was indicative of lack of competence, five were indicative of warmth, and one was indicative of lack of warmth. Contrary, for the LCLW group, five behaviours were indicative of lack of competence, one was indicative of competence, five were indicative of a lack of warmth, and one was indicative of warmth. We selected this ratio to convey a strong but realistic description of each group, that is, to avoid perceptions of both groups being 'all black or all white' – which might have been seen as somewhat artificial by participants. To facilitate the formation of associations between behaviours and groups, each behaviour was displayed in a rectangle whose colour matched the group's colour.

Social evaluation traits. To measure participants' perception of the two groups we asked them to indicate on a scale ranging from 1(=totally disagree) to 7(=totally agree) how

[2] The difference of estimated sample size between Study 1 and 2 stems from a reduced number of trials in Study 2, resulting in a higher number of participants required.

most people would perceive members of each social group, using 12 social evaluation traits recently proposed as forming a satisfactory set of traits (see Barbedor et al., 2024). Six traits pertained to the competence dimension (α_{LCLW}=.90; α_{HCHW}=.93), with three tapping the ability facet (*competent*, *intelligent*, *capable*) and three the assertiveness facet (*confident*, *persevering*, *determined*). Six traits pertained to the warmth dimension (α_{LCLW}=.88; α_{HCHW}=.89), with three measuring the sociability facet (*sociable*, *warm*, *agreeable*) and three the morality facet (*honest*, *moral*, *sincere*).

Status. As an additional measure of social perception, we asked participants to indicate where they would locate each group on a subjective socioeconomic status scale ranging from 1(=lowest status) to 10(=highest status).

Pain Decision Task. The task was identical to Study 1 with the following exceptions. First, we modified targets' alleged outgroup membership displayed on screens before the appearance of the fixation cross (Blue *vs*. Green group). Importantly, the identity of each group appeared in the associated colour (i.e., Green group in green and Blue group in blue). Second, the blank screen lasted for a fixed 3000ms (instead of previously lasting a maximum of 1200ms), to ensure that each trial would last long enough to allow exploratory measurement of late positive potential (LPP; Coll, 2018). Third, we only presented a total of 480 trials, split into 10 blocks.

Interpersonal Reactivity Index. We measured the IRI as in Study 1 ($\alpha_{Fantasy}$=.77, $\alpha_{Perspective\ Taking}$=.67, $\alpha_{Empathic\ Concern}$=.82, $\alpha_{Personal\ Distress}$=.91). For results including this measure, see the Supplementary Material.

3.3. Procedure

Upon their arrival at the lab, participants first read and signed an informed consent. Next, they underwent the impression formation task. We instructed them to read a series of statements about two fictitious groups, the Blue and the Green groups, and to form an impression about these groups. They read the 24 statements twice, first in a random order and then classified by group (i.e., the 12 statements of a group followed by the 12 statements of the other group). Next, we asked them to write a short text for each group describing their impression of this group, to consolidate impressions that had formed. They then conveyed their impression of both groups by means of the 12 social evaluation traits, as well as the perceived social status of each group. After the impression formation task, we presented participants with the Pain Decision Task (PDT). Throughout the task, we measured participants' EEG activity. Between each block, participants could take a short break. At Break 2, we asked participants to read again a subset of behaviours for each group, and at Breaks 4, 6 and 8 we asked participants to indicate what they deemed to be the most typical behaviours for each group among these subsets. This was done to ensure that the impression formed of each group remained active throughout the task. After the PDT, participants indicated once again their perception of both groups using the same 12 traits as before, to check whether their perception of both groups remained stable throughout the PDT. Next, participants completed the IRI as well as demographics. Finally, we debriefed, paid and thanked participants.

EEG recording and analysis. EEG recordings were collected and processed exactly as in Study 1, with the exception that we epoched data from 100ms to 3000ms after stimulus onset to allow for exploratory analyses of the late positive potential (LPP) component.

After visual inspection, we selected the following time windows for each component: 190–260ms for N2-N3, and 350–530ms for P3. We averaged electrode activity identically to Study 1.

3.4. Results

Manipulation check. To ensure that participants evaluated the LCLW and HCHW groups as expected, we submitted the ratings of both groups to a 2 (Target: LCLW *vs.* HCHW) × 2 (Dimension: competence *vs.* warmth) × 2 (Time: pre-PDT vs post-PDT) linear mixed models, with all factors varying within participants and participants and items as random effects. There was a significant main effect of Target, $F(1, 1487)=703.08$, $p<.001$, $\eta_p^2=.299$, indicating that, as intended, participants perceived the HCHW group more positively than the LCLW group across both dimensions (see Table 1). We also found an unexpected significant Target × Time interaction, $F(1, 1487)=4.19$, $p=.041$, $\eta_p^2=.010$, indicating that the difference between HCHW and LCLW differed as a function of time. Specifically, the HCHW targets were perceived as higher than the LCLW targets across both dimensions on pre-PDT measurement, $F(1, 1487)=299.35$, $p<.001$, $\eta_p^2=.154$, and this difference proved even stronger on the post-PDT social evaluation measures, $F(1, 1487)=407.92$, $p<.001$, $\eta_p^2=.198$. No other main or interaction effects emerged, Fs<4.76, ps>.054 (for means and standard deviations, see Table 1).

Further attesting to our successful manipulation, participants perceived both groups as differing in terms of status, $t(61.99)=7.05$, $p<.001$. Specifically, the HCHW group was perceived as higher in status (M=7.81, SD=1.84) than the LCLW group (M=4.59, SD=1.81), as intended.

	Pre-PDT		Post-PDT	
	Competence	Warmth	Competence	Warmth
HCHW targets	5.82 (1.19)	5.28 (1.56)	5.80 (1.26)	5.44 (1.40)
LCLW targets	3.83 (1.87)	3.37 (1.90)	3.41 (1.78)	3.29 (1.76)

Table 1. Mean (standard deviation) competence and warmth for HCHW and LCLW targets, as measured pre-PDT and post-PDT.

Pain Decision Task. Here again, we refrain from formulating hypotheses due to the inconsistency in past results, but nonetheless present our findings for interested readers. We excluded incorrect trials from the analyses (2.76% of the trials) as well as trials exceeding ± 2 standard deviations from a participant's mean response time of all correct trials (4.59% of the remaining trials). As in Study 1, we relied on the Inverse Efficiency Score (IES). We submitted the IES to a 2 (Target: LCLW *vs.* HCHW) × 2 (Stimulation: painless *vs.* painful) linear mixed model, with both factors varying within subjects and participants as random effects. No main or interaction effects emerged, Fs<1.39, ps>.239.

Event-Related Potential. To investigate our main hypothesis, we subjected mean area under the curve of each component to a 2 (Target: LCLW *vs.* HCHW) × 2 (Stimulation: painless *vs.* painful) linear mixed models, with both factors varying within subjects and participants as random effects.

For the N2-N3 component, we observed a significant Stimulation effect, $F(1, 1245)=5.13$, $p=.024$, $\eta_p^2=.001$, indicating that painful stimuli triggered more activation than painless stimuli. Contrary to our hypothesis, no other main or interaction effects emerged, Fs<0.01, ps>.991.

For the P3 component, we observed a significant Target effect, $F(1, 1117)=5.56$, $p=.019$, $\eta_p^2=.002$, indicating that painful stimuli triggered more activation than painless stimuli. However, no other main or interaction effects emerged, Fs<2.23, ps>.135.

3.5. Discussion

In this second study, we explored the role of outgroup derogation on empathy by contrasting two fictitious outgroups, namely a LCLW and a HCHW group. Based on past research showing that LCLW groups are derogated, we hypothesized that this would lead to observers displaying less empathy towards the pain of targets belonging to this quadrant compared to targets from the HCHW quadrant. We did not find evidence of such moderation of empathy by targets' quadrant, suggesting that other factors could be at play in previous work highlighting the presence of parochial empathy.

4. General Discussion

In two studies, we ambitioned to better understand how empathy unfolds in an intergroup context, and specifically to look at the potential moderating role of outgroup derogation. To do so, in a first study we contrasted targets from a high competence and high warmth (HCHW) ingroup to targets from a low competence and low warmth (LCLW) outgroup in a pain decision task (PDT). Confirming our hypotheses and replicating previous findings, we observed a moderation of empathy by targets' in- vs outgroup membership. That is, observers displayed more empathy toward the ingroup targets than toward outgroup targets. Interestingly, this moderation only concerned late empathic processes (i.e., cognitive empathy observed on the P3 component) but did not emerge for early empathic processes (i.e., affective empathy observed on the N2-N3 component). This pattern comes a bit as a surprise, given that the bulk of research on the time course of parochial empathy consistently found a moderation of group membership on early but not

on late empathic processes (Contreras-Huerta et al., 2014; X. Han et al., 2016; Sheng et al., 2016; Sheng & Han, 2012).

This pattern of early rather than late processes showing differences may partly have emerged because most work on parochial empathy relied on racial stimuli, thereby contrasting less salient (ingroup faces) to more salient (outgroup faces) stimuli[3]. At the same time, some work suggests that early empathic processes could be influenced by more bottom-up processes (such as emotions and salience of a stimulus), whereas late empathic processes could be influenced by more top-down processes (such as motivation and decision-making; Codispoti et al., 2006; Olofsson et al., 2008). Therefore, in our work the activation of group membership through a textual cue combined with the use of identical stimuli for both the in- and outgroup may have engaged more top-down, cognitive processes (e.g., motivation) rather than bottom-up, affective processes (e.g., salience), leading to the bias in late empathic reactions we found. Interestingly, a recent study looking at the effect of sociocultural interactions on parochial empathy (Zhou et al., 2022) found that White participants who resided for a long (vs. short) time in China displayed less parochial empathy on late empathic processes when presented with Asian vs. Caucasian faces, although this effect was stronger on early compared to late empathic processes. The authors suggested that perceptual experiences could partially explain their findings, supporting our account regarding the role of stimuli salience. Likewise, Caspar and colleagues (2023) recently looked at parochial empathy by relying exclusively on same-race targets as participants (i.e., survivors vs. perpetrators of the Rwanda genocide) and observed parochial empathy on late cognitive processes just as we did. This is additional evidence in support for our explanation of top-down, cognitive processes driving effects on late components. Nonetheless, more work is warranted to clarify the role of stimuli salience on both early and late cognitive processes.

In a second study, we relied on a similar design but contrasted fictitious HCHW outgroup to LCLW outgroup targets. Contrary to our expectations, we did not find evidence that an outgroup's location in different quadrants moderates empathy. This is surprising in light of the large body of evidence showing that compared to other outgroup targets, observers display less empathy towards and attribute fewer mental states to LCLW targets (Batson et al., 2002; Cameron et al., 2016; Harris & Fiske, 2006, 2007, 2009, 2011; Moore-Berg et al., 2022; Tan & Harris, 2021). Taking our results at face value would suggest that membership in stigmatized outgroups does not lead to a reduction in observers' empathy. In addition, this would also imply that, if stereotypes and prejudice do not play a role in the modulation of empathy, parochial empathy is likely driven by extraordinary empathy for ingroup members. Having said this, we think that some features of our design, and specifically of the impression formation task, could also play a role in explaining our data.

Specifically, in Study 2, we relied on fictitious, newly created groups rather than existing groups. We did so with the goal of generalizing our results to all groups inhabiting the HCHW and LCLW quadrants. Although participants reported perceiving a strong difference in terms of competence, warmth, and status between both groups, it is reasonable

[3] Although the work by Granjon and colleagues (2023) do not rely on racial in- vs. outgroup targets, their stimuli consisted of faces associated with pictograms representing the concept of (absence of) disability. Therefore, one could argue that the presence of a disability pictogram during the presentation of the faces could prove to be a salient element.

to assume that such 'mere' descriptions of novel groups by means of competence- and warmth-related behaviours did not activate negative stereotypes and prejudice as strongly as existing LCLW groups do. Conversely, participants may have empathized to the same extent with the pain of both HCHW and LCLW group targets. However, we note that past work relying on the same methodology found that descriptions of novel groups in terms of competence and warmth can indeed instigate bias not only on traditional rating scales (Judd et al., 2005; Yzerbyt et al., 2008) but also on indirect (e.g., less controlled or more automatic) measures (Kervyn et al., 2009; Schmitz et al., 2024; Schmitz & Yzerbyt, 2022), rendering this explanation less likely.

Next to the strength of stereotypes activation, the type of stereotypes activated by our task may also play a role in explaining the lack of difference. That is, even though our impression formation task rests on behaviours clearly related to the ability and assertiveness facets of the competence dimension (see Abele et al., 2021 for a review on facets), behaviours related to the warmth dimension make clear references to a group's friendliness – but very few to a group's morality. This could have contributed to both groups being perceived as differing on three of the four facets of social perception, but as rather similar to each other on the morality facet. This is potentially important insofar as a group's morality is a strong predictor of disgust and dehumanization (Esses et al., 2008; Morera et al., 2018), and the perceived morality of targets seems to be an important driver of empathy (Brambilla & Riva, 2017; Decety et al., 2010; for a review see Wang et al., 2023). It might thus be that the impression formation task activated stereotypes, but that the lack of difference in morality led to the LCLW group not being perceived in a derogatory way to the same extent as observed in previous research (Cuddy et al., 2009; Eurobarometer, 2018; Harris & Fiske, 2011). A set of exploratory analyses on the manipulation check data provides some preliminary support for this possibility (for details, see the Supplementary Material). Indeed, the difference of morality between the HCHW and LCLW targets proved the smallest among all four facets, with this difference emerging as barely significant in the pre-PDT measurement. Future research replicating the current work should ensure that the morality facet is indeed fully manipulated as expected during the impression formation task.

Our work has a series of limitations. First, we changed both the type of groups as well as the presence or absence of an ingroup from Study 1 to Study 2, going from preexisting in- and outgroups to fictitious outgroups only. This choice was made to ensure that Study 1 was as similar as possible to previous work investigating parochial empathy. However, this makes the identification of the specific factors (if any) that precluded the emergence of the expected moderation in Study 2 somewhat more difficult. That is, the absence of moderation could be due to weak stereotypes as discussed above, but also due to the absence of an ingroup – if parochial empathy is indeed driven by an ingroup favouritism. One way to address this issue would be to replicate our first study, albeit relying on a full design involving fictitious HCHW ingroup vs. fictitious HCHW outgroup vs. fictitious LCLW outgroups.

A second limitation resides in the type of stimuli we relied on in both studies and their ecological validity, namely neutral faces being subjected to painful vs. painless stimulations. The work from Sun and colleagues (2017) showed that whereas facial expressions of pain or arms being penetrated by needles are perceived as truly painful

stimuli, neutral faces being penetrated by needles are perceived as conveying a somewhat fake pain, due to the implausibility of keeping a neutral expression while being subjected to painful stimulations. One way to circumvent this issue would be to replicate our findings relying on stimuli conveying true pain such as facial expressions of pain vs. neutral expressions (Avenanti et al., 2010; X. Han et al., 2016).

A third limitation of our work is that we did not measure participants' ingroup identification in Study 1. Indeed, although we exclusively recruited participants that purposefully chose psychology classes in their cursus, we cannot confirm that they indeed perceived psychologists as their ingroup. Future work should measure the sense of identification to the ingroup in order to ensure that the expected ingroup is indeed perceived as such. Finally, our data stems mostly from young participants from France and Belgium, with Study 2 comprising exclusively students. This typically constitutes a WEIRD sample (Henrich et al., 2010). Replicating our studies using a more diverse sample in terms of age or ethnicity would be important, as these factors might influence the expression of empathy (for reviews, see Jami et al., 2023; Jarvis et al., 2024).

Empathy is crucial in intergroup relations (Paluck et al., 2021). Past research on the time course of empathy at the intergroup level focused either on the so-called parochial empathy (S. Han, 2018) or Schadenfreude (Cikara & Van Bavel, 2014). Our work sought to investigate the open question of whether the strong derogation and dehumanization of low competence and low warmth (LCLW) targets could lead to observers displaying less neural empathy for such targets compared to other, non-stigmatized outgroup targets. In addition, we sought to shed light on whether ingroup favouritism or outgroup derogation drives parochial empathy. Our results show that membership in a LCLW (vs. HCHW) outgroup does not differentially moderate empathy. One account for this pattern is that participants perceived both groups as rather similar regarding morality. An alternative account is that parochial empathy is in fact driven by exceptional empathy for the ingroup. Clearly, more work is required on the role of specific outgroup membership on empathy to better understand the interrelation between intergroup relations and empathy unfolding.

Chapter 7.

Discussion

Chapter 7. Discussion

In this section, we start by detailing the rationale supporting the work we conducted throughout this doctoral thesis. We then summarize and discuss the findings and limitations of each empirical chapter individually. Next, we discuss our findings in a more integrative manner, by considering implications as well as multiple factors implicated in the (lack of) findings across all chapters. Finally, we discuss potential transversal limitations of our work.

1. Objectives of the thesis

One fundamental aspect of the human condition is that we are social beings. Indeed, evidence of human ancestors living in groups and developing cultures and norms peculiar to their group dates back millions of years (Pennisi, 2011). An important factor contributing to such development is the ability to take on the perspective of others and to empathize with them (A. Smith, 2006). But as our social brain developed, so did heuristics such as stereotypes to better cope with the myriad of information about different groups available (N. D. Todd, 2009). While the content of people's stereotypes can sometimes be positive (e.g., 'Belgians are nice people'), it more often is negative (e.g., 'Italians are disorganized') or downright derogatory (e.g., 'Polish are alcoholics'). In the early 2000s, Fiske and colleagues (2002) took a closer look at the content of group stereotypes and found that most of them could be organized in terms of two main dimensions, namely the competence and warmth dimensions, pertaining to groups' ability to carry out their intent and the direction of these intents (i.e., cooperation or competition), respectively. Subsequent research confirmed that these two main dimensions underlie the content of stereotypes across a vast number of cultures (Cuddy et al., 2009; Durante et al., 2013, 2017a), as captured by the Stereotype Content Model (SCM; Cuddy et al., 2008).

The SCM posits that both dimensions can be conceptualized as orthogonal, leading to a four-quadrant space in which all social groups can be located as a function of their perceived competence or warmth (Cuddy et al., 2007). Whereas some groups are stereotypically described as high (HCHW; e.g., ingroup members such as our friends) or low (LCLW; e.g., drug addicts) on both dimensions, most groups are described by a combination of high competence and low warmth (HCLW; e.g., bankers) or low competence and high warmth (LCHW; e.g., disabled people). Importantly, membership in specific quadrants goes well beyond a simple description in terms of competence and warmth. Indeed, the past two decades of work on the SCM made clear that perceiving a group to belong in a specific quadrant influences a vast array of processes on the observers' part (Fiske, 2015, 2018). For example, people report feeling different emotions as a function of targets' membership in groups belonging to different quadrants: they tend to predominantly feel pride towards HCHW targets, envy towards HCLW targets, pity towards LCHW targets, and disgust towards LCLW targets. Moreover, group stereotypes are related to behavioural tendencies, with high (low) competence triggering passive facilitation (harm) and high (low) warmth triggering active facilitation (harm). These

examples of emotional reactions and behavioural tendencies point towards a striking conclusion: groups inhabiting the LCLW quadrant seem to be victims of a strong derogatory perception, trigger feelings of disgust in observers, and are the subject of both active and passive harm.

Indeed, the bulk of the work on the LCLW quadrant attests to the observation that, contrary to the three other quadrants, membership in this quadrant entails being stigmatized and even dehumanized (Boyd, 2002; Bruneau et al., 2018a, 2018b; Corrigan et al., 2009; Cozzarelli et al., 2001; Lott, 2002; Tan & Harris, 2021; Vaes & Paladino, 2010; Valtorta et al., 2019, to cite but a few research on the topic). For example, several findings converge in suggesting that people display a reduced – or even a lack of – attribution of mind to LCLW compared to other social targets, both on self-report (Cameron et al., 2016) and neural measures (Harris & Fiske, 2006, 2007, 2009, 2011). Not surprisingly then, especially LCLW quadrant groups are often victims of latent discrimination or even blatant aggressive behaviours, and are generally considered as outcasts (Kilian et al., 2021; Masson, 2014; Valtorta et al., 2024; Vaswani & Esses, 2021). The negative outcomes associated with belonging to a group in the LCLW quadrant do not merely stem from a direct relation with observers. Indeed, a large body of evidence shows that the feeling of being stigmatized negatively influences physical and psychological health (Frost, 2011; Kulesza, 2013; Panza et al., 2019; Reilly et al., 2022).

The above findings suggest that observers lack feelings of empathy towards LCLW targets. However, in our opinion, past research on this issue is limited, for example by the fact that a significant part of research conducted on the issue focused exclusively on empathy towards ethnic minorities (e.g., Black people or immigrants), preventing the generalization to other LCLW targets. Another limitation lies in the fact that much research relying on self-report measurements either looked at outcomes of empathy rather than empathy *per se* (e.g., support for immigration policies, Miklikowska, 2018), or relied on a single-question measurement of empathy (e.g., 'how would you feel?', Gross & Wronski, 2021; Sirin et al., 2016a, 2016b), failing to capitalize on the more complex nature of empathy and the various ways of measuring it (Eklund & Meranius, 2021). Finally, past efforts looking at empathy beyond self-report measurements suffer a further important limitation in the sense that they often investigate the parochial empathy phenomenon (i.e., higher empathy towards ingroup compared to outgroup members), thereby comparing LCLW targets to ingroup targets (e.g., Sheng & Han, 2012; Simpson & Todd, 2017). Relying on such an in- *vs*. outgroup design makes it difficult to conclude whether the observed difference in empathy stems from the derogatory perception of LCLW group members, a derogatory perception of outgroups in general, or rather from an excess of empathy towards the ingroup. To the best of our knowledge, only a handful of studies contrasted LCLW targets with targets from other quadrants. First, Cikara and Fiske (2012) presented participants with pictures of targets from the four SCM quadrants. In each trial, the target was described as going through a positive, neutral, or negative event, and participants answered the questions "How good (bad) would this make you feel?". The authors found that for negative events, participants reported feeling most empathic towards LCHW targets, followed by HCHW and LCLW targets at similar levels, with participants reporting feeling the least empathic towards HCLW targets. Relying on a comparable design, Aue and colleagues (2021) recently found similar results: people reported feeling most empathic for LCHW and the least empathic for HCLW targets, with HCHW and

LCLW targets falling in the middle. However, when answering the question "How bad do you think this person feels?", participants reported that the LCLW targets would feel the least bad. Taken together, these findings suggest that observers could prove the least empathic towards LCLW but that this reduced empathy may depend on the specific aspect of empathy measured (e.g. in the above work, when imagining how bad others would feel).

These findings and the scarce research comparing empathy towards targets from different groups highlight the importance of going beyond an ingroup *vs.* outgroup approach in investigating intergroup empathy by considering whether membership in specific SCM quadrants is related to different levels of observers' empathy. Moreover, we deem it important to consider a larger variety of operationalization of empathy, rather than simply relying on answers to the question of how bad observers would feel – which could tap into emotional contagion, perspective taking, or even personal distress. Expanding the literature on this matter is all the more important considering the crucial role of empathy in intergroup relations (A. R. Todd & Galinsky, 2014). Decades of work clearly show that empathy is a strong antecedent of positive intergroup relations, mediating the well-established positive relation between intergroup contact and improved attitudes towards stigmatized outgroups (Banas et al., 2020; Borinca et al., 2023; Hayward et al., 2017; Johnston & Glasford, 2018; Paluck et al., 2021; Pettigrew & Tropp, 2008). In addition, empathy is also positively related to people showing prosocial behaviours such as helping or donating to stigmatized outgroups (Batson et al., 2002; Decety et al., 2016; Shih et al., 2009), as well as reduced intergroup aggressions (Eisenberg et al., 2010; Nesdale et al., 2009). If observers indeed display less empathy towards LCLW targets compared to targets stemming from the three other SCM quadrants, this would make interventions fostering empathy all the more important when seeking to reduce stigmatization and discrimination towards these groups.

2. Discussion of the findings

2.1. Summary of the findings

In this thesis, we presented three empirical chapters (Chapters 4, 5, and 6) exploring whether observers would display less empathy towards LCLW quadrant groups than towards other quadrant groups. To examine this question, we relied on three distinct approaches to measure different components of empathy, going from most to least direct and controllable approach. In this section, we summarize the rationale, designs, and findings of our studies. We also discuss factors related to these specific approaches that could underlie our results.

In Chapter 4, we investigated the role of cognitive cost in the motivation to empathize with a LCLW *vs.* other social targets. Indeed, past research made clear that empathy is a motivated phenomenon, with many factors influencing observers' motivation to empathize with a target (see Zaki, 2014). Recently, Cameron and colleagues (Cameron et al., 2019) demonstrated that empathy entails a cognitive cost in and of itself, and that this perceived cognitive cost leads people to prefer avoiding empathy when there is no reward associated with being empathic. Based on the literature pertaining to the stigmatization of LCLW quadrant groups, we hypothesized that people would perceive empathizing with a LCLW target (*vs.* targets from another quadrant) as cognitively more costly, due to the effort

required to re-humanize and attribute a mind to the target. In turn, this should lead to observers choosing to empathize the least with LCLW targets. We investigated this hypothesis in a series of five experiments (four in the main text and one as supplementary material) relying on the Empathy Selection Task (Cameron et al., 2019), in which participants choose between describing (e.g., facial traits) *vs*. empathizing with a target. We additionally measured their perceived cognitive cost of describing and empathizing with targets.

In Studies 1 to 3, we asked people to choose repeatedly whether they wanted to describe *vs*. empathize with a target. Crucially, the targets belonged either to the LCLW quadrant or to one of the three remaining quadrants (i.e., HCHW, HCLW, LCLW). We replicated previous findings that people generally prefer to describe targets rather than to empathize with them, due to them perceiving a higher cognitive cost of empathy. However, there was no difference in choice nor in perceived cognitive cost as a function of targets' quadrant group membership. In Study 4, we contrasted LCLW with HCHW targets but this time we added a condition in which the choice (describe *vs*. empathize) was imposed rather than chosen by participants. This change was made to prevent participants from focusing on the difference between describing *vs*. empathizing and rather direct their focus on the difference between targets' outgroups. As in our previous studies, observers reported higher perceived cognitive cost when empathizing with compared to describing targets, but this difference was again not qualified by targets' quadrant group membership. Overall, these results suggest that empathizing with a LCLW target does not entail higher perceived cognitive costs compared to other social targets. Having said this, a series of factors might be responsible for our results not supporting our hypotheses. For example, the EST is not safe from a social desirability bias, and a willingness to appear non-discriminant and empathic may have driven participants to report identical levels of perceived cognitive costs for all social targets. Second, without any additional elements of context or visual cues conveying stereotypes, targets' social group may prove irrelevant when imagining what these targets feel based on their facial expressions. Future research relying on the EST should clarify the role of social desirability and context.

In Chapter 5, we looked at a purely cognitive facet of empathy, namely visual perspective taking (VPT). VPT is defined as the ability to adopt a target's viewpoint in the literal sense, namely imagining what a target sees (Cole et al., 2020). Classically, researchers consider that this ability entails two sub-components called Level-1 (L1-VPT) and Level-2 (L2-VPT), which entail observers' ability to understand *if* a target sees an object and *how* a target sees an object, respectively (for a discussion on whether these levels are part of two independent systems or rather stems from a single process, see Westra, 2017). Direct VPT takes place when observers adopt the perspective of the target on purpose. Interestingly, indirect VPT also occurs under certain conditions, as illustrated by the intrusion of a target's differing point of view when performing a task even though the target's point of view is not relevant to the task at hand. VPT has been shown to be influenced by several factors, with one of them being the in- *vs*. outgroup membership of targets (H. J. Ferguson et al., 2018; Simpson & Todd, 2017). However, past research never went past looking at parochial empathy by contrasting targets stemming from multiple different outgroups. This empirical chapter describes our work aiming to do so by investigating whether especially membership in LCLW quadrant (vs. other quadrant) groups would hinder observers' direct L2-VPT in terms of them showing a reduced

efficiency to adopt the target's perspective. Of note, an alternative hypothesis could be made, as kindly pointed out by a member of my jury. Indeed, some research showed that facing dissimilar targets or inducing a self-other differentiation mindset leads to higher degrees of perspective taking (Damen et al., 2019; Sassenrath et al., 2014; A. R. Todd et al., 2011, for a review see A. R. Todd & Tamir, 2024). One may thus argue that LCLW targets are perceived as the most dissimilar targets compared to targets in other quadrants, thereby leading to higher degrees of perspective taking. Fortunately, our statistical procedure set out to test both hypotheses at once.

To investigate our main hypothesis, in a series of six experiments (four in the main text and two as supplementary material) we relied on a well-known L2-VPT task from Surtees and colleagues (2012, 2016). Across all studies, we replicated their previous findings regarding the presence of an egocentric bias, that is participants being less efficient in adopting targets' perspective when they and targets did not perceive the stimulus the same way. Additionally, we also found support regarding the presence of an altercentric bias, that is participants being less efficient to answer from their own point of view when they and targets did not perceive the stimulus the same way. However, we consistently failed to find the expected moderation of L2-VPT by targets' quadrant group membership. Taken together, these findings suggest that membership in the LCLW quadrant does not influence observers' VPT abilities more negatively than membership in other quadrant groups. Such null findings are all the more surprising when considering that the opposite hypothesis is also supported by some literature (i.e., higher degrees of perspective taking for LCLW targets due to a higher perceived dissimilarity). Above and beyond methodological limitations such as the low ecological validity of our stimuli, these results could also be explained by observers not actually adopting targets' perspective, thereby rendering targets' characteristics irrelevant (Westra, 2017). That is, participants may have relied on their previous knowledge about the stimuli to answer rather than adopting the target's perspective, due to the stimuli being too familiar (i.e., numerals). In addition, some authors argued that VPT itself does not actually involve taking the perspective of a target, but rather following simple attentional cues such as gaze or posture (Heyes, 2014), thereby rendering targets' outgroup membership irrelevant.

In Chapter 6, we looked at whether membership in a LCLW group would influence the time course of observers' brain activity related to their empathy for pain by means of an electroencephalogram. Research on this time course showed that witnessing a target in pain triggers higher brain activation than seeing a target not subjected to pain (De Vignemont & Singer, 2006). Several studies looked at the influence of in- *vs.* outgroup membership on this time course and consistently showed a parochial empathy at play (Han, 2018). We wanted to investigate the potential differential role of targets being members of groups in the LCLW vs other quadrants on observers' brain activity related to their empathy for pain.

In a first study, we aimed at replicating the parochial empathy pattern observed in the literature by relying on clearly defined HCHW (psychologists) in- and LCLW (alcoholics) outgroup targets. As expected, we observed parochial empathy for others' pain, with observers displaying more empathy for HCHW ingroup compared to LCLW outgroup targets: They showed a greater difference in brain activity for painful *vs.* painless trials when witnessing HCHW targets in pain compared to LCLW targets. Interestingly, we observed this difference on the later P3 component of empathy, theorized to be associated

with more top-down processes such as motivation (Codispoti et al., 2006; Granjon et al., 2023; Olofsson et al., 2008). In a second study, we relied again on targets from HCHW *vs*. LCLW groups – with the difference being that both groups were fictitious outgroups. Contrary to our hypotheses, we did not observe a moderation of empathy for pain as a function of target group membership, suggesting that empathy for pain is not differentially influenced by outgroups' quadrant position. However, such results could also be due to the fact that we relied on newly created fictitious groups through an impression formation task. Such fictitious group may not activate negative stereotypes and derogatory judgments as strongly as existing LCLW groups do, thereby leading to similar degrees of empathy for pain across both groups. In addition, we relied on stimuli that can somewhat be considered implausible (i.e., targets submitted to painful stimulations while keeping a neutral expression). Previous work suggested that such stimuli may trigger lower activations of the N2-N3 and P3 components compared to more plausible stimuli, that is, facial expressions of pain or pictures of arms subjected to painful stimulation (Sun et al., 2017).

2.2. What can we conclude from these findings?

Across all our studies, which explored different components of empathy relying on multiple methodologies, we did not find evidence of a moderation of empathy by targets' membership in outgroups from different quadrants. Making sense of null findings always proves a difficult task, particularly when past work strongly supports our hypotheses. Indeed, a variety of factors could account for the lack of moderation in our results. In this section, we discuss what information we can extract from our findings in an integrative way and propose a selected set of factors that we consider the most relevant in explaining the lack of moderation in our results across all studies and methodologies. When possible, we will also detail how future research could address these factors.

First, we pointed out throughout this thesis that most of the efforts investigating intergroup empathy focused on the parochial empathy phenomenon (e.g., Behler & Berry, 2022; Fourie et al., 2017; Han, 2018; Molenberghs, 2013; Molenberghs & Louis, 2018; Stürmer & Snyder, 2009). However, an important limitation of this past work lies in the fact that it did not additionally include in the design control or 'neutral' groups, rendering impossible to identify whether parochial empathy is driven by an unusually high level of empathy towards the ingroup or rather stems from strong prejudice towards the outgroup reducing empathy for the latter. If this parochial empathy finds its origin in outgroup derogation, one would expect that the more a group is negatively perceived, the less observers will empathize with members of this group – regardless of the presence of an ingroup. Put differently, if there was a clear relation between (different levels of) derogatory perceptions and attitudes towards outgroups and empathy, we probably should have found evidence for this in our work – in the form of lowest levels of empathy towards targets from LCLW quadrant groups. Not only was this not the case, but the only significant moderation of empathy by targets' social group membership we observed emerged when we relied on an ingroup *vs*. outgroup design (Chapter 6, Study 1). In our opinion, this suggests that ingroup preference drives parochial empathy. Having said this, our studies likewise lacked control conditions that would have allowed us to confidently support this stance. Future research on the topic could contrast HCHW ingroup *vs*. HCHW outgroup *vs*. LCLW outgroup targets to look at the processes driving parochial empathy in a more fine-grained manner.

Turning to factors underlying the lack of support for our hypotheses, one clear possibility is that the expected reduced empathy towards LCLW group members simply does not exist or is significantly smaller than anticipated to the point of not being relevant. This being said, most researchers agree that 'absence of evidence is not evidence of absence' (authorship of this quote remains debated, see quoteresearch, 2019). One way to gather more information on this front would be to rely on complementary statistical tools, such as performing equivalent testing (i.e., testing whether our effects are smaller than our effect size of interest and thus neglectable; see Lakens & Delacre, 2020). Another set of statistical tools that could prove useful would be Bayesian testing, as it allows for computing the probability of the null hypothesis proving true. Assuming such a radical conclusion and the purely methodological and statistical factors that could substantiate it are not warranted, there are indeed a series of methodological and theoretical considerations that could account for the absence of support for our hypotheses. We discuss them in the following sections.

First, one important issue resides in the way we relied on the Stereotype Content Model (Fiske et al., 2002). At its core, the SCM posits that stereotypes' content can be described by means of two important dimensions, i.e., competence and warmth. We conducted our research within this framework, defining LCLW groups as lacking both competence and warmth. However, recent research on the topic of social perception makes increasingly clear that these two dimensions can be conceptualized as comprising two facets each, namely the ability and assertiveness facets for the competence dimension on the one hand (Carrier et al., 2014; Yzerbyt et al., 2022), as well as the sociability and morality facets for the warmth dimensions on the other hand (Abele et al., 2016, 2021; Carrier et al., 2023). In the same vein, Leach and colleagues (2015) argued that rather than partitioning the competence-by-warmth space into four quadrants, a circumplex model of the SCM would prove more fitting to explain the whole range of group stereotyping. According to these authors, groups located in different quadrants do not merely differ on competence and warmth, but rather vary on a series of more complex characteristics that modulate their associated stereotypes (e.g., prestige, strength, trustworthiness, or peacefulness). Research relying on this more fine-grained approach showed that facets indeed play distinctive roles in various processes, including dehumanization and empathy. For instance, the morality and assertiveness facets seem strongly related to the dehumanization of social targets (Formanowicz, 2023). In addition, a recent review from Wang and colleagues (2023) stresses the role of a target's perceived morality in empathy, making it clear that the less a target is perceived as moral, the less observers display empathy towards them. This argument nicely dovetails with the literature on Schadenfreude showing that morality plays a stronger role than sociability and ability in explaining reduced empathy and increased counter-empathy towards competitive targets (Brambilla & Riva, 2017). It is thus possible that by focusing solely on differences between groups in terms of competence and warmth, we failed to consider presumably more relevant factors contributing to dehumanization and empathy such as targets' morality. We find partial support for this argument in the supplementary analyses of our manipulation check of the second study of Chapter 6, in which we relied on an impression formation task to convey a perception of HCHW and LCLW outgroups. Although the difference between both fictitious outgroups proved quite large when looking at the data in terms of competence and warmth, analysing the data at the facet-level highlighted that the perceived difference in morality emerged barely significant

and much smaller than the differences on all three other facets. We think that one strength of this doctoral dissertation resides in the fact that we relied on a variety of social groups associated with the four quadrants, ranging from groups classically used in the SCM (e.g., homeless people or bankers) to professions (e.g., garbage collectors or paediatricians), thereby ensuring a wider range of perceptions, including perceptions of morality. Still, future research should take into considerations more fine-grained distinctions by considering the facets and investigating their role in dehumanization and empathy.

Second, a point of discussion concerns the absence of costs in empathizing with targets in our studies. Interestingly, work from Cameron and colleagues (2016) showed that anticipated emotional exhaustion due to such interactions or behaviours is a partial mediator of the relation between stigma and mind attribution. In all our studies, participants never had to interact with targets, nor did we ask them to engage in prosocial behaviours involving targets. Thus, it is likely that participants never believed that they would have to interact in any way with the targets, given the low ecological validity of the tasks that we used (e.g., absence of a real target in the lab or online studies). In turn, because no interaction was expected, it may be that participants did not anticipate emotional exhaustion when empathizing, leading to a higher mind attribution to LCLW targets than predicted and resulting in similar degrees of empathy towards LCLW and other targets.

A final and admittedly less obvious factor may be at work that might explain our failure to find reduced empathy towards LCLW quadrant targets. Specifically, the absence of moderation by targets' quadrant group membership could be linked to variations in general levels of empathy in the population over the years. Indeed, a meta-analysis from Konrath and colleagues (2011) looked at individuals' levels of empathy (as measured through the Empathic Concern and Perspective taking subscales of the Interpersonal Reactivity Index, Davis, 1983) from 1979 to 2009. These authors highlighted the fact that empathy started to drop from 1979 onwards and plummeted around 2000, reaching an all-time low by 2009. This coincides with the publication of a certain number of studies showing that membership in LCLW quadrant groups entails harsh negative perceptions and dehumanization (e.g., Cikara et al., 2010; Cuddy et al., 2007, 2009; Fiske et al., 2002; Harris & Fiske, 2006, 2007, 2009, 2011). Interestingly, in an updated meta-analysis considering more recent datasets up until 2018, Konrath and colleagues (2023) found that since 2009, individual levels of empathy have risen again – to the point of equating 1970s levels in the recent years. Such an increase can also be observed regarding the frequency of people engaging in prosocial behaviours such as donating or volunteering (Helliwell et al., 2023). Although it is difficult to confirm, some authors suggested that relatively recent important events (e.g., Great Recession of 2008, COVID-19 pandemic, war in Ukraine) contributed to this increase in peoples' empathy. As such, these recent higher levels of empathy could have played a role in eradicating the differences between LCLW *vs*. other quadrant targets. Still, we do not believe that this rise in the general level of empathy offers a satisfactory account for the absence of moderation in our work. Indeed, looking at more recent data (Eurobarometer, 2018) as well as press articles (BX1, 2023; Gautier, 2023; Médecins Sans Frontières, 2024), we believe that LCLW group members continue to be considered as outcasts and dehumanized.

2.3. Limitations and future work

Despite our best efforts to investigate our hypotheses in the most precise and controlled manner, some limitations need to be acknowledged. First, we investigated our hypotheses using three different strategies (i.e., perceived cognitive cost of empathizing and mentalizing; visual perspective taking; neural indicators of empathy for others in pain). Nonetheless, this represents only a portion of processes included under the umbrella term 'empathy' (Batson, 2009; Eklund & Meranius, 2021), and, consequently, only a fraction of possible measures. As such, it is difficult to generalize our results across the bulk of concepts constitutive of empathy. Whilst our work constitutes a first step in going beyond parochial empathy, future research should adopt a similar approach as many other areas of research in empathy could also benefit from looking beyond parochial empathy.

Secondly, we relied on (pretested) LCLW targets based on past work highlighting that people dehumanize members of such groups (Fiske, 2015; Harris & Fiske, 2011). However, we never formally measured whether participants indeed dehumanized LCLW targets in our experiments. It could very well be that the absence of differences in empathy as a function of the target's social group simply stems from participants resisting to dehumanize LCLW targets and displaying identical levels of mind attribution to targets from the different quadrants. Unfortunately, we do not have data that would allow us to support or refute this account. We thus recommend that future research actually measures whether LCLW targets are indeed perceived in a dehumanized way. This could be done for instance by relying on measurements of blatant dehumanization such as the 'ascent of humans', in which participants must locate various social groups on an 'evolution' scale ranging from quadrupedal human ancestors to modern-day humans (e.g., Kteily & Bruneau, 2017). However, we would rather recommend relying on more subtle forms of dehumanisation, such as assessing participants' responses on the Mind Scale (Gray et al., 2007) in which participants assign a variety of mental states related to either agency (e.g., self-control or planning) or experience (e.g., hunger or desire) to various targets. Ideally, such self-reported data would be enriched by data from less controllable measures, such as fMRI data.

Thirdly, we failed to exploit textual data collected in Chapter 4 due to time constraints. Indeed, the Empathy Selection Task requires participants to choose between describing the physical appearance of a target and trying and feel what the target is feeling. After each choice, participants must perform the task they selected by writing a few words or sentences. Even though these written productions were not part of our hypotheses and merely served as a way to ensure that each choice entailed some cognitive cost, past research showed that written or oral productions are a powerful tool to investigate people's perception of social targets (Markowitz, 2022; Mendelsohn, 2020). For instance, it could be that participants did not differ in their perceived cognitive cost of empathizing with LCLW *vs.* other social targets because they crafted less detailed – thus less costly – descriptions of LCLW targets' emotions. Additionally, looking at these written productions could serve as a means to verify whether participants perceived LCLW in a dehumanized way, as research shows that people attribute fewer secondary emotions to dehumanized targets (Leyens et al., 2000; Martinez et al., 2024). If we do not have the opportunity to look more closely at these data in the near future, we hope that our Open Science approach to research (i.e., openly sharing data) will allow interested researchers to explore these possibilities.

Finally, a fourth, sadly classic yet important, limitation of this thesis has to do with our reliance on WEIRD samples (Henrich et al., 2010), and more specifically psychology students. Although this can be considered as a general limitation in terms of the difficulty of generalization, this aspect may prove particularly critical to take into consideration in this thesis. That is, a portion of our data (Studies 1-2 from Chapter 5 and Study 1 from Chapter 6) originates from French-speaking psychology students, and this poses two challenges. First, students following a psychology major generally display higher levels of empathy than students following other majors (Bahri & Chakravarty, 2023). Importantly, this difference in empathy is not merely the result of following what could be considered an empathy-inducing cursus but rather seems to drive the desire to enrol in such cursus, thereby suggesting that psychology students already display higher levels of empathy in their first year of university (Harton & Lyons, 2003). In other words, collecting data from first- or second-year students – as we did in our studies – does not overcome this issue. Second, the academic world has a reputation of being situated on the left of the ideological (and by extension political) spectrum, going as far as having the French Minister of Education stating that the *islamo-gauchisme* in academic research should be investigated (Zappi et al., 2021). Although we do not share such an extreme (and we dare say unsubstantiated) point of view, it does seem that the academic world – and in particular psychology – lean towards *leftist* ideologies and present lower levels of Social Dominance Orientation (Abrams, 2017; Dambrun et al., 2002, 2009, but see Denzler & Wolter, 2018). It could thus be that psychology students do not buy into the derogatory views of LCLW quadrant groups, being keen to express comparable levels of empathy for all social targets. To be sure, we collected the rest of our data either through online platforms (i.e., Prolific Academic) or through advertisement of our studies on public Facebook groups, broadening the range of participants' profiles beyond exclusively (psychology) students. In addition, political orientation never interacted with our data when performing exploratory analyses. Nevertheless, it is clear in our opinion that future research should rely on more diverse samples to prevent potential shortcomings and allow for a better generalization of findings.

Conclusion

Conclusion

A striking observation one can make about past research on intergroup empathy is the lack of focus on the differential role of outgroups' characteristics. This is most surprizing because membership in one or another outgroup can imply very different outcomes regarding various processes. Building on extensive research on the Stereotype Content Model (Cuddy et al., 2007, 2009; Fiske et al., 2002) highlighting the dehumanized perception of groups low in competence and also low in warmth (LCLW) and the lack of mind attribution to members of such groups (Cikara et al., 2010; Harris & Fiske, 2006, 2011), we hypothesized that membership in LCLW groups would be related to lower levels of empathy. In a set of 13 studies, we set out to test these hypotheses by means of multiple methodologies investigating empathy with groups of different SCM quadrants using three different approaches. Across all studies, we did not find evidence for the expected moderation of empathy by targets' quadrant group membership. We nonetheless believe that our findings contribute in a meaningful way to the literature, by opening new avenues for refining research on intergroup empathy.

Specifically, we think that this doctoral thesis should encourage researchers to not simply focus on *whether* observers display less empathy towards LCLW quadrant targets, but rather to start focusing on *which* LCLW targets are related to lower levels of empathy. Indeed, throughout this dissertation we criticized the focus of past research on parochial empathy and aimed at going beyond this distinction by looking at specific identities of outgroups. In light of our results, we encourage researchers to go beyond a simple competence and warmth distinction and to investigate the role of facets (such as perceived morality) on empathy. Identifying key factors underlying (the absence of) empathy towards dehumanized groups is essential, not least because this would allow for interventions to target these specific factors rather than trying to bolster empathy in an undiscriminating way. For instance, if empathy proves to be strongly dependent on a target's perceived morality, interventions aiming at improving observers' perception of a target as being moral could prove way more efficient at improving intergroup relations than classic empathy-inducing interventions.

To conclude, our work makes it clear that the relation between membership in LCLW quadrant groups and empathy is not as straightforward as one could hypothesize, and that more work on this issue is warranted.

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Supplementary Material

Supplementary Material

1. Chapter 4 – Supplementary material 1

Of note, the distribution of our samples on both SDO and political orientation is right-skewed across all our experiments. We therefore report the secondary analyses involving these variables for interested readers, but call to err on the side of caution regarding their reliability.

1.1. Experiment 1 – Additional analyses

1.1.1. Method

Power calculations. We computed our power analysis to detect the Quadrant (Q) x Type of Deck (D) interaction, with participants (P) as random factor and 4 replicates. Var(error) was set at 0.5 and var(P*D) was set at 0.167.

1.1.2. Results

Moderation of Task Choice by Social Dominance and Political orientation. To investigate the effect of Social Dominance Orientation (SDO), we performed a logistic linear mixed model with Task Choice as our binary dependent variable (0=*Describe* task; 1=*Feel* task), Quadrant (LCLW vs. HCLW) as within-participant factor, SDO as a centred continuous variable, their interaction, and participants and stimuli as random factors. The model intercept proved significant, Odds Ratio (*OR*)=0.39, *z*=-4.74, *p*<.001. No other effect or interaction emerged significant, all *z*s<-0.97, all *p*s>.330.

To investigate the effect of Political Orientation, we performed a logistic linear mixed model with Task Choice as our binary dependent variable (0=*Describe* task; 1=*Feel* task), Quadrant (LCLW vs. HCLW) as within-participant factors, Political Orientation as a centred continuous variable, their interaction, and participants and stimuli as random factors. The model intercept proved significant, Odds Ratio (*OR*)=0.39, *z*=-4.83, *p*<.001. No other effect nor any interaction emerged significant, all *z*s<-1.26, all *p*s>.208.

Moderation of Task Choice by Valence of affect. To investigate the effect of target's valence of affect, we performed a logistic linear mixed model with Task Choice as our binary dependent variable (0=*Describe* task; 1=*Feel* task), Valence of affect (Positive vs. Negative) and Quadrant (LCLW vs. HCLW) as within-participant factors, their interaction, and participants and stimuli as random factors. The model intercept proved significant, Odds Ratio (*OR*)=0.39, *z*=-4.73, *p*<.001. There was a main effect of Valence of affect, Odds Ratio (*OR*)=1.29, *z*=3.07, *p*=.002, suggesting that participants were more likely to choose the *Feel* task when the target displayed a negative compared to a positive emotion. No other main effect nor interaction emerged significant, all *z*s<-0.675, all *p*s>.499.

Moderation of Task Choice by Time. Due to the programming of the task, we could not collect the trials' position. Therefore, we could not perform this analysis for Experiment 1.

NASA Task Load Index. Relying on a different but complementary way to investigate our second hypothesis, we performed a mixed model analysis by regressing NASA Task Load Index scores on a set of Helmet contrasts, with C1 being our contrast of interest and comparing cognitive costs in the *Feel* task for LCLW targets to all other cells, C2 comparing cognitive costs for in the *Feel* task for HCLW targets to the mean of *Describe* task for both LCLW and HCLW targets, and C3 comparing cognitive costs in the *Describe* task for LCLW to *Describe* task for the HCLW targets. We included participants as random factor. There was a significant main effect of C1, $F(1, 186.50)=4.35$, $p=.038$, $\eta_p^2=.009$, suggesting that participants perceived higher cognitive costs when performing the *Feel* task for the LCLW compared to the average perceived cognitive costs of all other scenarios. This effect never emerged again in subsequent experiments. No other contrast was significant, all Fs<1.60, ps>.206.

Moderation of cognitive costs by Social Dominance and Political orientation. To investigate the effect of Social Dominance Orientation (SDO), we submitted the scores on the NASA Task Load Index to a 2 (Quadrant: LCLW vs. HCLW) x 2 (Type of task: *Describe* vs. *Feel*) mixed model analysis, with both factors varying within participants, SDO as a centred continuous variable and participants as random factor. There was a significant main effect of Type of task, $F(1, 556)=8.66$, $p=.003$, $\eta_p^2=.011$, but no other main effect nor interaction emerged significant, all Fs<3.57, ps>.063.

To investigate the effect of Political Orientation, we submitted the scores on the NASA Task Load Index to a 2 (Quadrant: LCLW vs. HCLW) x 2 (Type of task: *Describe* vs. *Feel*) mixed model analysis, with both factors varying within participants, Political Orientation as a continuous variable and participants as random factor. There was a significant main effect of Type of task, $F(1, 556)=8.36$, $p=.004$, $\eta_p^2=.011$. There was also a significant three-way interaction, $F(1, 556)=4.10$, $p=.043$, $\eta_p^2=.005$. However, no significant two-way interaction emerged when decomposing this three-way interaction, all Fs<3.82, ps>.053.

NASA Task Load Index – Effort subscale. we submitted the scores on the NASA Task Load Index Effort subscale to a 2 (Quadrant: LCLW vs. HCLW) x 2 (Type of task: *Describe* vs. *Feel*) mixed model analysis, with both factors varying within participants and participants as random factor. There was a main effect of Type of task, $F(1, 238)=3.93$, $p=.049$, $\eta_p^2=.009$. There was no main effect of Quadrant nor any interaction, all Fs<2.70, ps>.102.

NASA Task Load Index – Aversion subscale. we submitted the scores on the NASA Task Load Index Aversion subscale to a 2 (Quadrant: LCLW vs. HCLW) x 2 (Type of task: *Describe* vs. *Feel*) mixed model analysis, with both factors varying within participants and participants as random factor. No effect nor any interaction was significant, all Fs<1.10, ps>.298.

NASA Task Load Index – Efficacy subscale. we submitted the scores on the NASA Task Load Index Efficacy subscale to a 2 (Quadrant: LCLW vs. HCLW) x 2 (Type of task: *Describe* vs. *Feel*) mixed model analysis, with both factors varying within participants and participants as random factor. There was a main effect of Type of task, $F(1, 78)=10.11$,

p=.002, η_p^2=.046, indicating that participants perceived the *Feel* task as cognitively more demanding than the *Describe* task, regardless of the target's social group. There was no main effect of Quadrant nor any interaction, all Fs<0.50, ps>.482.

1.2. Experiment 2 – Additional analyses

1.2.1. Method

Power calculations. We computed our power analysis to detect the Quadrant (Q) x Type of Deck (D) interaction, with participants (P) as random factor and 24 replicates. Var(error) was set at 0.333 and var(P*Q*D) was set at 0.083.

1.2.2. Results

Moderation of Task Choice by Social Dominance and Political orientation. To investigate the effect of Social Dominance Orientation (SDO), we performed a logistic linear mixed model with Task Choice as our binary dependent variable (0=*Describe* task; 1=*Feel* task), Quadrant (LCLW vs. HCHW) as within-participant factor, SDO as a centred continuous variable, their interaction, and participants and stimuli as random factors. The intercept proved significant, *OR*=0.37, *z*=-5.63, *p*<.001, suggesting that participants were more likely to choose the *Describe* task compared to the *Feel* task. No other effect or interaction emerged significant, all *z*s<-1.60, all *p*s>.109.

To investigate the effect of Political Orientation, we performed a logistic linear mixed model with Task Choice as our binary dependent variable (0=*Describe* task; 1=*Feel* task), Quadrant (LCLW vs. HCHW) as within-participant factors, Political Orientation as a centred continuous variable, their interaction, and participants and stimuli as random factors. The intercept proved significant, *OR*=0.37, *z*=-5.68, *p*<.001. No other effect or interaction emerged significant, all *z*s<-1.91, all *p*s>.055.

Moderation of Task Choice by Valence of affect. To investigate the effect of target's valence of affect, we performed a logistic linear mixed model with Task Choice as our binary dependent variable (0=*Describe* task; 1=*Feel* task), Valence of affect (Positive vs. Negative) and Quadrant (LCLW vs. HCHW) as within-participant factors, their interaction, and participants and stimuli as random factors. The model intercept proved significant, Odds Ratio (*OR*)=0.36, *z*=-5.57, *p*<.001. No other main effect nor interaction emerged significant, all *z*s<-0.20, all *p*s>.842.

Moderation of Task Choice by Time. To investigate the effect of time (operationalized as trial number), we regressed Task Choice (0=*Describe* task; 1=*Feel* task) on Time, with participants and stimuli as random factors. The model intercept proved significant, Odds Ratio (*OR*)=0.39, *z*=-4.96, *p*<.001. However, there was no effect of Time, Odds Ratio (*OR*)=1.00, *z*=-1.03, *p*=.304.

NASA Task Load Index. Relying on a different but complementary way to investigate our second hypothesis, we performed a mixed model analysis by regressing NASA Task Load Index scores on a set of Helmet contrasts, with C1 being our contrast of interest and comparing cognitive costs in the *Feel* task for LCLW targets to all other cells, C2 comparing cognitive costs for in the *Feel* task for HCHW targets to the mean of *Describe* task for both LCLW and HCHW targets, and C3 comparing cognitive costs in the *Describe* task for LCLW to *Describe* task for the HCHW targets. We included participants as random factor. No contrast was significant, all *F*s<2.64, *p*s>.104.

Moderation of cognitive costs by Social Dominance and Political orientation. To investigate the effect of Social Dominance Orientation (SDO), we submitted the scores on the NASA Task Load Index to a 2 (Quadrant: LCLW vs. HCHW) x 2 (Type of task: *Describe* vs. *Feel*) mixed model analysis, with both factors varying within participants, SDO as a centred continuous variable and participants as random factor. There was a significant main effect of Quadrant, $F(1, 1599)=4.02$, $p=.045$, $\eta_p^2=.002$, suggesting that participants perceived a higher cognitive cost for the LCLW compared to the HCHW targets, regardless of the type of task or the participants' level of SDO. We also found a significant Type of task * SDO interaction, $F(1, 1599)=6.69$, $p=.010$, $\eta_p^2=.003$. As this interaction does not directly concern our hypothesis, we refrain from decomposing it further. No other main effect nor interaction emerged significant, all Fs<0.92, ps>.340.

To investigate the effect of Political Orientation, we submitted the scores on the NASA Task Load Index to a 2 (Quadrant: LCLW vs. HCHW) x 2 (Type of task: *Describe* vs. *Feel*) mixed model analysis, with both factors varying within participants, Political Orientation as a centred continuous variable and participants as random factor. There was again a significant main effect of Quadrant, $F(1, 1599)=4.03$, $p=.045$, $\eta_p^2=.002$, suggesting that participants perceived a higher cognitive cost for the LCLW compared to the HCHW targets, regardless of the type of task or the participants' political orientation. We also found a significant effect of Political Orientation, $F(1, 105)=3.97$, $p=.049$, $\eta_p^2=.013$, as well as a Type of task * Political Orientation interaction, $F(1, 1599)=4.42$, $p=.036$, $\eta_p^2=.002$. As this interaction does not directly concern our hypothesis, we refrain from decomposing it further. No other main effect nor interaction emerged significant, all Fs<0.65, ps>.421.

NASA Task Load Index – Effort subscale. We submitted the scores on the NASA Task Load Index Effort subscale to a 2 (Quadrant: LCLW vs. HCHW) x 2 (Type of task: *Describe* vs. *Feel*) mixed model analysis, with both factors varying within participants and participants as random factor. There was a main effect of Quadrant, $F(1, 746)=9.00$, $p=.003$, $\eta_p^2=.006$, suggesting that participants perceived a higher cognitive cost for the LCLW compared to the HCHW targets, regardless of the type of task. There was no main effect of Type of task nor any interaction, all Fs<0.46, ps>.497.

NASA Task Load Index – Aversion subscale. We submitted the scores on the NASA Task Load Index Aversion subscale to a 2 (Quadrant: LCLW vs. HCHW) x 2 (Type of task: *Describe* vs. *Feel*) mixed model analysis, with both factors varying within participants and participants as random factor. No effect nor any interaction was significant, all Fs<0.19, ps>.661.

NASA Task Load Index – Efficacy subscale. We submitted the scores on the NASA Task Load Index Efficacy subscale to a 2 (Quadrant: LCLW vs. HCHW) x 2 (Type of task: *Describe* vs. *Feel*) mixed model analysis, with both factors varying within participants and participants as random factor. No effect nor any interaction was significant, all Fs<1.88, ps>.171.

1.3. Experiment 3 – Additional analyses

1.3.1. Results

Moderation of Task Choice by Social Dominance and Political orientation. To investigate the effect of Social Dominance Orientation (SDO), we performed a logistic linear mixed model by regressing Task Choice (0=*Describe* task; 1=*Feel* task) on a set of Helmert contrasts, with C1 being our contrast of interest by comparing LCLW targets to all three other targets, C2 comparing LCHW targets to both HCLW and HCHW targets, and C3 comparing HCLW to HCHW targets, SDO as a centred continuous variable, their interaction, and participants and stimuli as random factors. The intercept proved significant, *OR*=0.22, *z*=-11.51, *p*<.001. No other effect or interaction emerged significant, all *z*s<-1.00, all *p*s>.316.

To investigate the effect of Political Orientation, we performed a logistic linear mixed model by regressing Task Choice (0=*Describe* task; 1=*Feel* task) on the same set of Helmert contrasts, Political Orientation as a centred continuous variable, their interaction, and participants and stimuli as random factors. The intercept proved significant, *OR*=0.22, *z*=-11.58, *p*<.001. C1 was significant, *OR*=0.88, *z*=-1.96, *p*<.05, but the effect ran contrary to our hypothesis. No other effect or interaction emerged significant, all *z*s<1.60, all *p*s>.110.

Moderation of Task Choice by Time. To investigate the effect of time (operationalized as trial number), we regressed Task Choice (0=*Describe* task; 1=*Feel* task) on Time, with participants and stimuli as random factors. The model intercept proved significant, Odds Ratio (*OR*)=0.28, *z*=-8.83, *p*<.001. We also found a significant effect of Time, Odds Ratio (*OR*)=0.98, *z*=-3.90, *p*<.001, indicating that participants were even more likely to choose the *Describe* task over the *Feel* task as trials went by.

NASA Task Load Index. Relying on a different but complementary way to investigate our second hypothesis, we performed a mixed model analysis by regressing NASA Task Load Index scores on a planned contrast comparing the *Feel* task for LCLW targets with all other scenarios. We included participants as random factor. The contrast emerged significant, $F(1, 4469)=109.46$, $p<.001$, $\eta_p^2=.017$. However, it is likely that this effect is driven by the *Describe* task scores being systematically lower than the *Feel* task scores across all quadrants. As we did not anticipate this pitfall when preregistering analyses, we decided to move this analysis in Supplementary Material and focus on the most robust analysis in the manuscript.

Moderation of cognitive costs by Social Dominance and Political orientation. To investigate the effect of Social Dominance Orientation (SDO), we performed a mixed model analysis by regressing NASA Task Load Index scores on the same set of Helmet contrasts as above, with C1 being our contrast of interest by comparing LCLW targets to all three other targets, C2 comparing LCHW targets to both HCLW and HCHW targets, and C3 comparing HCLW to HCHW targets, as well as on Type of task (*Describe* vs. *Feel*), SDO as a centred continuous variable, and their interactions. We included participants as random factor. There was a significant main effect of Type of task, $F(1, 4455.56)=249.90$, $p<.001$, $\eta_p^2=.038$. We also found a significant Type of task * SDO interaction, $F(1, 4455.56)=6.29$, $p=.012$, $\eta_p^2=.001$. As this interaction does not directly concern our

hypothesis, we refrain from decomposing it further. No other main effect nor interaction emerged significant, all *F*s<2.10, *p*s>.147.

To investigate the effect of Political Orientation, we performed a mixed model analysis by regressing NASA Task Load Index scores on the same set of Helmet contrasts as above, with C1 being our contrast of interest (comparing LCLW targets to all three other targets), as well as on Type of task (*Describe* vs. *Feel*), Political Orientation as a centred continuous variable, and their interactions. We included participants as random factor. There was again a significant main effect of Type of task, $F(1, 4455.24)=88.10$, $p<.001$, $\eta_p^2=.014$. No other main effect nor interaction emerged significant, all *F*s<3.59, *p*s>.058.

NASA Task Load Index – Effort subscale. We performed a mixed model analysis by regressing the NASA Task Load Index Effort subscale scores on the same set of Helmet contrasts as above, with C1 being our contrast of interest (comparing LCLW targets to all three other targets), as well as on Type of task (*Describe* vs. *Feel*) and all contrast by task type interactions. We included participants as random factor. There was a main effect of Type of task, $F(1, 2079.01)=181.79$, $p<.001$, $\eta_p^2=.037$. There was no other significant main effect nor any interaction, all *F*s<1.52, *p*s>.218.

NASA Task Load Index – Aversion subscale. We performed a mixed model analysis by regressing the NASA Task Load Index Aversion subscale scores on the same set of Helmet contrasts as above, as well as on Type of task (*Describe* vs. *Feel*) and all contrast by task type interactions. We included participants as random factor. There was a main effect of Type of task, $F(1, 887.51)=84.25$, $p<.001$, $\eta_p^2=.032$. There was no other significant main effect nor interaction, all *F*s<1.73, *p*s>.189.

NASA Task Load Index – Efficacy subscale. We performed a mixed model analysis by regressing the NASA Task Load Index Efficacy subscale scores on the same set of Helmet contrasts as above, as well as on Type of task (*Describe* vs. *Feel*) and all contrast by task type interactions. We included participants as random factor. There was a main effect of Type of task, $F(1, 887.46)=145.57$, $p<.001$, $\eta_p^2=.072$. We also found a significant main effect of C1, $F(1, 889.05)=4.96$, $p=.026$, $\eta_p^2=.003$. However, this effect ran counter to our hypothesis. There was no other significant main effect nor interaction, all *F*s<0.79, *p*s>.374.

1.4. Experiment 4 – Additional analyses

1.4.1. Results

NASA Task Load Index. Relying on a different but complementary way to investigate our second hypothesis, we performed a mixed model analysis by regressing NASA Task Load Index Effort subscale scores on a set of Helmert contrasts, with C1 being our contrast of interest and comparing cognitive costs in the *Feel* task for LCLW targets to all other cells, C2 comparing cognitive costs in the *Feel* task for HCHW targets to the mean of *Describe* task for both LCLW and HCHW targets, and C3 comparing cognitive costs in the *Describe* task for LCLW to *Describe* task for the HCHW targets. We included participants as random factor. C1 was significant, $F(1, 254.31)=6.73$, $p=.01$, $\eta_p^2=.003$. However, it is likely that this effect is driven by the *Describe* task scores being systematically lower than the *Feel* task scores across all quadrants. As we did not anticipate this pitfall when preregistering analyses, we decided to move this analysis in Supplementary Material and focus on the most robust analysis in the manuscript. C2 was significant as well, $F(1, 240.40)=6.00$, $p=.015$, $\eta_p^2=.006$. No other main effect nor interaction emerged significant, all Fs<3.58, ps>.06.

Moderation of cognitive costs by Social Dominance and Political orientation. To investigate the effect of Social Dominance Orientation, we performed a mixed model analysis by regressing scores on the NASA Task Load Index Effort subscale on Quadrant (LCLW vs. HCHW), Type of task (*Describe* vs. *Feel*), Design (Between-subject vs. Within-subject), SDO as a centred continuous variable, and all interactions. We included participants as random factor. There was a significant main effect of Type of task, $F(1, 233.01)=5.68$, $p=.018$, $\eta_p^2=.008$, as well as a significant main effect of SDO, $F(1, 228.00)=11.76$, $p<.001$, $\eta_p^2=.033$. We also found a significant Quadrant * Type of task * SDO interaction, $F(1, 10988.00)=4.05$, $p=.044$, $\eta_p^2<.001$. However, no two-way interaction emerged significant when decomposing further this three-way interaction, all Fs<3.29, ps>.070. No other main effect nor interaction emerged significant, all Fs<3.87, ps>.050.

To investigate the effect of Political Orientation, we performed a mixed model analysis by regressing scores on the NASA Task Load Index Effort subscale on Quadrant (LCLW vs. HCHW), Type of task (*Describe* vs. *Feel*), Design (Between-subject vs. Within-subject), Political Orientation as a centred continuous variable, and all interactions. We included participants as random factor. There was a significant main effect of Type of task, $F(1, 232.95)=7.97$, $p=.005$, $\eta_p^2=.011$. We also found a significant Type of task * Political Orientation interaction, $F(1, 233.12)=4.48$, $p=.035$, $\eta_p^2=.006$, as well as a significant Design * Political Orientation interaction, $F(1, 228.00)=4.23$, $p=.041$, $\eta_p^2=.012$. As these interactions do not directly concern our hypothesis, we refrain from decomposing them further. No other main effect nor interaction emerged significant, all Fs<3.82, ps>.051.

Moderation of cognitive costs by Time. To investigate the effect of time (operationalized as trial number), we regressed scores on the NASA Task Load Index Effort subscale on Time, with participants and stimuli as random factors. We did not find a significant effect of Time, $F(1, 10997.00)=1.13$, $p=.288$, indicating that participants did not report a higher perceived cognitive cost as trials went by, regardless of the condition or the quadrant.

2. Chapter 4 – Supplementary Material 2

Of note, the distribution of our samples on both SDO and political orientation is right-skewed across all our experiments. We therefore report the secondary analyses involving these variables for interested readers, but call to err on the side of caution regarding their reliability.

2.1. Additional Experiment 1

This experiment was conducted prior to Experiment 2 and relies on an identical design.

2.1.1. Method

Participants and design. A total of 50 French-speaking participants took part in a 46-minute-long (median time) experiment on Prolific Academic in exchange of 4.69£. Both quadrant (LCLW targets vs. HCHW targets) and type of task (Feel vs. Describe) varied within participants. We excluded 3 participants who erred on more than 30% of questions randomly controlling their attention paid to targets' social group. The final sample thus comprised 47 participants (M_{age}=31.43, SD_{age}=9.93, 20 women).

Power calculation. We ran an a priori power analysis for the Quadrant × Type of task interaction using the PANGEA web app, with an effect size of d=.3, corresponding to a medium effect in updated guidelines of Cohen's d . We computed our power analysis to detect the Quadrant (Q) x Type of Deck (D) interaction, with participants (P) as random factor and 24 replicates. Var(error) was set at 0.333 and var(P*Q*D) was set at 0.083. This power analysis indicated that we needed at least 33 participants to reach 80% power. To account for the possible loss of participants due to our exclusion criteria, we aimed for 50 participants

Procedure. Procedure was identical to Experiment 2 (*Describe* task: α=.91; *Feel* task: α=.87).

2.1.2. Results

Empathy Selection Task. To investigate our first hypothesis, we performed a logistic linear mixed model with Task Choice as our binary dependent variable (0=*Describe* task; 1=*Feel* task), Quadrant (LCLW vs. HCHW) as a within-participant factor and participants and stimuli as random factors. The model intercept proved significant, Odds Ratio (OR)=0.32, z=-3.24, p<.001, confirming that, across conditions, participants were more likely to choose the *Describe* task compared to the *Feel* task. This again replicates Cameron et al.'s findings. However, contrary to our hypothesis, there was no main effect of Quadrant, OR=1.18, z=1.50, p=.133.

Moderation of Task Choice by Social Dominance and Political orientation. To investigate the effect of Social Dominance Orientation (SDO), we performed a logistic linear mixed model with Task Choice as our binary dependent variable (0=*Describe* task; 1=*Feel* task), Quadrant (LCLW vs. HCHW) as within-participant factor, SDO as a centred continuous variable, their interaction, and participants and stimuli as random factors. The

model intercept proved significant, Odds Ratio (*OR*)=0.31, *z*=-3.24, *p*=.001. No other effect or interaction emerged significant, all *z*s<1.52, all *p*s>.129.

To investigate the effect of Political Orientation, we performed a logistic linear mixed model with Task Choice as our binary dependent variable (0=*Describe* task; 1=*Feel* task), Quadrant (LCLW vs. HCHW) as within-participant factors, Political Orientation as a centred continuous variable, their interaction, and participants and stimuli as random factors. The model intercept proved significant, Odds Ratio (*OR*)=0.31, *z*=-3.24, *p*=.001. No other effect or interaction emerged significant, all *z*s<1.62, all *p*s>.105.

Moderation of Task Choice by Valence of affect. To investigate the effect of target's valence of affect, we performed a logistic linear mixed model with Task Choice as our binary dependent variable (0=*Describe* task; 1=*Feel* task), Valence of affect (Positive vs. Negative) and Quadrant (LCLW vs. HCHW) as within-participant factors, their interaction, and participants and stimuli as random factors. The model intercept proved significant, Odds Ratio (*OR*)=0.31, *z*=-3.24, *p*<.001, confirming that, across conditions, participants were more likely to choose the *Describe* task compared to the *Feel* task. No other main effect nor interaction emerged significant, all *z*s<1.51, all *p*s>.132.

Moderation of Task Choice by Time. To investigate the effect of time (operationalized as trial number), we regressed Task Choice (0=*Describe* task; 1=*Feel* task) on Time, with participants and stimuli as random factors. The model intercept proved significant, Odds Ratio (*OR*)=0.34, *z*=-2.91, *p*=.003. However, there was no effect of Time, Odds Ratio (*OR*)=1.00, *z*=-0.80, *p*=.423.

NASA Task Load Index. To investigate our second hypothesis, we submitted the scores on the NASA Task Load Index to a 2 (Quadrant: LCLW vs. HCHW) x 2 (Type of task: *Describe* vs. *Feel*) mixed model analysis, with both factors varying within participants and participants as random factor. There was no main effect of Task, $F(1, 702)=1.22$, $p=.269$, $\eta_p^2<.001$, and no main effect of Quadrant nor any interaction, all *F*s<0.64, *p*s>.423.

Relying on a different but complementary way to investigate our second hypothesis, we performed a mixed model analysis by regressing NASA Task Load Index scores on a set of Helmet contrasts, with C1 being our contrast of interest and comparing cognitive costs in the *Feel* task for LCLW targets to all other cells, C2 comparing cognitive costs for in the *Describe* task for HCHW targets to the mean of *Describe* task for both LCLW and HCHW targets, and C3 comparing cognitive costs in the *Describe* task for LCLW to *Describe* task for the HCHW targets. We included participants as random factor. No contrast was significant, all *F*s<1.02, *p*s>.313.

Moderation of cognitive costs by Social Dominance and Political orientation. To investigate the effect of Social Dominance Orientation (SDO), we submitted the scores on the NASA Task Load Index to a 2 (Quadrant: LCLW vs. HCHW) x 2 (Type of task: *Describe* vs. *Feel*) mixed model analysis, with both factors varying within participants, SDO as a centred continuous variable and participants as random factor. There was a significant main effect of SDO, $F(1, 45)=4.35$, $p=.043$, $\eta_p^2=.034$, but no other main effect nor interaction emerged significant, all *F*s<1.17, *p*s>.279.

To investigate the effect of Political Orientation, we submitted the scores on the NASA Task Load Index to a 2 (Quadrant: LCLW vs. HCHW) x 2 (Type of task: *Describe* vs.

Feel) mixed model analysis, with both factors varying within participants, Political Orientation as a centred continuous variable and participants as random factor. No main effect nor any interaction was significant, all *F*s<1.54, *p*s>.216.

NASA Task Load Index – Effort subscale. We submitted the scores on the NASA Task Load Index Effort subscale to a 2 (Quadrant: LCLW vs. HCHW) x 2 (Type of task: *Describe* vs. *Feel*) mixed model analysis, with both factors varying within participants and participants as random factor. There was a main effect of Task, $F(1, 326)=9.51$, $p=.002$, $\eta_p^2=.013$, indicating that participants perceived the *Feel* task as cognitively more demanding than the *Describe* task, regardless of the target's social group. There was no main effect of Quadrant nor any interaction, all *F*s<0.90, *p*s>.343.

NASA Task Load Index – Aversion subscale. We submitted the scores on the NASA Task Load Index Aversion subscale to a 2 (Quadrant: LCLW vs. HCHW) x 2 (Type of task: *Describe* vs. *Feel*) mixed model analysis, with both factors varying within participants and participants as random factor. No effect nor any interaction was significant, all *F*s<0.59, *p*s>.442.

NASA Task Load Index – Efficacy subscale. We submitted the scores on the NASA Task Load Index Efficacy subscale to a 2 (Quadrant: LCLW vs. HCHW) x 2 (Type of task: *Describe* vs. *Feel*) mixed model analysis, with both factors varying within participants and participants as random factor. There was a main effect of Task, $F(1, 138)=7.63$, $p=.007$, $\eta_p^2=.024$, indicating that participants perceived the *Feel* task as cognitively more demanding than the *Describe* task, regardless of the target's social group. There was no main effect of Quadrant nor any interaction, all *F*s<0.20, *p*s>.657.

3. Chapter 5 – Supplementary Material 1

3.1. Experiment 1 – Additional analyses

Power calculations. We computed our power analysis to detect the number type (S) x location (L) x perspective (P) interaction, with participants (I) as random factor and eight replicates. Var(error) was set at 0.2 and var(I*S*L*P) was set at 0.04.

Altercentric interference – response time. Following previous guidelines (Surtees et al., 2012; Simpson & Todd, 2017), we excluded the failed trials from the analysis. To investigate the presence of an altercentric interference, we submitted the response time to a 2 (avatar's social characteristics: no social group vs. social groups) x 2 (type of number: non-ambiguous=0,8 vs. ambiguous=6,9) x 2 (location: wall vs. table) x 2 (perspective: self vs. other) mixed model analysis with the avatar's social characteristics varying between participants, the three remaining factors varying within participants, and participants as random factor (for a visual representation of the data, see Figure 1).

There were significant main effects of type of number, location, and perspective, confirming that participants took longer to answer when the number was ambiguous ($M_{ambiguous}$=1051.86, $SD_{ambiguous}$=362.81, $M_{non\text{-}ambiguous}$=845.82, $SD_{non\text{-}ambiguous}$=296.67), F(1, 7297.51)=1222.05, p<.001, η_p^2=.10, when the number was on the table (M_{table}=1006.36, SD_{table}=374.93, M_{wall}=888.61, SD_{wall}=305.61), F(1, 7297.29)=441.42, p<.001, η_p^2=.04, and when they answered from the perspective of the avatar (M_{other}=994.80, SD_{other}=366.62, M_{self}=896.91, SD_{self}=316.85), F(1, 7297.80)=285.91, p<.001, η_p^2=.03. There was no main effect of the avatar's social characteristics, F(1, 121.32)=1.16, p=.283, η_p^2<.01. We observed a significant perspective × avatar's social characteristics interaction, F(1, 7297.80)=6.70, p=.001, η_p^2<.01, with participants taking more time to answer from the avatar's perspective in the *no social group* condition (M_{other}=1004.89, SD_{other}=360.72, M_{self}=922.95, SD_{self}=326.06), F(1, 7296.76)=111.07, p<.001, η_p^2=.01. This effect emerged even more strongly in the *social groups* condition (M_{other}=983.15, SD_{other}=373.08, M_{self}=866.61, SD_{self}=303.08), F(1, 7298.69)=176.50, p<.001, η_p^2=.02. No further two-way interactions emerged, all Fs<0.42, all ps>.519, all η_p^2<.01.

The type of number × location × perspective was significant, F(1, 7297.70)=38.43, p<.001, η_p^2<.01. Follow-up analyses indicated that the type of number × location interaction was significant for the 'self' trials, F(1, 7297.92)=59.33, p<.001, η_p^2<.01. Specifically, for non-ambiguous numbers, there was no significant difference based on location (M_{table}=832.39, SD_{table}=280.02, M_{wall}=821.92, SD_{wall}=293.34), F(1, 7296.62)=0.69, p=.407, η_p^2<.01. In contrast, for ambiguous numbers, participants took longer to answer when the number was displayed on the table than on the wall (M_{table}=1044.04, SD_{table}=353.48, M_{wall}=903.39, SD_{wall}=292.17), F(1, 7298.92)=133.18, p<.001, η_p^2=.01. This pattern indicates the presence of altercentric interference, that is, a greater difficulty to answer from our own point of view when what one sees does not correspond to what the avatar sees (i.e., on incongruent trials).

Turning to the 'other' trials, the type of number × location interaction was also significant, F(1, 7297.31)=271.54, p<.001, η_p^2=.02. Specifically, for non-ambiguous numbers, participants took longer to answer when the number was displayed on the table than on the wall (M_{table}=883.47, SD_{table}=316.41, M_{wall}=845.14, SD_{wall}=292.30), F(1,

7296.61)=9.93, p=.002, η_p^2<.01. The same effect was even stronger for ambiguous numbers (M_{table}=1303.96, SD_{table}=362.94, M_{wall}=984.31, SD_{wall}=318.28), F(1, 7297.99)=671.84, p<.001, η_p^2=.06. This pattern indicates the presence of egocentric interference, that is, a greater difficulty to answer from the avatar's point of view when what one sees does not correspond to what the avatar sees (i.e., on incongruent trials).

The avatar's social characteristics × type of number × location × perspective interaction was not significant, F(1, 7297.70)=0.01, p=.904, η_p^2<.01, indicating that the observed altercentric and egocentric interferences were not modulated by the avatar's social characteristics.

Altercentric interference - errors. We submitted the errors (with 0 indicating a failed trial and 1 a successful trial) to a 2 (avatar's social characteristics: no social group vs. social groups) x 2 (type of number: non-ambiguous=0,8 vs. ambiguous=6,9) x 2 (location: wall vs. table) x 2 (perspective: self vs. other) mixed model analysis with the avatar's social characteristics varying between participants, the three remaining factors varying within participants, and participants as random factor (for a visual representation of the data, see Figure 2). We found a significant main effect of type of number, location and perspective, indicating that participants were less likely to answer correctly when the number was ambiguous, *Odds Ratio* (*OR*)=0.53, z=-4.36, p<.001, when the number was on the table, *OR*=0.26, z=-6.22, p<.001, or when answering from their own perspective, *OR*=1.46, z=2.59, p=.009. There was no main effect of the avatar's social characteristics, z=-0.23, p=.818.

The type of number × location × avatar's social characteristics interaction was significant, z=-3.43, p<.001. Follow-up analyses indicated that the type of number × location interaction was not significant in the *no social group* condition, z=-1.17, p=.241. However, this interaction was significant in the *social groups* condition, z=-5.63, p<.001. Specifically, for non-ambiguous numbers, there was no significant difference based on location, z=-0.06, p=.949. However, participants were less likely to answer correctly for ambiguous numbers they appeared on the table, *OR*=0.08, z=-8.05, p<.001. No further three- of four-way interaction emerged, all zs<|1.274|, ps>.202.

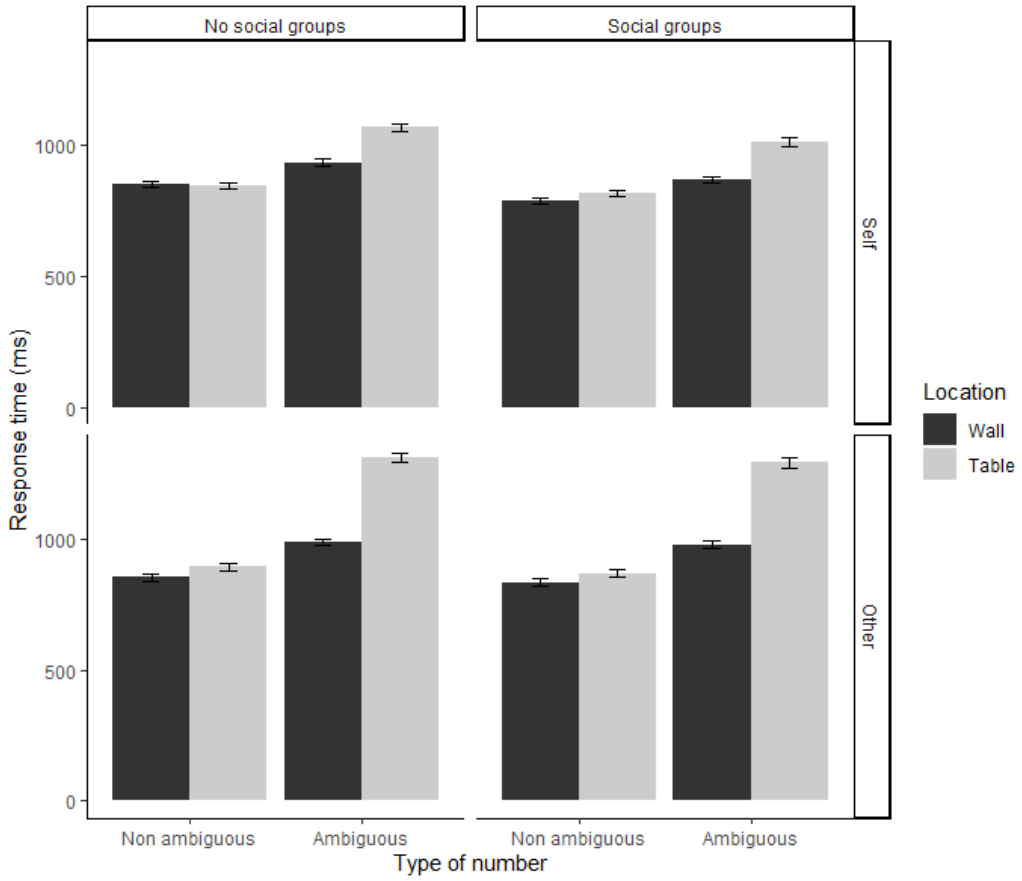


Figure 1. Graph of response time as a function of the avatar's social characteristics, type of number, location, and perspective. Bars represent the standard error of the mean.

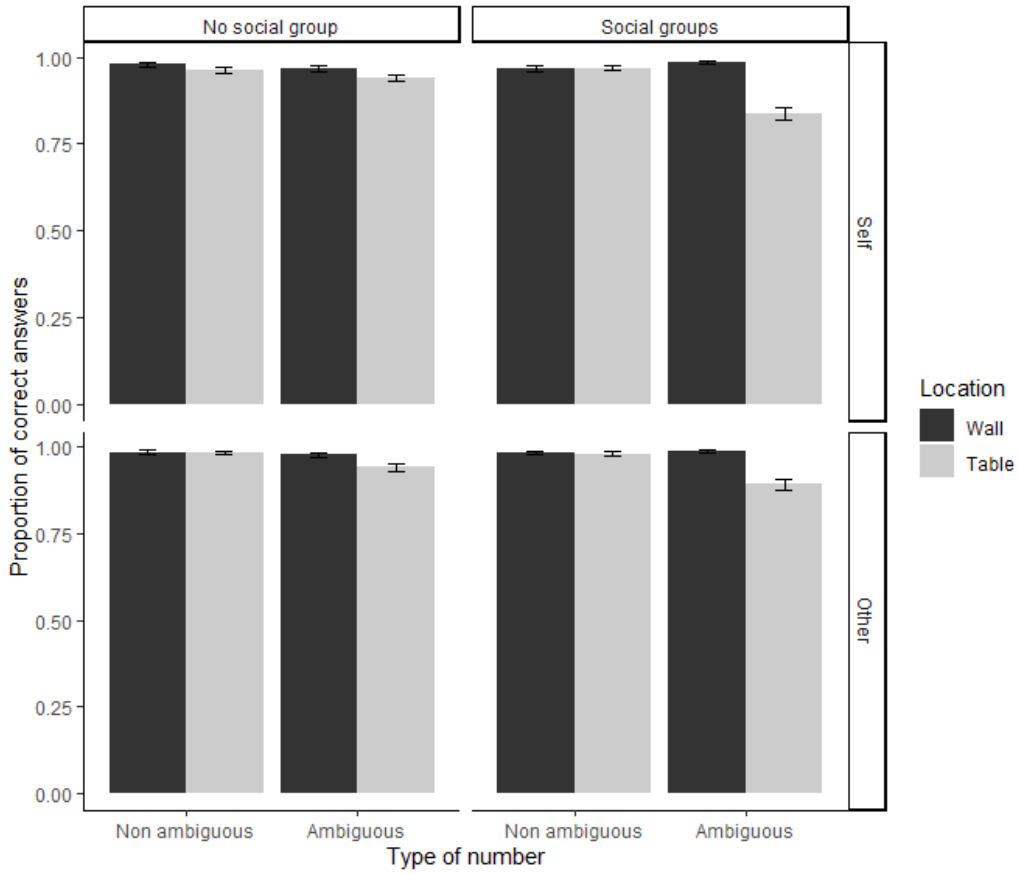


Figure 2. Graph of proportion of correct answers as a function of the avatar's social characteristics, type of number, location, and perspective. Bars represent the standard error of the mean.

Impact of the avatar's social group – response time. Our main objective was to investigate whether participants demonstrate greater difficulty to adopt the visual perspective of a LCLW target compared to a HCLW target. To do so, we only considered data in the *social groups* condition for the trials in which participants had to answer from the avatar's perspective. We submitted the response time in the *social groups* condition to a 2 (type of number: non-ambiguous=0,8 vs. ambiguous=6,9) x 2 (location: wall vs. table) x 2 (perspective: politician vs. drug addict) mixed model analysis with the three factors varying within participants and participants as random factor (for a visual representation of the data, see Figure 3).

As before, significant main effects of type of number and location confirmed that participants took longer to answer when the number was ambiguous ($M_{ambiguous}$=1123.35, $SD_{ambiguous}$=381.80, $M_{non\text{-}ambiguous}$=852.67, $SD_{non\text{-}ambiguous}$=312.83), $F(1, 1661.86)=452.76$,

p<.001, η_p^2=.15, and when the number was on the table (M_{table}=1064.86, SD_{table}=410.31, M_{wall}=907.46, SD_{wall}=316.86), F(1, 1661.90)=177.90, p<.001, η_p^2=.06. There was no effect of perspective, F(1, 1660.95)=0.30, p=.585, , η_p^2<.01.

Not surprisingly, the type of number × location was significant, F(1, 1661.72)=112.49, p<.001, η_p^2=.04. Specifically, for non-ambiguous numbers, participants took marginally more time when the number was on the table (M_{table}=870.64, SD_{table}=338.32, M_{wall}=834.63, SD_{wall}=284.17), F(1, 1660.72)=3.91, p=.048, η_p^2<.01. This effect emerged even stronger for ambiguous numbers (M_{table}=1292.64, SD_{table}=368.30, M_{wall}=979.65, SD_{wall}=331.07), F(1, 11662.80)=274.78, p<.001, η_p^2=.10. Contrary to our hypothesis, the type of number × location × perspective interaction was not significant, F(1, 1660.77)<0.01, p=.955, η_p^2<.01. No further two-way interactions emerged, all Fs<1.45, all ps>.229, all η_p^2<.01.

Impact of the avatar's social group – errors. We submitted the errors (with 0 indicating a failed trial and 1 a successful trial) to a 2 (type of number: non-ambiguous=0,8 vs. ambiguous=6,9) x 2 (location: wall vs. table) x 2 (perspective: politician vs. drug addict) mixed model analysis with the three factors varying within participants and participants as random factor (for a visual representation of the data, see Figure 4). We found a significant main effect of type of number and location, indicating that participants were less likely to answer correctly when the number was ambiguous, *Odds Ratio* (*OR*)=0.46, z=-2.31, p=.021, and when the number was on the table, *OR*=0.31, z=-3.54, p<.001. There was no main effect of perspective, z=-0.22, p=.825.

The type of number × location was significant, z=-3.19, p=.001. Specifically, for non-ambiguous numbers, there was no effect of location, z=-0.23, p=.816. However, for ambiguous numbers, participants were less likely to answer correctly when the number was on the table, *OR*=0.11, z=-5.04, p<.001. No other interaction proved significant, all zs<|0.56|, ps>.578.

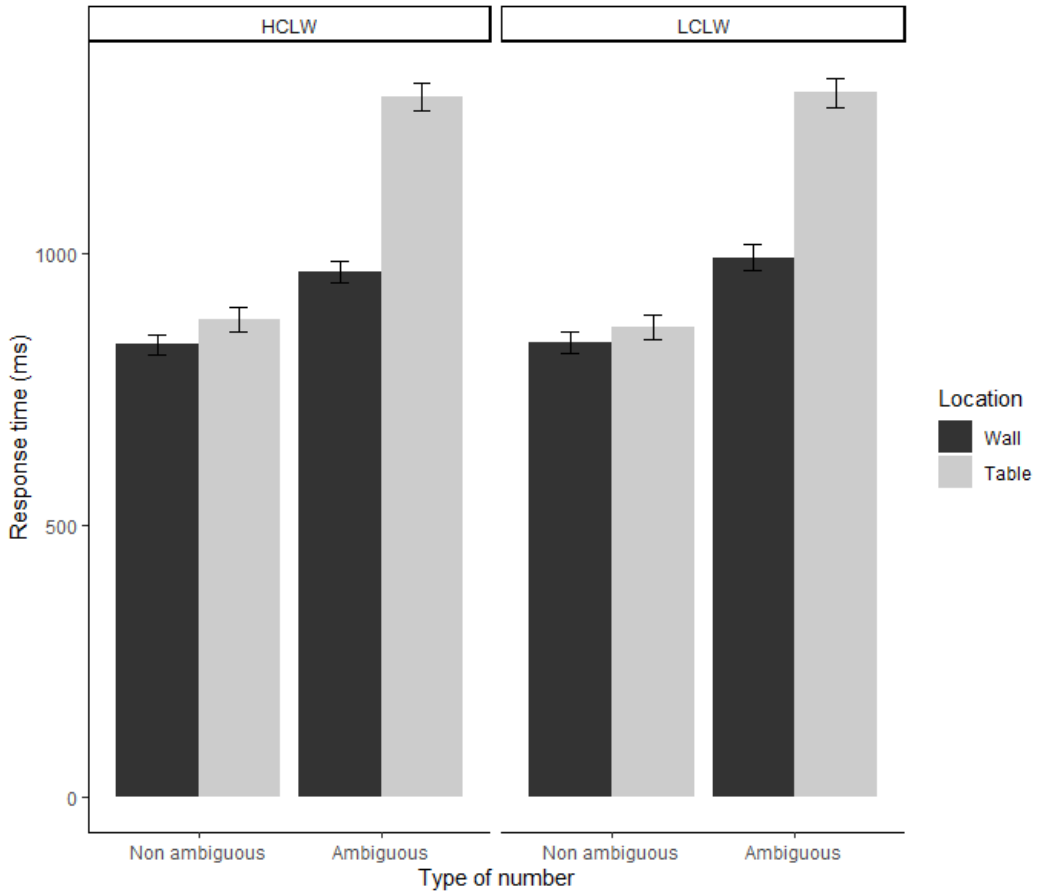


Figure 3. Graph of response time as a function of type of number, location, and perspective. Bars represent the standard error of the mean. LCLW=low competence low warmth; HCLW=high competence low warmth.

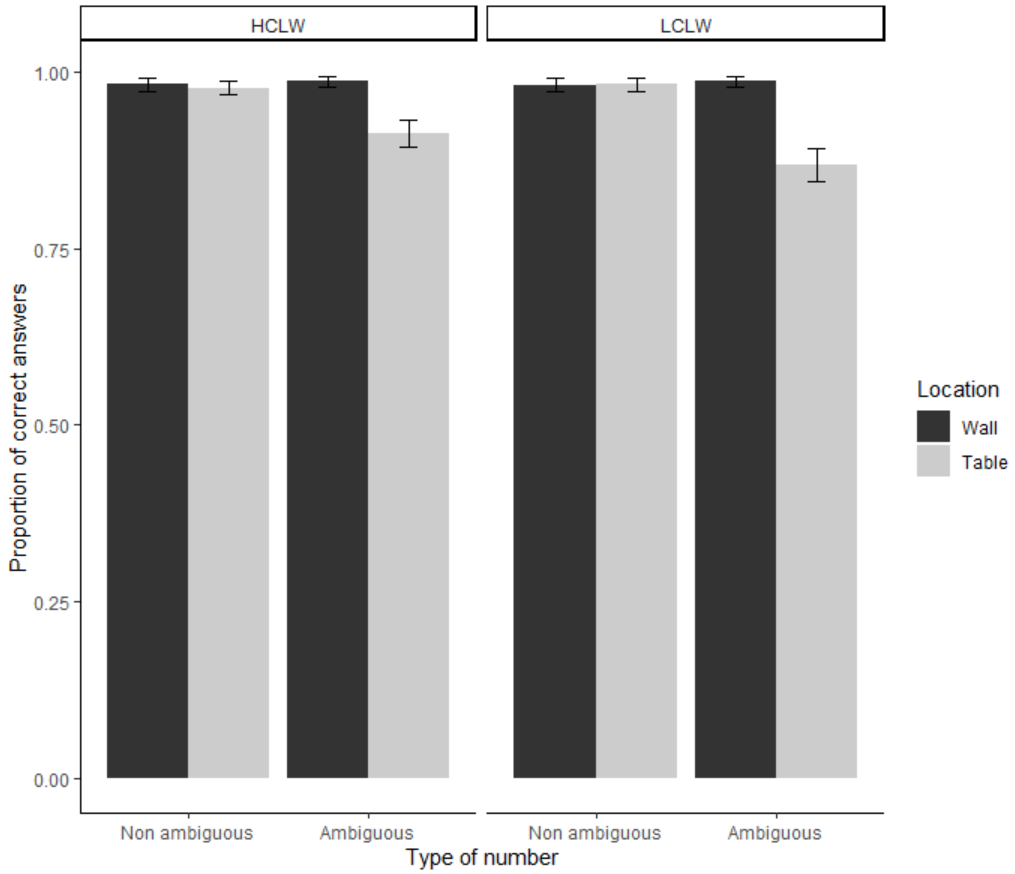


Figure 4. Graph of proportion of correct as a function of type of number, location, and perspective. Bars represent the standard error of the mean. LCLW=low competence low warmth; HCLW=high competence low warmth.

3.2. Experiment 2 – Additional analyses

Power calculations. We computed our power analysis to detect the number type (S) x location (L) x perspective (P) interaction, with participants (I) as random factor and 12 replicates. Planned contrasts were used to compare the two avatars.Var(error) was set at 0.2 and var(I*S*L*P) was set at 0.04.

Response time. Following previous guidelines (Surtees et al., 2012; Simpson & Todd, 2017), we excluded failed trials from analyses. We submitted the response time in milliseconds to a 2 (type of number: non-ambiguous=0,8 vs. ambiguous=6,9) x 2 (location: wall vs. table) x 3 (perspective: self vs. HCLW quadrant avatars vs. LCLW quadrant avatars) mixed model analysis with all three factors varying within participants and participants as random factor (for a visual representation of the data, see Figure 5). Significant effects of type number and of location indicated that participants took more time answering when the number was ambiguous ($M_{ambiguous}$=997.18, $SD_{ambiguous}$=347.98, $M_{non\text{-}ambiguous}$=799.03, $SD_{non\text{-}ambiguous}$=266.07), F(1, 8243.66)=1295.94, p<.001, η_p^2=.10, or on the table (M_{table}=958.49, SD_{table}=356.39, M_{wall}=833.14, SD_{wall}=276.38), F(1, 8243.66)=555.16, p<.001, η_p^2=.05.

A set of contrasts allowed us to compare the response time for 'self' versus 'other' (both HCLW and LCLW), as well for the HCLW vs. LCLW avatars. The 'self' versus 'other' contrast proved significant, F(1, 8244.70)=190.68, p<.001, η_p^2=.02, indicating that participants took more time answering for the avatar than for themselves, regardless of the avatar's social group (M_{other}=912.28, SD_{other}=329.98, M_{self}=833.59, SD_{self}=293.29). There was no significant difference between the LCLW and the HCLW targets, F(1, 8244.49)=1.66, p=.197, η_p^2<.01. No interaction including this factor emerged, all Fs<0.46, all ps>.498, all η_p^2<.01.

The type of number × location × 'self' versus 'other' contrast was significant, F(1, 8243.88)=25.51, p<.001, η_p^2<.01. Follow-up analyses revealed that the number × location interaction was significant for the 'self' trials, F(1, 8243.33)=42.48, p<.001, η_p^2<.01. Specifically, for non-ambiguous numbers, there was no significant difference in response times as a function of location (M_{table}=762.18, SD_{table}=234.15, M_{wall}=763.23, SD_{wall}=256.92), F(1, 8241.79)<0.01, p=.958, η_p^2<.01. However, for ambiguous numbers, participants took longer to answer when the number was displayed on the table than on the wall (M_{table}=1008.44, SD_{table}=347.09, M_{wall}=845.83, SD_{wall}=281.40), F(1, 8244.53)=77.47, p<.001, η_p^2<.01.

Turning to the 'other' trials, the type of number × location interaction was also significant, F(1, 8244.48)=463.20, p<.001, η_p^2=.04. Specifically, for non-ambiguous numbers, participants took longer to answer when the number was displayed on the table than on the wall (M_{table}=824.60ms, SD_{table}=277.41ms, M_{wall}=797.93ms, SD_{wall}=264.92ms), F(1, 8241.92)=8.96, p=.003, η_p^2<.01. This difference emerged even more strongly for ambiguous numbers (M_{table}=1187.81ms, SD_{table}=359.17ms, M_{wall}=888.06ms, SD_{wall}=281.70ms), F(1, 8246.62)=1050.35, p<.001, η_p^2=.09.

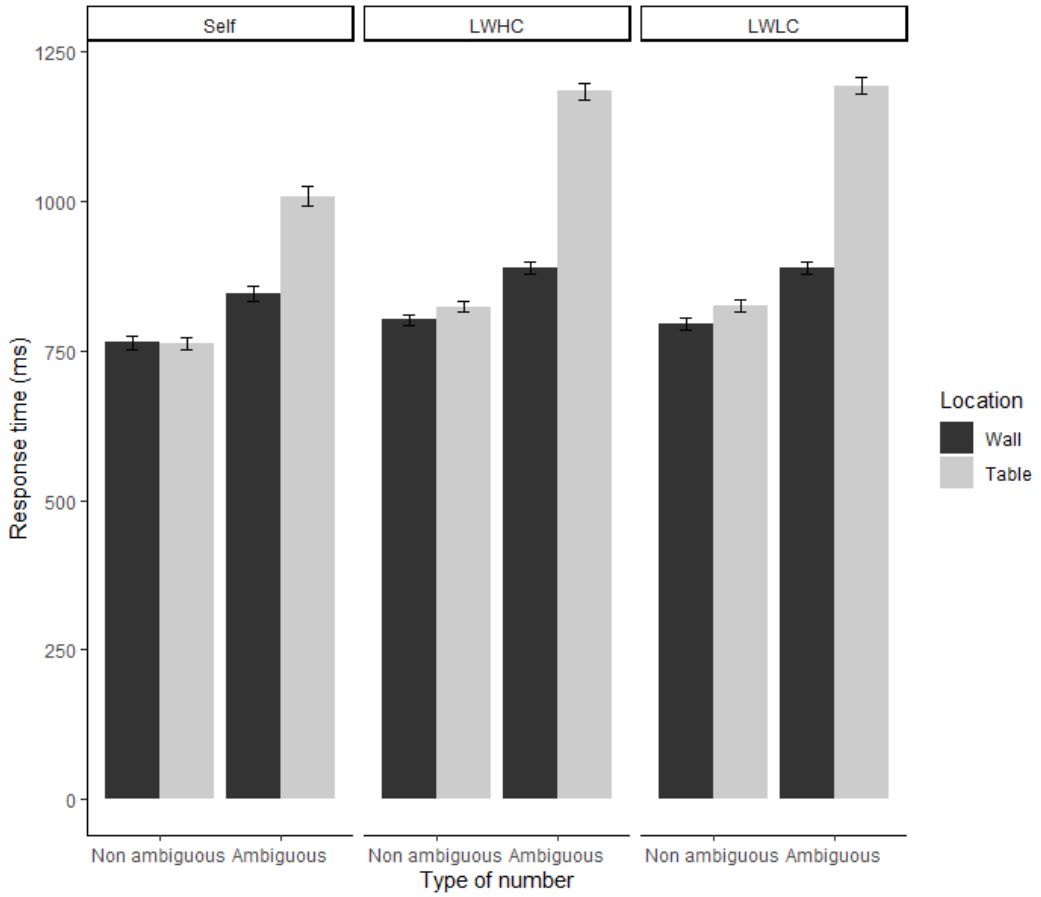


Figure 5. Graph of response time as a function of type of number, location, and perspective. Bars represent the standard error of the mean. LCLW=low competence low warmth; HCLW=high competence low warmth.

Errors. We submitted the errors (with 0 indicating a failed trial and 1 indicating a successful trial) to a 2 (type of number: non-ambiguous=0,8 vs. ambiguous=6,9) x 2 (location: wall vs. table) x 3 (perspective: self vs. HCLW quadrant avatars vs. LCLW quadrant avatars) logistic mixed model analysis with all three factors varying within participants and participants as random factor (for a visual representation of the data, see Figure 6). We found a significant main effect of type of number and location, indicating that participants were less likely to answer correctly when the number was ambiguous, *Odds Ratio* (*OR*)=0.25, *z*=-9.04, *p*<.001, or when the number was on the table, *OR*=0.26, *z*=-8.77, *p*<.001. Turning to the effect of perspective, the 'self' versus 'other' contrast was not significant, *z*=-0.34, *p*=.730. The 'HCLW' versus 'LCLW' contrast proved significant, indicating that participants were less likely to answer correctly for LCLW groups than for the HCLW groups, *OR*=0.55, *z*=-3.65, *p*<.001. No interaction including this factor emerged, all *z*s<|1.223|, *p*s>.22

The type of number × location interaction was significant, z=-8.82, p<.001. Specifically, for non-ambiguous numbers, participants were no less likely to answer correctly when the number appeared on the table, z=0.03, p=.978. However, for ambiguous numbers, they were less likely to answer correctly when they appeared on the table, *OR*=0.07, z=-14.91, p<.001. The type of number × 'self' versus 'other' contrast interaction was also significant, z=2.49, p=.028. Specifically, when answering from their perspective, participants were less likely to answer correctly for ambiguous than for non-ambiguous numbers, *OR*=0.14 z=-6.19, p<.001. Interestingly, this effect was less marked when participants had to answer from the avatar's perspective, *OR*=0.33, z=-6.64, p<.001. Finally, the location × 'self *vs.* other' contrast interaction also came out significant, z=2.19, p=.028. That is, when answering from their perspective, participants were less likely to answer correctly when the number was on the table, *OR*=.15 z=-5.84, p<.001. Again, this effect was less marked when participants had to answer from the avatar's perspective, *OR*=0.34, z=-6.61, p<.001. No other interaction proved significant, all zs<|1.22|, ps>.221.

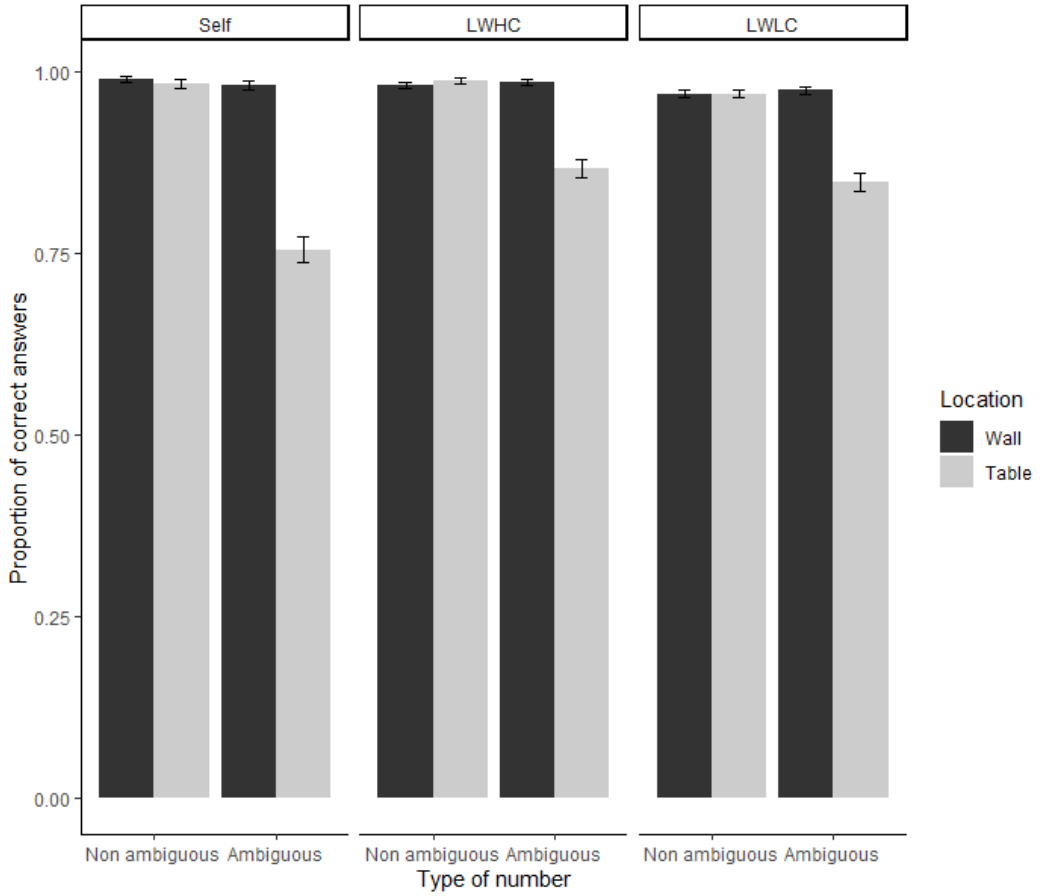


Figure 6. Graph of proportion of correct answers as a function of type of number, location, and perspective. Bars represent the standard error of the mean. LCLW=low competence low warmth; HCLW=high competence low warmth.

3.3. Experiment 3 – Additional analyses

Power calculations. We computed our power analysis to detect the number type (S) x location (L) x perspective (P) x quadrant group (Q) interaction, with participants (I) as random factor and 12 replicates. Planned contrasts were used to compare the two avatars.Var(error) was set at 0.111 and var(I*S*L*P*Q) was set at 0.019.

Response time. Following previous guidelines (Surtees et al., 2012; Simpson & Todd, 2017), we excluded failed trials from analyses. We submitted the response time to a 2 (type of number: non-ambiguous=0,8 vs. ambiguous=6,9) x 2 (location: wall vs. table) x 2 (perspective: self vs. other) x 2 (quadrant group: HCLW vs. LCLW) mixed model analysis with all four factors varying within participants and participants as random factor (for a visual representation of the data, see Figure 7). Significant effects of type number, location and perspective indicated that participants took more time answering when the number was ambiguous ($M_{ambiguous}$=1004.57, $SD_{ambiguous}$=380.25, $M_{non\text{-}ambiguous}$=795.58, $SD_{non\text{-}ambiguous}$=306.72), F(1, 7295.12)=628.81, p<.001, η_p^2=.06, on the table (M_{table}=973.75, SD_{table}=398.13, M_{wall}=825.52, SD_{wall}=302.23), F(1, 7295.14)=329.89, p<.001, η_p^2=.03, and when answering from the avatar's perspective, regardless of the avatar's social group (M_{other}=911.76, SD_{other}=365.16, M_{self}=857.22, SD_{self}=341.82), F(1, 7295.21)=47.37, p<.001, η_p^2<.01. There was no main effect of quadrant group, F(1, 7295.11)=0.26, p=.610, η_p^2<.01, and no interaction including this factor emerged, all Fs<2.81, all ps>.094, all η_p^2<.01.

The type of number × location × perspective interaction was significant, F(1, 7295.12)=20.99, p<.001, η_p^2<.01. Follow-up analyses revealed that the number × location interaction was significant for 'self' trials, F(1, 7295.14)=31.33, p<.001, η_p^2<.01. Specifically, for non-ambiguous numbers, there was no significant difference in response time as a function of location (M_{table}=806.81, SD_{table}=331.80, M_{wall}=773.40, SD_{wall}=299.94), F(1, 7295.11)=2.57, p=.109, η_p^2<.01. However, for ambiguous numbers, participants took longer to answer when the number was displayed on the table rather than on the wall (M_{table}=1023.16, SD_{table}=376.48, M_{wall}=842.02, SD_{wall}=306.75), F(1, 7295.20)=89.60, p<.001, η_p^2<.01.

Turning to the 'other' trials, the type of number × location interaction was also significant, F(1, 7295.14)=379.73, p<.001, η_p^2=.03. Specifically, for non-ambiguous numbers, participants took more time to answer when the number was displayed on the table rather than on the wall (M_{table}=810.77, SD_{table}=315.06, M_{wall}=783.94, SD_{wall}=290.83), F(1, 7295.03)=7.16, p=.007, η_p^2<.01. This pattern emerged even more strongly for ambiguous numbers (M_{table}=1189.14, SD_{table}=398.25, M_{wall}=878.59, SD_{wall}=303.85), F(1, 7295.23)=900.46, p<.001, η_p^2=.08.

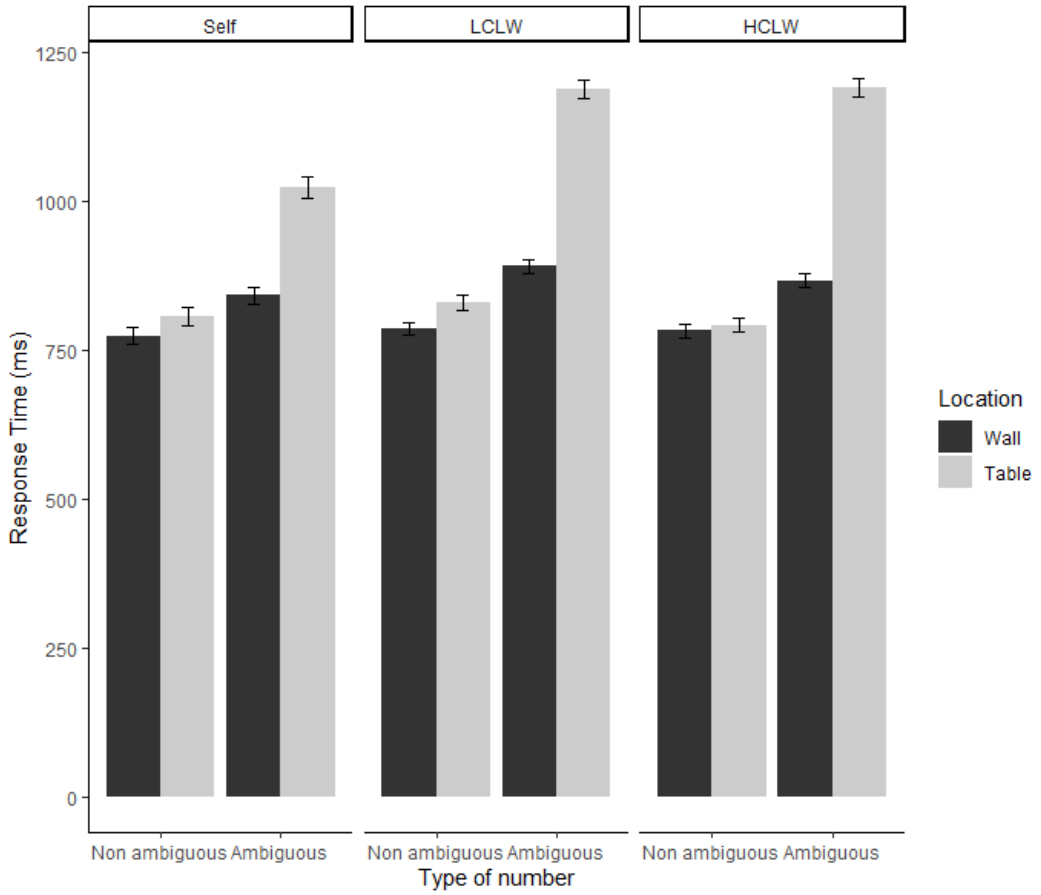


Figure 7. Graph of response time as a function of type of number, location, and perspective. Bars represent the standard error of the mean. LCLW=low competence low warmth; HCLW=high competence low warmth.

Errors. We submitted the errors (with 0 indicating a failed trial and 1 indicating a successful trial) to a 2 (type of number: non-ambiguous=0,8 vs. ambiguous=6,9) x 2 (location: wall vs. table) x 2 (perspective: self vs. other) x 2 (quadrant group: HCLW vs. LCLW) mixed model analysis with all four factors varying within participants and participants as random factor (for a visual representation of the data, see Figure 8). We found a significant main effect of type of number, location and perspective, indicating that participants were less likely to answer correctly when the number was ambiguous, *Odds Ratio* (*OR*)=0.54, z=-3.20, p=.001, when the number was on the table, *OR*=0.47, z=-4.01, p<.001, and when answering from their own perspective, *OR*=1.80, z=3.11, p=.002. There was no significant main effect of quadrant group, z=-1.74, p=.08.

The type of number × location × quadrant group interaction was significant, z=2.06, p=.04. Follow-up analyses revealed that the number × location interaction was significant for HCLW targets, z=-4.83, p<.001. Specifically, for non-ambiguous numbers, there was no

significant difference in errors as a function of location z=1.43, p=.150. However, for ambiguous numbers, participants were less likely to answer correctly when the number was displayed on the table rather than on the wall OR=0.11, z=-5.69, p<.001.

Turning to the LCLW targets, the type of number × location interaction was also significant z=-2.50, p=.012. Specifically, for non-ambiguous numbers, there was no significant difference in errors as a function of location, z=-0.67, p=.713. However, for ambiguous numbers, participants were less likely to answer correctly when the number was displayed on the table rather than on the wall OR=0.25, z=-4.15, p<.001. No other interaction proved significant, all zs<|1.76|, ps>.08.

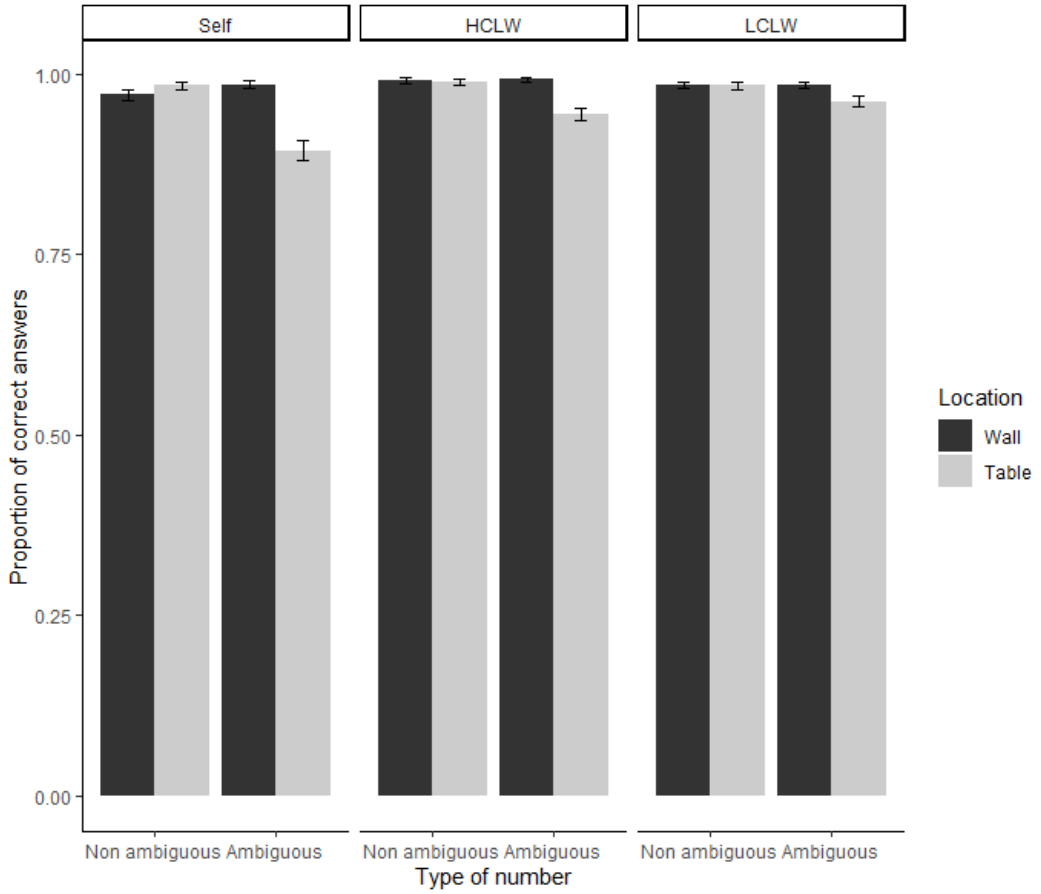


Figure 8. Graph of proportion of correct answers as a function of type of number, location, and perspective. Bars represent the standard error of the mean. LCLW=low competence low warmth; HCLW=high competence low warmth.

3.4. Experiment 4 – Additional analyses

Power calculations. We computed our power analysis to detect the number type (S) x location (L) x perspective (P) x quadrant group (Q) interaction, with participants (I) as random factor and 12 replicates. Planned contrasts were used to compare the two avatars.Var(error) was set at 0.111 and var(I*S*L*P*Q) was set at 0.019.

Response time. Following previous guidelines (Surtees et al., 2012; Simpson & Todd, 2017), we excluded failed trials from analyses. We submitted the response time to a 2 (type of number: non-ambiguous=0,8 vs. ambiguous=6,9) x 2 (location: wall vs. table) x 2 (perspective: self vs. other) x 2 (quadrant group: HCHW vs. LCLW) mixed model analysis with all four factors varying within participants and participants as random factor (for a visual representation of the data, see Figure 9). Significant effects of type number, location and perspective indicated that participants took more time answering when the number was ambiguous ($M_{ambiguous}$=1067.21, $SD_{ambiguous}$=391.33, $M_{non\text{-}ambiguous}$=849.49, $SD_{non\text{-}ambiguous}$=318.41), F(1, 4089.10)=390.31, p<.001, η_p^2=.06, on the table (M_{table}=1032.28, SD_{table}=407.66, M_{wall}=883.80, SD_{wall}=318.44), F(1, 4089.08)=173.80, p<.001, η_p^2=.03, and when answering from the avatar's perspective, regardless of the avatar's social group (M_{other}=966.95, SD_{other}=374.27, M_{self}=925.73, SD_{self}=365.19), F(1, 4089.10)=14.96, p<.001, η_p^2<.01. There was no main effect of quadrant group, F(1, 4089.05)=0.02, p=.875, η_p^2<.01, and no interaction including this factor emerged, all Fs<3.30, all ps>.07, all η_p^2<.01.

The type of number × location × perspective interaction was significant, F(1, 4089.14)=7.22, p=.007, η_p^2<.01. Follow-up analyses revealed that the number × location interaction was significant for 'self' trials, F(1, 4089.13)=25.83, p<.001, η_p^2<.01. Specifically, for non-ambiguous numbers, there was no significant difference in response time as a function of location (M_{table}=854.33, SD_{table}=348.93, M_{wall}=828.66, SD_{wall}=291.07), F(1, 4089.05)=0.36, p=.546, η_p^2<.01. However, for ambiguous numbers, participants took longer to answer when the number was displayed on the table rather than on the wall (M_{table}=1121.80, SD_{table}=395.48, M_{wall}=913.59, SD_{wall}=351.65), F(1, 4089.18)=60.49, p<.001, η_p^2=.01.

Turning to the 'other' trials, the type of number × location interaction was also significant, F(1, 4089.09)=211.47, p<.001, η_p^2<.04. Specifically, for non-ambiguous numbers, there was no significant difference in response time as a function of location (M_{table}=861.52, SD_{table}=325.16, M_{wall}=842.65, SD_{wall}=309.50), F(1, 4089.07)=1.67, p=.196, η_p^2<.01. However, for ambiguous numbers, participants took longer to answer when the number was displayed on the table rather than on the wall (M_{table}=1249.78, SD_{table}=397.67, M_{wall}=932.58, SD_{wall}=316.34), F(1, 4089.11)=470.31, p<.001, η_p^2=.08.

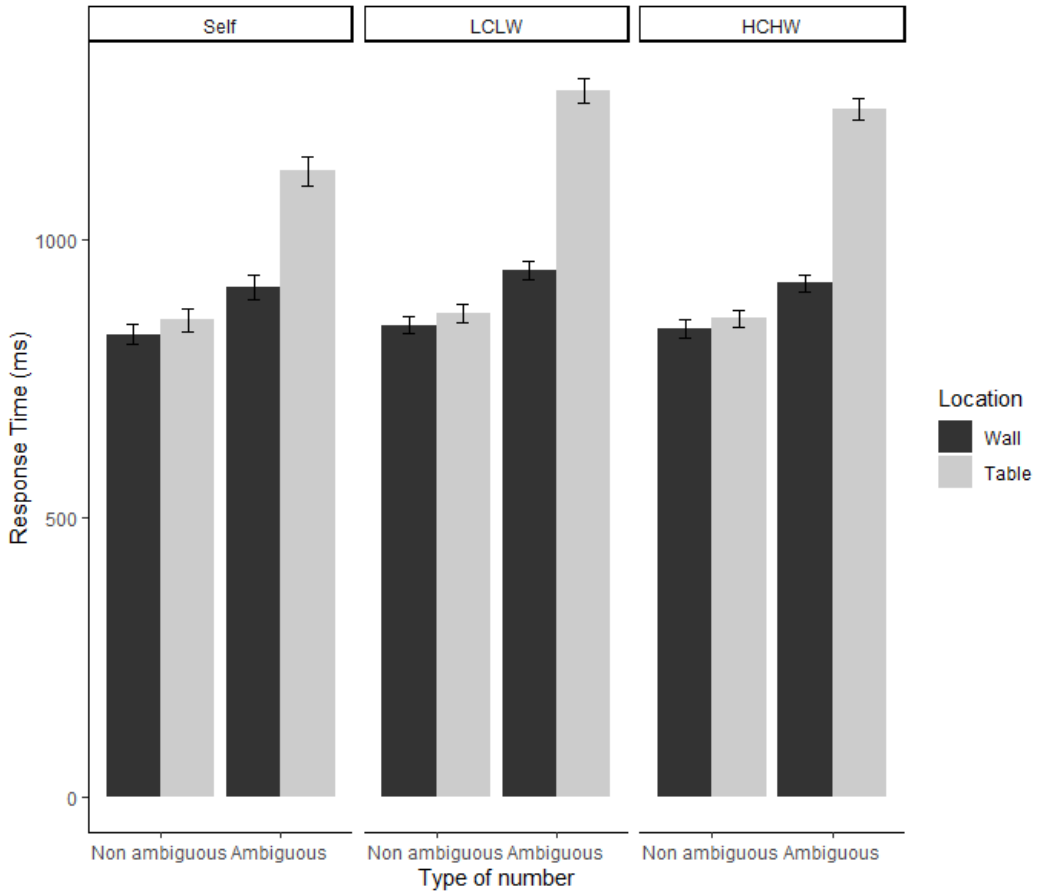


Figure 9. Graph of response time as a function of type of number, location, and perspective. Bars represent the standard error of the mean. LCLW=low competence low warmth; HCHW=high competence high warmth.

Errors. We submitted the errors (with 0 indicating a failed trial and 1 indicating a successful trial) to a 2 (type of number: non-ambiguous=0,8 vs. ambiguous=6,9) x 2 (location: wall vs. table) x 2 (perspective: self vs. other) x 2 (quadrant group: HCLW vs. LCLW) mixed model analysis with all four factors varying within participants and participants as random factor (for a visual representation of the data, see Figure 10). We found no significant main effect, all *z*s<|1.91|, *p*s>.056. The type of number × location interaction was significant, *z*=-4.33, *p*<.001. Specifically, for non-ambiguous numbers, there was no significant difference in errors as a function of location, *z*=1.67, *p*=.094. However, for ambiguous numbers, participants were less likely to answer correctly when the number was displayed on the table rather than on the wall *OR*=0.18, *z*=-4.51, *p*<.001. No other interaction proved significant, all *z*s<|1.25|, *p*s>.211.

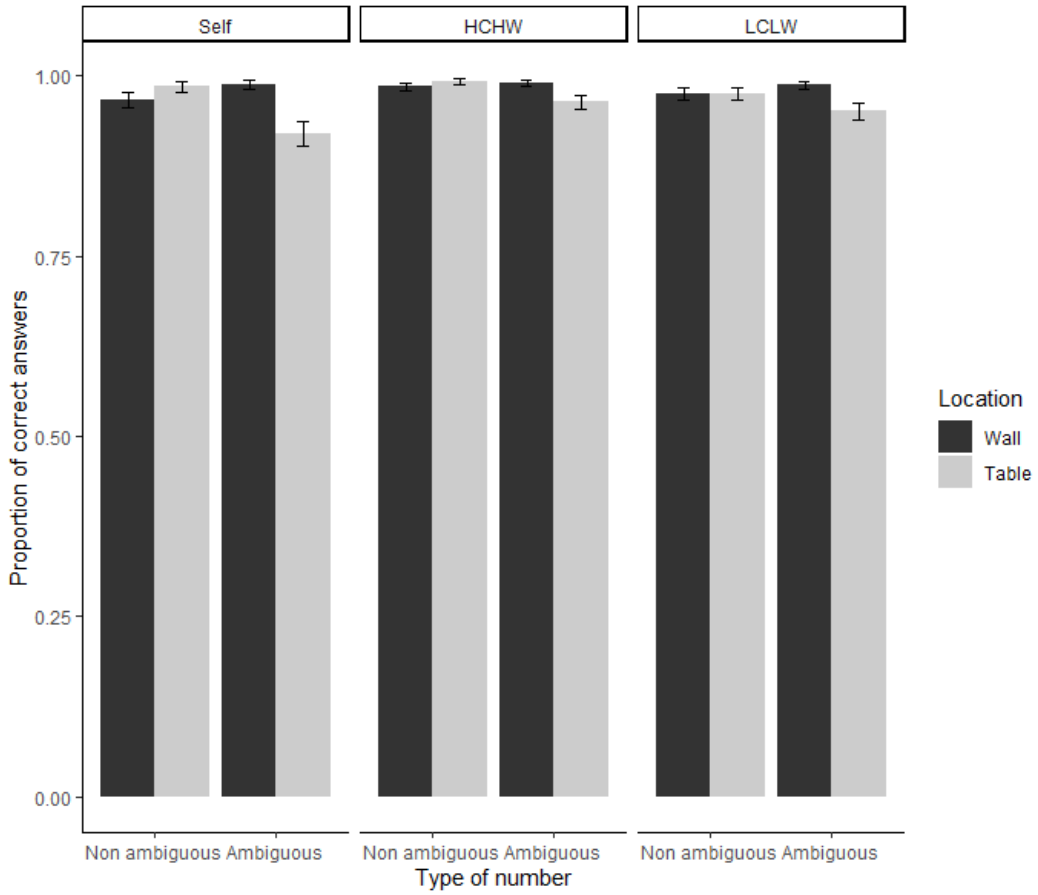


Figure 10. Graph of proportion of correct answers as a function of type of number, location, and perspective. Bars represent the standard error of the mean. LCLW=low competence low warmth; HCHW=high competence high warmth.

4. Chapter 5 – Supplementary Material 2

4.1. Additional Experiment 1

This experiment consists of an exact replication of the *social groups* condition of our first experiment.

4.1.1. Method

Power calculations. We conducted our power analysis for a 2 x 2 x 3 repeated measures design using the PANGEA webapp[1], and aimed for 90% power. Specifically, We computed our power analysis to detect the number type (S) x location (L) x perspective (P) interaction, with participants (I) as random factor and eight replicates. Planned contrasts were used to compare the two avatars.Var(error) was set at 0.2 and var(I*S*L*P) was set at 0.04. This analysis indicated that we needed at least 50 participants to achieve 90% power to detect a small effect (d=.2).

Participants and design. A total of 51 Belgian students (M_{age}=20.67, SD_{age}=4.41, 47 women) took part in the 25 min. study in exchange for partial course credits. The experiment involved a 2 (type of number: non-ambiguous=0 and 8 vs. ambiguous=6 and 9) x 2 (location: wall vs. table) x 3 (perspective: self vs. HCLW quadrant avatar vs. LCLW quadrant avatars) within-participant repeated measures design.

Procedure. The procedure was identical to that of Experiment 1, with the exception that we dropped the no social group condition.

4.1.2. Results

Analyses were performed using R (R Core Team, 2020), with the lme4 (Bates et al., 2015) and lmerTest (Kuznetsova et al., 2017) packages. Again, and following Surtees et al. (2012), trials for which participants had to press the N (incorrect) button were not considered, leaving out 64 of the 128 trials for each participant. We checked if any participant failed to perform above chance, which was not the case. Furthermore, and also as in Surtees and colleagues (2012), we excluded trials for which the response time was 2.5 SD away from the mean response time (0.88% of the remaining 64 trials per participant).

Inverse Efficiency Score. Following previous guidelines (Surtees et al., 2012; Simpson & Todd, 2017), we excluded failed trials from analyses. We submitted the IES to a 2 (type of number: non-ambiguous=0,8 vs. ambiguous=6,9) x 2 (location: wall vs. table) x 3 (perspective: self vs. HCLW quadrant avatars vs. LCLW quadrant avatars) mixed model analysis with all three factors varying within participants and participants as random factor (for a visual representation of the data, see Figure 1). Significant effects of type number and of location indicated that participants had more difficulties answering when the number was ambiguous ($M_{ambiguous}$=1199.67, $SD_{ambiguous}$=483.02, $M_{non\text{-}ambiguous}$=1016.65, $SD_{non\text{-}}$

[1] https://jakewestfall.shinyapps.io/

$_{ambiguous}$=445.09), F(1, 2828.63)=280.17, p<.001, η_p^2=.05, or on the table (M_{table}=1159.06, SD_{table}=489.61, M_{wall}=1052.99, SD_{wall}=450.23), F(1, 2828.79)=135.64, p<.001, η_p^2=.02.

A set of contrasts allowed us to compare the IES for 'self' versus 'other' (both HCLW and LCLW), as well for the HCLW vs. LCLW avatars. The 'self' versus 'other' contrast proved significant, F(1, 2828.07)=163.95, p<.001, η_p^2=.03, indicating that participants had more difficulties answering for the avatar than for themselves, regardless of the avatar's social group (M_{other}=1185.21, SD_{other}=500.81, M_{self}=1023.03, SD_{self}=427.55). There was no significant difference between the LCLW and the HCLW targets, F(1, 2828.76)=0.82, p=.366, η_p^2<.01. No interaction including this factor emerged, all Fs<2.83, all ps>.092, all η_p^2<.01.

The type of number × location × 'self' versus 'other' contrast interaction was significant, F(1, 2828.74)=17.84, p<.001, η_p^2<.01. Follow-up analyses revealed that the number × location interaction was significant for 'self' trials, F(1, 2828.72)=7.95, p=.005, η_p^2<.01. Specifically, for non-ambiguous numbers, there was no significant difference in difficulty as a function of location (M_{table}=970.90, SD_{table}=412.89, M_{wall}=943.38, SD_{wall}=365.07), F(1, 2828.28)=0.35, p=.556, η_p^2<.01. However, for ambiguous numbers, participants had more difficulties answering when the number was displayed on the table than on the wall (M_{table}=1151.32, SD_{table}=484.84, M_{wall}=1048.44, SD_{wall}=423.51), F(1, 2828.96)=19.77, p<.001, η_p^2=.01.

Turning to 'other' trials, the type of number × location interaction was also significant, F(1, 2828.75)=76.78, p<.001, η_p^2=.01. Specifically, for non-ambiguous numbers, there was no significant difference in difficulty as a function of location (M_{table}=1085.95, SD_{table}=459.11, M_{wall}=1066.72, SD_{wall}=513.85), F(1, 2828.47)=3.15, p=.076, η_p^2<.01. However, for ambiguous numbers, participants had more difficulties answering when the number was displayed on the table than on the wall (M_{table}=1484.88, SD_{table}=458.01, M_{wall}=1155.41, SD_{wall}=461.21), F(1, 2828.35)=187.74, p<.001, η_p^2=.03.

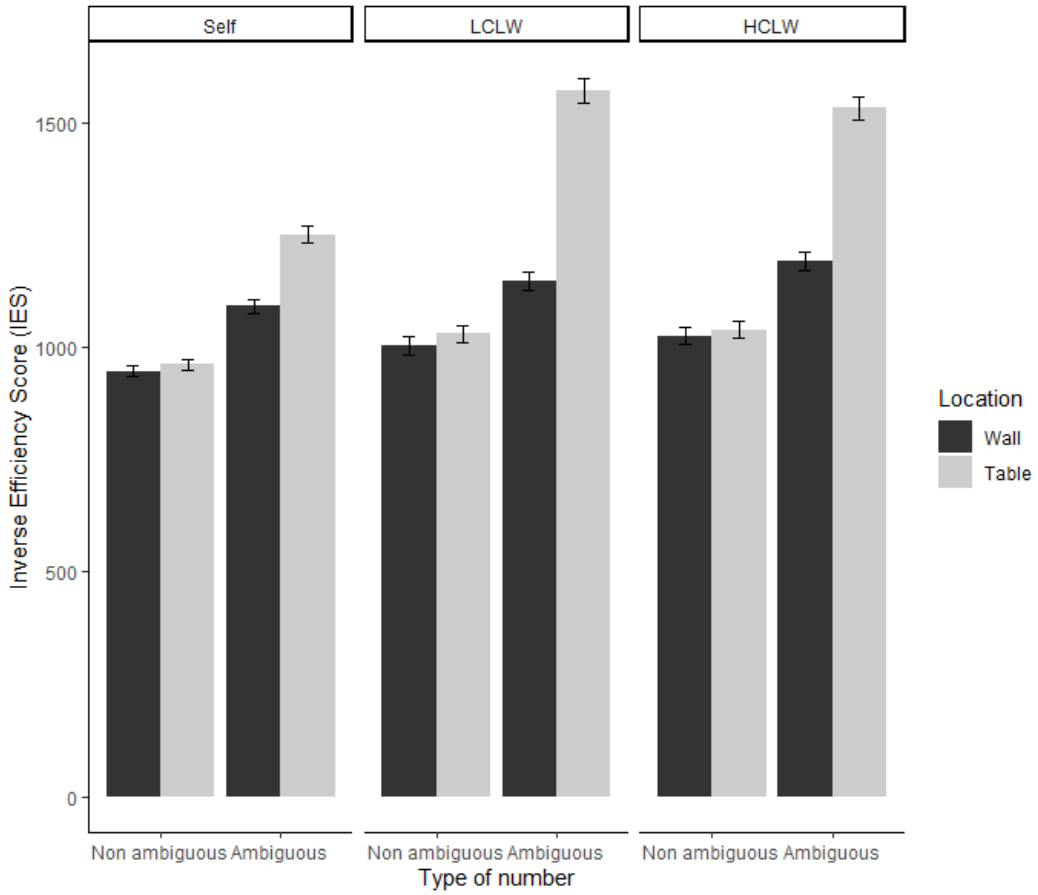


Figure 1. Graph of inverse efficiency score as a function of type of number, location, and perspective. Bars represent the standard error of the mean. LCLW=low competence low warmth; HCLW=high competence low warmth.

Response time. Following previous guidelines (Surtees et al., 2012; Simpson & Todd, 2017), we excluded failed trials from analyses. We submitted the response time in milliseconds to a 2 (type of number: non-ambiguous=0,8 vs. ambiguous=6,9) x 2 (location: wall vs. table) x 3 (perspective: self vs. HCLW quadrant avatars vs. LCLW quadrant avatars) mixed model analysis with all three factors varying within participants and participants as random factor (for a visual representation of the data, see Figure 2). Significant effects of type number and of location indicated that participants took more time answering when the number was ambiguous ($M_{ambiguous}$=1086.98, $SD_{ambiguous}$=400.79, $M_{non\text{-}ambiguous}$=905.35, $SD_{non\text{-}ambiguous}$=323.24), F(1, 2806.91)=366.29, p<.001, η_p^2=.08, or on the table (M_{table}=1045.14, SD_{table}=402.15, M_{wall}=942.99, SD_{wall}=337.82), F(1, 2807.20)=151.02, p<.001, η_p^2=.03.

A set of contrasts allowed us to compare the response time for 'self' versus 'other' (both HCLW and LCLW), as well for the HCLW vs. LCLW avatars. The 'self' versus 'other'

contrast proved significant, $F(1, 2807.93)=220.32$, $p<.001$, $\eta_p^2=.05$, indicating that participants took more time answering for the avatar than for themselves, regardless of the avatar's social group ($M_{other}=1068.28$, $SD_{other}=405.42$, $M_{self}=915.68$, $SD_{self}=321.01$). There was no significant difference between the LCLW and the HCLW targets, $F(1, 2807.19)=1.93$, $p=.165$, $\eta_p^2<.01$.

The location × HCLW versus LCLW avatars contrast interaction was significant, $F(1, 2805.99)=3.93$, $p=.048$, $\eta_p^2<.01$. Specifically, for the HCLW avatar, participants took longer to answer when the number was displayed on the table than on the wall ($M_{table}=1158.16$, $SD_{table}=446.20$, $M_{wall}=1019.43$, $SD_{wall}=364.27$), $F(1, 2807.16)=51.70$, $p<.001$, $\eta_p^2=.01$. This difference emerged even more strongly for the LCLW avatar ($M_{table}=1152.87$, $SD_{table}=426.12$, $M_{wall}=957.68$, $SD_{wall}=348.55$), $F(1, 2806.63)=96.09$, $p<.001$, $\eta_p^2=.02$. No further interaction including this factor emerged, all Fs<0.57, all ps>.450, all $\eta_p^2<.01$.

The type of number × location × 'self' versus 'other' contrast was significant, $F(1, 2807.18)=28.82$, $p<.001$, $\eta_p^2<.01$. Follow-up analyses revealed that the number × location interaction was significant for the 'self' trials, $F(1, 2807.14)=5.72$, $p=.017$, $\eta_p^2<.01$. Specifically, for non-ambiguous numbers, there was no significant difference in response times as a function of location ($M_{table}=867.19$, $SD_{table}=285.13$, $M_{wall}=853.30$, $SD_{wall}=290.33$), $F(1, 2806.25)=0.56$, $p=.456$, $\eta_p^2<.01$. However, for ambiguous numbers, participants took longer to answer when the number was displayed on the table than on the wall ($M_{table}=1022.01$, $SD_{table}=363.98$, $M_{wall}=940.51$, $SD_{wall}=323.39$), $F(1, 2807.67)=15.92$, $p<.001$, $\eta_p^2=.01$.

Turning to the 'other' trials, the type of number × location interaction was also significant, $F(1, 2807.27)=99.12$, $p<.001$, $\eta_p^2=.02$. Specifically, for non-ambiguous numbers, there was no significant difference in response times as a function of location ($M_{table}=964.66$, $SD_{table}=357.81$, $M_{wall}=937.50$, $SD_{wall}=342.14$), $F(1, 2806.47)=2.26$, $p=.133$, $\eta_p^2<.01$. However, for ambiguous numbers, participants took longer to answer when the number was displayed on the table than on the wall ($M_{table}=1383.55$, $SD_{table}=411.57$, $M_{wall}=1042.56$, $SD_{wall}=366.07$), $F(1, 2808.46)=228.23$, $p<.001$, $\eta_p^2=.05$.

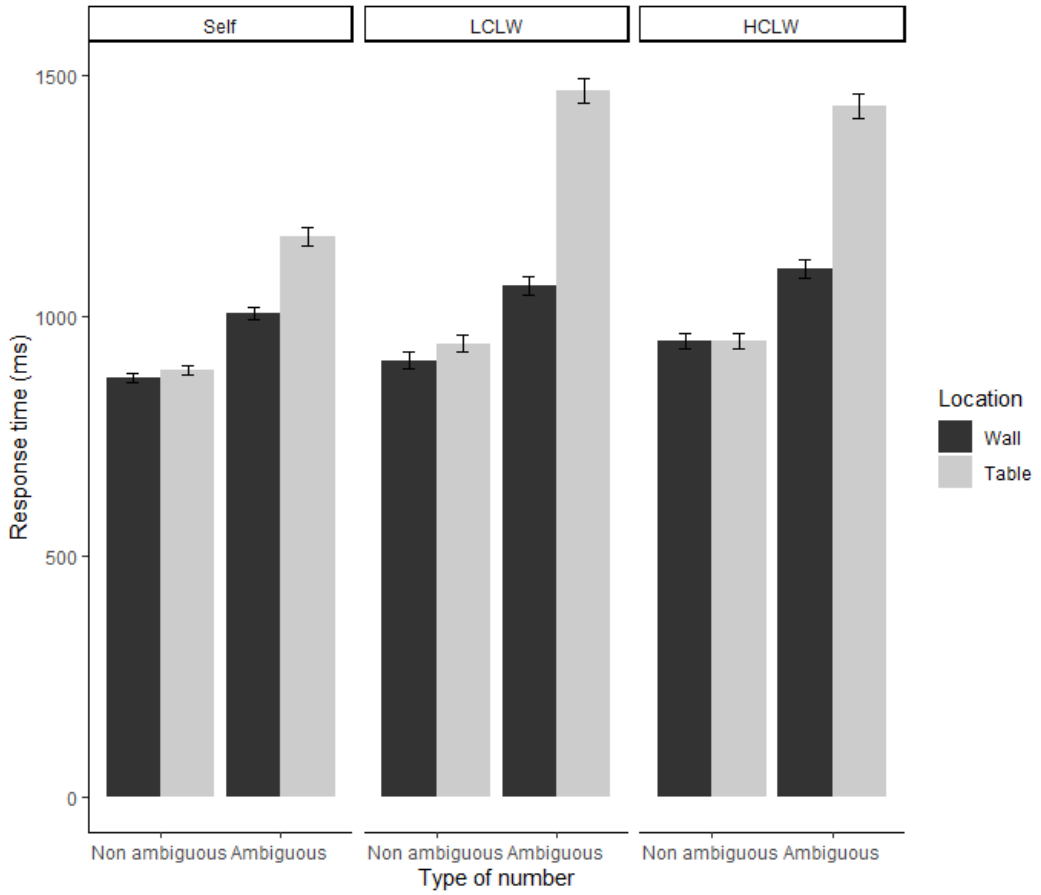


Figure 2. Graph of response time as a function of type of number, location, and perspective. Bars represent the standard error of the mean. LCLW=low competence low warmth; HCLW=high competence low warmth.

Errors. We submitted the errors (with 0 indicating a failed trial and 1 indicating a successful trial) to a 2 (type of number: non-ambiguous=0,8 vs. ambiguous=6,9) x 2 (location: wall vs. table) x 3 (perspective: self vs. HCLW quadrant avatars vs. LCLW quadrant avatars) logistic mixed model analysis with all three factors varying within participants and participants as random factor (for a visual representation of the data, see Figure 3). We found a significant main effect of type of number and location, indicating that participants were less likely to answer correctly when the number was ambiguous, *Odds Ratio* (*OR*)=0.40, z=-5.61, p<.001, or when the number was on the table, *OR*=0.38, z=-5.99, p<.001. Turning to the effect of perspective, the 'self' versus 'other' contrast was not significant, z=-0.31, p=.753. The HCLW versus LCLW contrast proved significant, indicating that participants were less likely to answer correctly for the LCLW than for the HCLW avatar, *OR*=0.60, z=-2.36, p=.018. No interaction including this factor emerged, all zs<|1.16|, ps>.246

The type of number × location interaction was significant, z=-4.11, p<.001. Specifically, for non-ambiguous numbers, participants were no less likely to answer correctly when the number appeared on the table, z=-1.23, p=.217. However, for ambiguous numbers, they were less likely to answer correctly when they appeared on the table, OR=0.20, z=-7.97, p<.001. No other interaction proved significant, all zs<|1.40|, ps>.161.

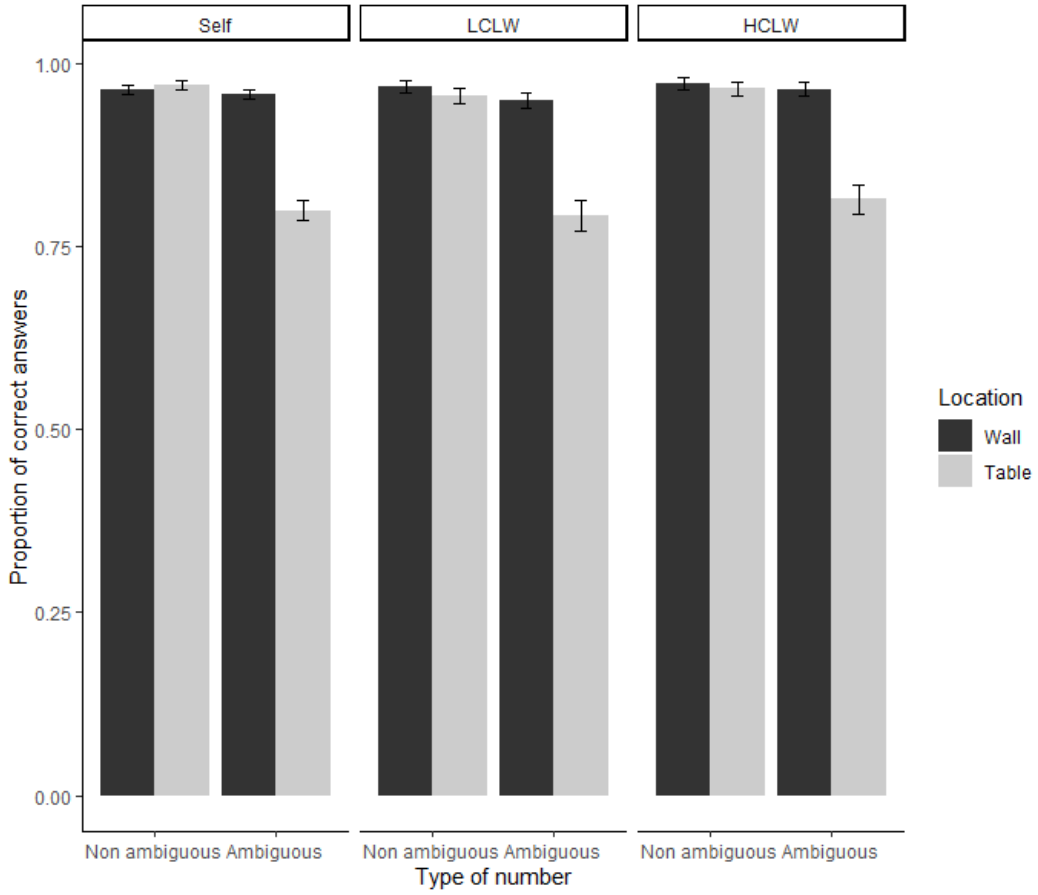


Figure 3. Graph of proportion of correct answers as a function of type of number, location, and perspective. Bars represent the standard error of the mean. LCLW=low competence low warmth; HCLW=high competence low warmth.

5. Chapter 5 – Supplementary Material 3

5.1. Additional Experiment 2

This experiment consists of an exact replication of the *social groups* condition of our first experiment.

5.1.1. Method

Power calculations. We conducted our power analysis for a 2 x 2 x 3 repeated measures design using the PANGEA webapp, and aimed for 90% power. Specifically, we computed our power analysis to detect the number type (S) x location (L) x perspective (P) interaction, with participants (I) as random factor and eight replicates. Planned contrasts were used to compare the two avatars. Var(error) was set at 0.2 and var(I*S*L*P) was set at 0.04. This analysis indicated that we needed at least 50 participants to achieve 90% power to detect a small effect (d=.2).

Participants and design A total of 101 French-speaking participants (M_{age}=29.49, SD_{age}=9.79, 39 women) took part in the 25 min. study on Prolific Academic[2] (prolific.co) in exchange of a financial compensation of £2.30. The experiment involved a 2 (type of number: non-ambiguous=0 and 8 vs. ambiguous=6 and 9) x 2 (location: wall vs. table) x 3 (perspective: self vs. HCLW quadrant avatar vs. LCLW quadrant avatars) within-participant repeated measures design.

Procedure. The procedure was identical to that of Additional Experiment 1, with a few modifications from taken Experiment 2. First, we raised the number of trials to 192. Second, we randomly asked participants to indicate the social group of the avatar in the previous trial. This was asked fifteen times throughout the task. Finally, there was no time pressure. That is, we asked participants to answer as correctly as possible, and asked them to take their time to ensure that they produced a correct answer.

5.1.2. Results

Analyses were performed using R (R Core Team, 2020), with the lme4 (Bates et al., 2015) and lmerTest (Kuznetsova et al., 2017) packages. Again, and following Surtees et al. (2012), trials for which participants had to press the N (incorrect) button were not considered, leaving out 96 of the 192 trials for each participant. We checked if any participant failed to perform above chance, which was not the case. Furthermore, and also as in Surtees and colleagues (2012), we excluded trials for which the response time was 2.5 SD away from the mean response time (0.97% of the remaining 96 trials per participant).

Inverse Efficiency Score. Following previous guidelines (Surtees et al., 2012; Simpson & Todd, 2017), we excluded failed trials from analyses. We submitted the IES to a 2 (type of number: non-ambiguous=0,8 vs. ambiguous=6,9) x 2 (location: wall vs. table) x 3 (perspective: self vs. HCLW quadrant avatars vs. LCLW quadrant avatars) mixed model

[2] https://prolific.co/

analysis with all three factors varying within participants and participants as random factor (for a visual representation of the data, see Figure 1). Significant effects of type number and of location indicated that participants had more difficulties answering when the number was ambiguous ($M_{ambiguous}$=1442.07, $SD_{ambiguous}$=877.53, $M_{non\text{-}ambiguous}$=1166.88, $SD_{non\text{-}ambiguous}$=848.17), F(1, 9277.62)=299.09, p<.001, η_p^2=.02, or on the table (M_{table}=1414.77, SD_{table}=921.51, M_{wall}=1194.22, SD_{wall}=806.73), F(1, 9277.44)=199.91, p<.001, η_p^2=.02.

A set of contrasts allowed us to compare the IES for 'self' versus 'other' (both HCLW and LCLW), as well for the HCLW vs. LCLW avatars. The 'self' versus 'other' contrast proved significant, F(1, 9277.66)=54.96, p<.001, η_p^2<.01, indicating that participants had more difficulties answering for the avatar than for themselves, regardless of the avatar's social group (M_{other}=1343.42, SD_{other}=863.41, M_{self}=1220.26, SD_{self}=888.54). There was no significant difference between the LCLW and the HCLW targets, F(1, 9277.05)=0.38, p=.536, η_p^2<.01. No interaction including this factor emerged, all Fs<0.36, all ps>.546, all η_p^2<.01.

The type of number × location × 'self' versus 'other' contrast interaction was significant, F(1, 9277.49)=6.08, p=.014, η_p^2<.01. Follow-up analyses revealed that the number × location interaction was significant for 'self' trials, F(1, 9277.64)=13.81, p<.001, η_p^2<.01. Specifically, for non-ambiguous numbers, there was no significant difference in difficulty as a function of location (M_{table}=1133.02, SD_{table}=833.32, M_{wall}=1142.50, SD_{wall}=935.36), F(1, 9277.11)=0.05, p=.817, η_p^2<.01. However, for ambiguous numbers, participants had more difficulties answering when the number was displayed on the table than on the wall (M_{table}=1411.64, SD_{table}=849.03, M_{wall}=1210.45, SD_{wall}=904.13), F(1, 9278.22)=24.69, p<.001, η_p^2=.01.

Turning to 'other' trials, the type of number × location interaction was also significant, F(1, 9277.35)=92.09, p<.001, η_p^2=.01. Specifically, for non-ambiguous numbers, participants had more difficulties answering when the number was displayed on the table than on the wall (M_{table}=1232.32, SD_{table}=947.34, M_{wall}=1130.70, SD_{wall}=686.97), F(1, 9277.37)=14.43, p<.001, η_p^2<.01. This effect emerged even more strongly for ambiguous numbers (M_{table}=1750.99, SD_{table}=877.21, M_{wall}=1274.89, SD_{wall}=790.03), F(1, 9277.26)=298.87, p<.001, η_p^2=.02.

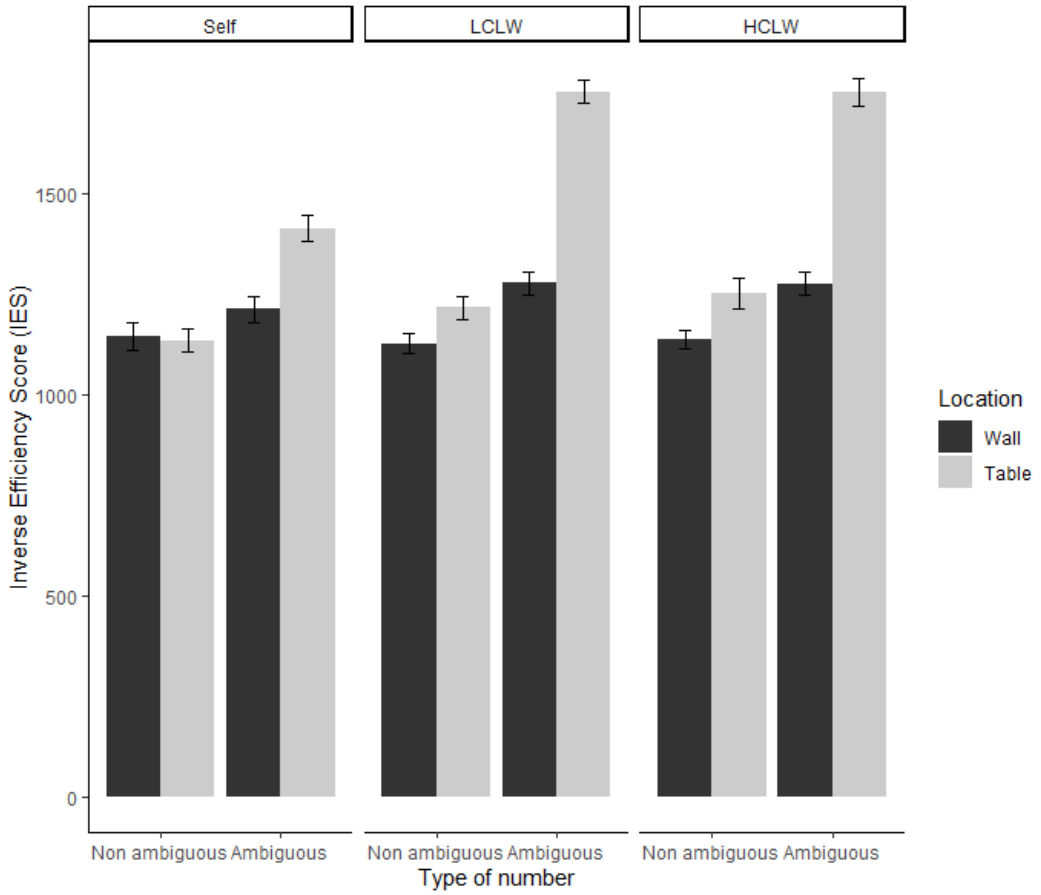


Figure 1. Graph of inverse efficiency score as a function of type of number, location, and perspective. Bars represent the standard error of the mean. LCLW=low competence low warmth; HCLW=high competence low warmth.

Response time. Following previous guidelines (Surtees et al., 2012; Simpson & Todd, 2017), we excluded failed trials from analyses. We submitted the response time in milliseconds to a 2 (type of number: non-ambiguous=0,8 vs. ambiguous=6,9) x 2 (location: wall vs. table) x 3 (perspective: self vs. HCLW quadrant avatars vs. LCLW quadrant avatars) mixed model analysis with all three factors varying within participants and participants as random factor (for a visual representation of the data, see Figure 2). Significant effects of type number and of location indicated that participants took more time answering when the number was ambiguous ($M_{ambiguous}$=1398.60, $SD_{ambiguous}$=828.16, $M_{non\text{-}ambiguous}$=1130.75, $SD_{non\text{-}ambiguous}$=786.81), F(1, 9277.74)=327.99, p<.001, η_p^2=.03, or on the table (M_{table}=1371.91, SD_{table}=860.55, M_{wall}=1157.47, SD_{wall}=760.88), F(1, 9277.56)=216.80, p<.001, η_p^2=.02.

A set of contrasts allowed us to compare the response time for 'self' versus 'other' (both HCLW and LCLW), as well for the HCLW vs. LCLW avatars. The 'self' versus 'other'

contrast proved significant, $F(1, 9277.78)=61.37$, $p<.001$, $\eta_p^2<.01$, indicating that participants took more time answering for the avatar than for themselves, regardless of the avatar's social group ($M_{other}=1302.97$, $SD_{other}=814.86$, $M_{self}=1181.91$, $SD_{self}=819.96$). There was no significant difference between the LCLW and the HCLW targets, $F(1, 9277.19)=0.24$, $p=.625$, $\eta_p^2<.01$. No interaction including this factor emerged, all Fs<0.42, all ps>.515, all $\eta_p^2<.01$.

The type of number × location × 'self' versus 'other' contrast was significant, $F(1, 9277.62)=6.36$, $p=.012$, $\eta_p^2<.01$. Follow-up analyses revealed that the number × location interaction was significant for the 'self' trials, $F(1, 9277.76)=15.95$, $p<.001$, $\eta_p^2<.01$. Specifically, for non-ambiguous numbers, there was no significant difference in response times as a function of location ($M_{table}=1095.95$, $SD_{table}=743.51$, $M_{wall}=1105.57$, $SD_{wall}=859.10$), $F(1, 9277.24)=0.07$, $p=.799$, $\eta_p^2<.01$. However, for ambiguous numbers, participants took longer to answer when the number was displayed on the table than on the wall ($M_{table}=1372.76$, $SD_{table}=829.31$, $M_{wall}=1170.28$, $SD_{wall}=817.37$), $F(1, 9278.32)=28.45$, $p<.001$, $\eta_p^2<.01$.

Turning to the 'other' trials, the type of number × location interaction was also significant, $F(1, 9277.47)=101.86$, $p<.001$, $\eta_p^2=.02$. Specifically, for non-ambiguous numbers, participants took longer to answer when the number was displayed on the table than on the wall ($M_{table}=1193.44$, $SD_{table}=869.16$, $M_{wall}=1098.17$, $SD_{wall}=672.51$), $F(1, 9277.50)=14.69$, $p<.001$, $\eta_p^2<.01$. This effect emerged even more strongly for ambiguous numbers ($M_{table}=1699.15$, $SD_{table}=817.94$, $M_{wall}=1235.91$, $SD_{wall}=756.21$), $F(1, 9277.70)=314.91$, $p<.001$, $\eta_p^2=.03$.

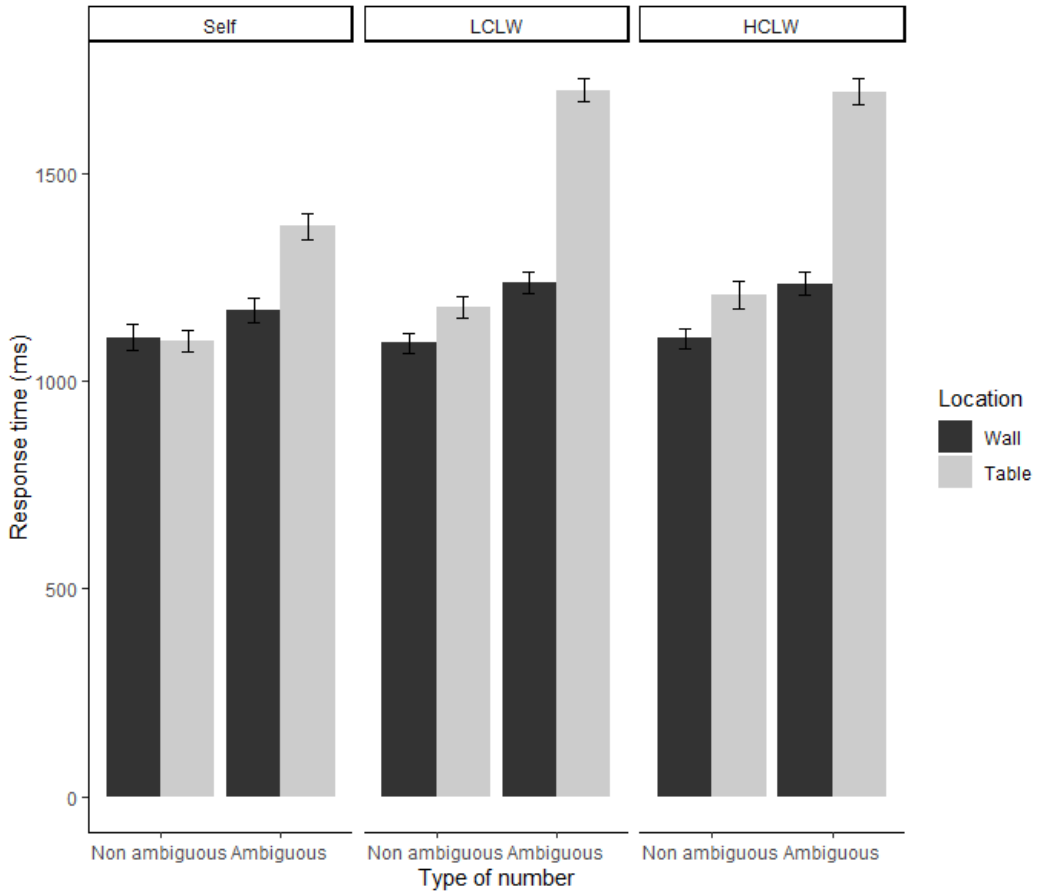


Figure 2. Graph of response time as a function of type of number, location, and perspective. Bars represent the standard error of the mean. LCLW=low competence low warmth; HCLW=high competence low warmth.

Errors. We submitted the errors (with 0 indicating a failed trial and 1 indicating a successful trial) to a 2 (type of number: non-ambiguous=0,8 vs. ambiguous=6,9) x 2 (location: wall vs. table) x 3 (perspective: self vs. HCLW quadrant avatars vs. LCLW quadrant avatars) logistic mixed model analysis with all three factors varying within participants and participants as random factor (for a visual representation of the data, see Figure 3). We found a significant main effect of type of number and location, indicating that participants were less likely to answer correctly when the number was ambiguous, *Odds Ratio* (*OR*)=0.59, z=-3.44, p<.001, or when the number was on the table, *OR*=0.38, z=-6.43, p<.001. Turning to the effect of perspective, the 'self' versus 'other' contrast was significant, indicating that participants were less likely to answer correctly when answering from their own perspective, *OR*=1.46, z=2.50, p=.012. The HCLW versus LCLW contrast did not prove significant, indicating that participants were no less likely to answer correctly

for the LCLW than for the HCLW avatar, z=-0.45, p=.651. No interaction including this factor emerged, all zs<|1.08|, ps>.281

The type of number × location interaction was significant, z=-1.66, p<.001. Specifically, for non-ambiguous numbers, participants were no less likely to answer correctly when the number appeared on the table, z=-0.64, p=.521. However, for ambiguous numbers, they were less likely to answer correctly when they appeared on the table, OR=0.16, z=-8.69, p<.001. No other interaction proved significant, all zs<|1.51|, ps>.132.

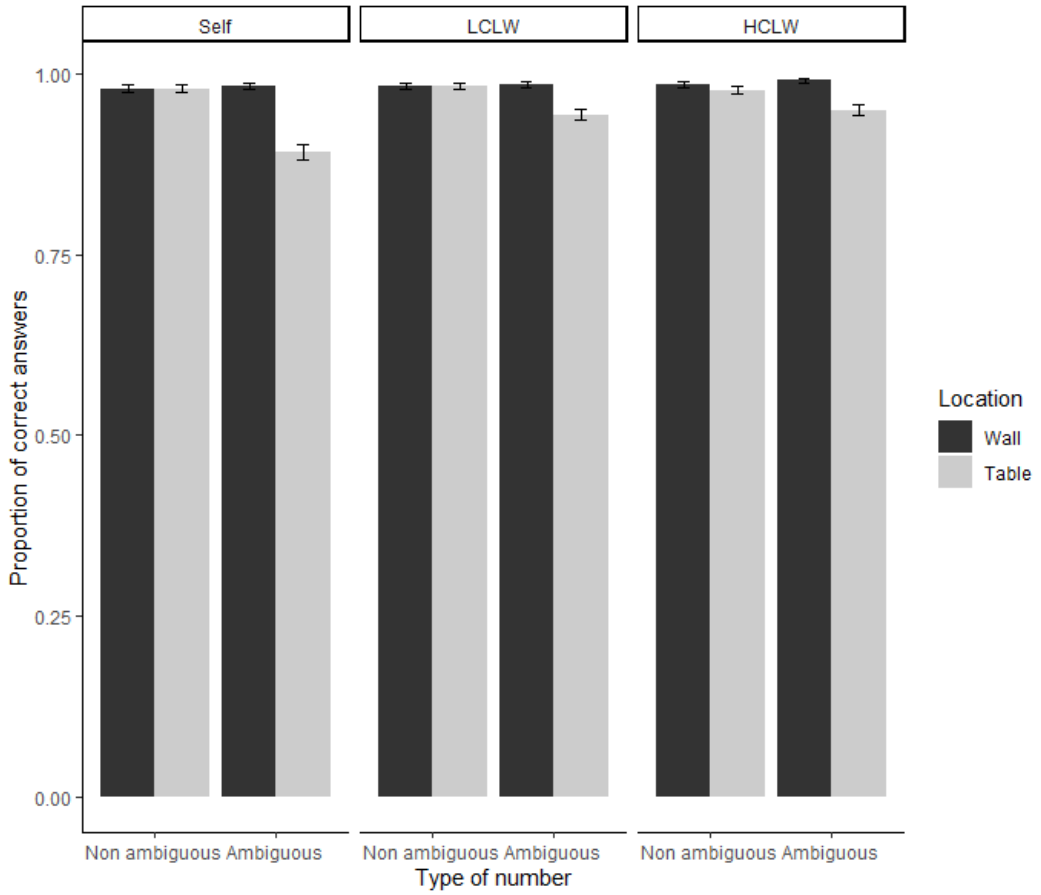


Figure 3. Graph of proportion of correct answers as a function of type of number, location, and perspective. Bars represent the standard error of the mean. LCLW=low competence low warmth; HCLW=high competence low warmth.

6. Chapter 6 – Supplementary Material

6.1. Experiment 1 – Additional analyses

We report here additional exploratory analyses not reported in the main text. As these analyses are exploratory, we limit ourselves to reporting the results without further discussion.

After visual inspection, we selected the following time windows for each component: 80–120ms for P1, 70–110ms for N1, 120–160ms for N170, 140–200ms for P2. As in Study 1, we clustered electrodes in one region of interest. We maximized component appearance by averaging activity in frontal and central electrodes for the N1 and P2 components (AFz, AF3/AF4, AF7/AF8, Fz, F3/F4, F5/F6, F7/F8, FCz, FC5/FC6, C3/C4), and parietal and occipital electrodes for the P1 and N170 components (O1/O2, PO7/PO8, Oz).

Power calculations. We computed our power analysis to detect the Target (T) x Stimulation (S) interaction, with participants (I) and stimuli (F) as random factors and 12 replicates. There was a total of 80 different stimuli. Var(error) was set at 0.135, var(I*F*T*S) was set at 0.027, var(F*T*S) was set at 0.054, and var (I*T*S) was set at 0.054.

6.1.1. Results

Pain Decision Task. In addition to the analyses reported in the main text, we also conducted analyses on the mean response time and the error rate separately. We submitted the mean response time to a 2 (Target: Alcoholic *vs.* Psychologist) × 2 (Stimulation: painless *vs.* painful) linear mixed models, with both factors varying within subjects and participants as random. No main effect nor interaction emerged significant, Fs<0.66, ps>.418. We submitted the error rate as a binary variable to a 2 (Target: HCHW *vs.* LCLW) × 2 (Stimulation: painful *vs.* painless) logistic linear mixed models, with both factors varying within subjects and participants as random. We found a main effect of Target, z=-5.16, p<.001, Odds Ratio (OR)=0.79, indicating that participants were more likely to answer correctly for psychologist compared to alcoholic targets. We also found a main effect or Stimulation, z=-8.07, p<.001, Odds Ratio (OR)=0.69, indicating that participants were more likely to answer correctly for painful compared to painless trials. In addition, we found a significant Target × Stimulation interaction, z=-3.42, p<.001, Odds Ratio (OR)=0.73. Specifically, participants were more likely to answer correctly for painful compared to painless trials for alcoholic targets, z=-3.16, p=.002, Odds Ratio (OR)=0.81. However, this effect proved stronger for psychologist targets, z=-8.50, p<.001, Odds Ratio (OR)=0.59.

Event-Related Potential – Additional components. As exploratory analyses, we subjected mean area under the curve of each listed component to a 2 (Target: Alcoholic *vs.* Psychologist) × 2 (Stimulation: painless *vs.* painful) × 3 (Hemisphere: central *vs.* left *vs.* right) linear mixed model, with all three factors varying within subjects and participants as random.

For the P1 component, we observed a significant Hemisphere effect, $F(2, 635)=67.65$, $p<.001$, $\eta_p^2=.070$. No other effect nor any interaction emerged significant, Fs<0.68, ps>.507.

For the N1 component, we observed a significant Target effect, $F(1, 2267)=5.22$, $p=.022$, $\eta_p^2<.001$, as well as a significant Stimulation effect, $F(1, 2267)=12.62$, $p<.001$, $\eta_p^2<.002$, and a significant Hemisphere effect, $F(2, 2267)=171.26$, $p<.001$. $\eta_p^2=.064$. We also found a significant Target × Stimulation interaction, $F(1, 2267)=13.15$, $p<.001$, $\eta_p^2=.003$. Specifically, we observed a difference between painless and painful stimuli for alcoholic targets, $F(1, 2267)=25.77$, $p<.001$, $\eta_p^2=.005$. However, this difference was not significant for psychologist targets, $F(1, 2267)<0.01$, $p=.958$, $\eta p2<.001$. No other effect nor any interaction emerged significant, Fs<0.35, ps >.704.

For the N170 component, we observed a significant Stimulation effect, $F(1, 635)=4.32$, $p=.038$, $\eta_p^2=.002$, as well as a significant Hemisphere effect, $F(2, 635)=5.46$, $p=.004$, $\eta_p^2=.005$. No other effect nor any interaction emerged significant, Fs<1.53, ps>.217.

For the P2 component, we observed a significant Stimulation effect, $F(1, 2267)=50.80$, $p<.001$, $\eta_p^2<.005$, as well as a significant Hemisphere effect, $F(2, 2267)=11.01$, $p<.001$. $\eta_p^2=.002$. We also found a significant Target × Stimulation interaction, $F(1, 2267)=15.02$, $p<.001$, $\eta_p^2=.002$. Specifically, we observed a difference between painless and painful stimuli for alcoholic targets, $F(1, 2267)=60.53$, $p<.001$, $\eta_p^2=.006$. However, this difference proved weaker for psychologist targets, $F(1, 2267)=5.29$, $p=.022$, $\eta p2=.001$. No other effect nor any interaction emerged significant, Fs<0.18, ps >.668.

ERP – Interaction with IRI (Fantasy subscale). As exploratory analyses, we subjected mean area under the curve of our components of interest (i.e., N2-N3; P3) to a 2 (Target: Alcoholic *vs.* Psychologist) × 2 (Stimulation: painless *vs.* painful) × Score on the IRI Fantasy subscale linear mixed model, with both factors varying within subjects and participants as random.

For the N2-N3 component, we observed a significant Target effect, $F(1, 1320)=9.06$, $p=.003$, $\eta_p^2=.006$, as well as a significant Stimulation effect, $F(1, 1320)=15.83$, $p<.001$, $\eta_p^2=.010$. We also found a significant Target × Fantasy interaction, $F(1, 1320)=8.19$, $p=.004$, $\eta_p^2=.005$. Additionally, we also found a significant Stimulation × Fantasy interaction, $F(1, 1320)=11.55$, $p<.001$, $\eta_p^2=.007$. No other effect nor any interaction emerged significant, Fs<0.59, ps >.444.

For the P3 component, we observed a significant Target effect, $F(1, 1184)=8.55$, $p=.004$, $\eta_p^2=.006$. No other effect nor any interaction emerged significant, Fs<2.99, ps >.084.

ERP – Interaction with IRI (Perspective Taking subscale). As exploratory analyses, we subjected mean area under the curve of our components of interest (i.e., N2-N3; P3) to a 2 (Target: Alcoholic *vs.* Psychologist) × 2 (Stimulation: painless *vs.* painful) × Score on the IRI Perspective Taking subscale linear mixed model, with both factors varying within subjects and participants as random.

For the N2-N3 component, no effect nor any interaction emerged significant, Fs<0.06, ps >.800.

For the P3 component, no effect nor any interaction emerged significant as well, Fs<1.12, ps >.290.

ERP – Interaction with IRI (Empathic Concern subscale). As exploratory analyses, we subjected mean area under the curve of our components of interest (i.e., N2-N3; P3) to a 2 (Target: Alcoholic *vs.* Psychologist) × 2 (Stimulation: painless *vs.* painful) × Score on the IRI Empathic Concern subscale linear mixed model, with both factors varying within subjects and participants as random.

For the N2-N3 component, we observed a significant Target effect, $F(1, 1320)=3.96$, $p=.047$, $\eta_p^2=.003$. No other effect or interaction emerged significant, Fs<3.53, ps >.061.

For the P3 component, we observed a significant Target × Stimulation interaction, $F(1, 1184)=4.46$, $p=.035$, $\eta_p^2=.003$. No other effect or interaction emerged significant, Fs<3.54, ps >.060.

ERP – Interaction with IRI (Personal Distress subscale). As exploratory analyses, we subjected mean area under the curve of our components of interest (i.e., N2-N3; P3) to a 2 (Target: Alcoholic *vs.* Psychologist) × 2 (Stimulation: painless *vs.* painful) × Score on the IRI Personal Distress subscale linear mixed model, with both factors varying within subjects and participants as random.

For the N2-N3 component, no effect nor any interaction emerged significant, Fs<0.64, ps >.423.

For the P3 component, we observed a significant Stimulation effect, $F(1, 1184)=4.24$, $p=.040$, $\eta_p^2=.003$. No other effect or interaction emerged significant, Fs<1.10, ps >.294.

6.2. Experiment 2 – Additional analyses

After visual inspection, we selected the following time windows for each component: 80–120ms for P1, 70–110ms for N1, 120–160ms for N170, 140–200ms for P2. Following standard procedure in such designs (Sessa et al., 2014; Coll, 2018; Granjon et al., 2023), we clustered electrodes in one region of interest. We maximized component appearance by averaging activity in frontal and central electrodes for the N1 and P2 components (AFz, AF3/AF4, AF7/AF8, Fz, F3/F4, F5/F6, F7/F8, FCz, FC5/FC6, C3/C4)

Power calculations. We computed our power analysis to detect the Target (T) x Stimulation (S) interaction, with participants (I) as random factors and 10 replicates. There was a total of 48 different stimuli. Var(error) was set at 0.333, and var(I* T*S) was set at 0.083.

6.2.1. Results

Pain Decision Task. In addition to the analyses reported in the main text, we also conducted analyses on the mean response time and the error rate separately. We submitted the mean response time to a 2 (Target: LCLW *vs.* HCHW) × 2 (Stimulation: painless *vs.* painful) linear mixed models, with both factors varying within subjects and participants as random. No main effect nor interaction emerged significant, Fs<1.07, ps>.301. We submitted the error rate as a binary variable to a 2 (Target: LCLW *vs.* HCHW) × 2 (Stimulation: painless *vs.* painful) logistic linear mixed models, with both factors varying within subjects and participants as random. We found a main effect of Stimulation, z=2.11, p=.035, Odds Ratio (OR)=1.25, indicating that participants were more likely to answer correctly for painless compared to painful trials. No main effect nor interaction emerged significant, Fs<1.07, ps>.301.

Event-Related Potential – Additional components. As exploratory analyses, we subjected mean area under the curve of each listed component to a 2 (Target: LCLW *vs.* HCHW) × 2 (Stimulation: painless *vs.* painful) × 3 (Hemisphere: central *vs.* left *vs.* right) linear mixed models, with all three factors varying within subjects and participants as random.

For the P1 component, we observed a significant Stimulation effect, F(1, 597)=5.03, p=.0025, η_p^2=.002, as well as a significant Hemisphere effect, F(2, 597)=53.05, p<.001, η_p^2=.173. No other effect nor any interaction emerged significant, Fs< 3.51, ps >.061.

For the N1 component, we observed a significant Quadrant effect, F(1, 2133)=4.76, p=.029, η_p^2=.001, as well as a significant Hemisphere effect, F(2, 2133)=58.74, p<.001, η_p^2=.030. No other effect nor any interaction emerged significant, Fs< 0.50, ps >.479.

For the N170 component, we observed a significant Quadrant effect, F(1, 597)=3.93, p=.048, η_p^2=.001, as well as a significant Hemisphere effect, F(2, 597)=28.57, p<.001, η_p^2=.015. We also found a significant Quadrant × Stimulation interaction, F(1, 597)=5.32, p=.021, η_p^2<.001. Specifically, there was no significant difference between painless

compared to painful stimulation for LCLW targets, $F(1, 597)=1.32$, $p=.252$, $\eta_p^2<.001$. However, this difference proved significant for HCHW targets, $F(1, 597)=4.48$, $p=.035$, $\eta_p^2=.001$. No other effect nor any interaction emerged significant, Fs<1.01, ps>.364.

For the P2 component, we observed a significant Hemisphere effect, $F(2, 2133)=27.16$, $p<.001$, $\eta_p^2=.005$. No other effect nor any interaction emerged significant, Fs<2.78, ps>.096.

Finally, for the LPP component, we observed a significant Quadrant effect, $F(1, 9301)=4.94$, $p=.026$, $\eta_p^2=.001$, as well as a significant Stimulation effect, $F(1, 9301)=5.83$, $p=.016$, $\eta_p^2=.001$, and a significant Hemisphere effect, $F(2, 9301)=5.29$, $p=.005$, $\eta_p^2=.001$. However, no interaction emerged significant, Fs<0.91, ps>.340.

ERP – Interaction with IRI (Fantasy subscale). As exploratory analyses, we subjected mean area under the curve of our components of interest (i.e., N2-N3; P3) to a 2 (Target: LCLW *vs.* HCHW) × 2 (Stimulation: painless *vs.* painful) × Score on the IRI Fantasy subscale linear mixed model, with both factors varying within subjects and participants as random.

For the N2-N3 component, we observed a significant Stimulation effect, $F(1, 1242)=4.80$, $p=.029$, $\eta_p^2=.003$. We also found a significant Target × Stimulation interaction, $F(1, 1242)=6.54$, $p=.011$, $\eta_p^2=.004$. Additionally, we also found a significant Target × Stimulation × Fantasy interaction, $F(1, 1242)=6.82$, $p=.009$, $\eta_p^2=.005$. No other effect nor any interaction emerged significant, Fs<3.15, ps >.076.

For the P3 component, no effect nor any interaction emerged significant, Fs<2.92, ps>.088.

ERP – Interaction with IRI (Perspective Taking subscale). As exploratory analyses, we subjected mean area under the curve of our components of interest (i.e., N2-N3; P3) to a 2 (Target: LCLW *vs.* HCHW) × 2 (Stimulation: painless *vs.* painful) × Score on the IRI Perspective Taking subscale linear mixed model, with both factors varying within subjects and participants as random.

For the N2-N3 component, we observed a significant Target × Stimulation interaction, $F(1, 1242)=12.37$, $p<.001$, $\eta_p^2=.008$. Additionally, we also found a significant Target × Stimulation × Perspective Taking interaction, $F(1, 1242)=12.65$, $p<.001$, $\eta_p^2=.009$. No other effect nor any interaction emerged significant, Fs<0.73, ps >.393.

For the P3 component, we observed a significant Target × Stimulation interaction, $F(1, 1114)=9.38$, $p=.002$, $\eta_p^2=.007$. In addition, we also found a significant Target × Stimulation × Perspective Taking interaction, $F(1, 1114)=9.57$, $p=.002$, $\eta_p^2=.007$. No other effect nor any interaction emerged significant, Fs<0.55, ps >.458.

ERP – Interaction with IRI (Empathic Concern subscale). As exploratory analyses, we subjected mean area under the curve of our components of interest (i.e., N2-N3; P3) to a 2 (Target: LCLW *vs.* HCHW) × 2 (Stimulation: painless *vs.* painful) × Score on the IRI Empathic Concern subscale linear mixed model, with both factors varying within subjects and participants as random.

For the N2-N3 component, we observed a significant Stimulation effect, $F(1, 1242)=6.09$, $p=.014$, $\eta_p^2=.004$. In addition, we also found a significant Stimulation ×

Empathic Concern interaction, $F(1, 1242)=8.72$, $p=.003$, $\eta_p^2=.006$. No other effect or interaction emerged significant, Fs<0.52, ps >.471.

For the P3 component, we observed a significant effect of Empathic Concern, $F(1, 30)=4.37$, $p=.045$, $\eta_p^2=.181$. No other effect or interaction emerged significant, Fs<1.86, ps >.172.

ERP – Interaction with IRI (Personal Distress subscale). As exploratory analyses, we subjected mean area under the curve of our components of interest (i.e., N2-N3; P3) to a 2 (Target: LCLW *vs.* HCHW) × 2 (Stimulation: painless *vs.* painful) × Score on the IRI Personal Distress subscale linear mixed model, with both factors varying within subjects and participants as random.

For the N2-N3 component, we observed a significant Target effect, $F(1, 1242)=7.38$, $p=.007$, $\eta_p^2=.005$. In addition, we also found a significant Target × Empathic Concern interaction, $F(1, 1242)=8.47$, $p=.004$, $\eta_p^2=.006$. No other effect or interaction emerged significant, Fs<3.71, ps >.054.

For the P3 component, we observed a significant Target effect, $F(1, 1114)=7.97$, $p=.005$, $\eta_p^2=.006$. Additionally, we also found a significant Target × Personal Distress, $F(1, 1114)=15.57$, $p<.001$, $\eta_p^2=.012$. No other effect or interaction emerged significant, Fs<0.40, ps >.526.

Manipulation Check. We conducted additional exploratory analyses on manipulation check data to better understand how the manipulation affected observers' perception of both groups at the level of the facets of social perception. We submitted scores for each facet individually to a 2 (Target: LCLW *vs.* HCHW) × 2 (Temporality: pre-PDT *vs.* post-PDT) linear mixed models, with both factors varying within subjects and participants and items as random.

For the morality facet, we observed a significant main effect of Target, $F(1, 347)=893.67$, $p<.001$, $\eta_p^2=.066$, as well as a significant Target × Temporality interaction, $F(1, 347)=6.33$, $p=.012$, $\eta_p^2=.015$. Specifically, the HCHW group was perceived as higher on morality than the LCLW group on pre-PDT measurement (for means and standard deviations, see Supplementary Table 1 & 2 below), $F(1, 347)=3.95$, $p=.048$, $\eta_p^2=.010$. However, this difference proved even stronger on post-PDT measurement, $F(1, 347)=30.77$, $p<.001$, $\eta_p^2=.071$. No main effect of Temporality emerged, $F(1, 347)<0.01$, $p=.974$, $\eta_p^2<.001$.

For the friendliness facet, we observed a significant main effect of Target, $F(1, 380)=456.78$, $p<.001$, $\eta_p^2=.544$. No other effect proved significant, all Fs<1.08, all ps>.299.

For the ability facet, we observed a significant main effect of Target, $F(1, 349)=135.46$, $p<.001$, $\eta_p^2=.246$, as well as a significant Temporality effect, $F(1, 349)=4.41$, $p=.036$, $\eta_p^2=.011$. We also found a significant Target × Temporality interaction, $F(1, 349)=6.39$, $p=.012$, $\eta_p^2=.015$. Specifically, the HCHW group was perceived as higher on morality than the LCLW group on pre-PDT measurement, $F(1, 349)=41.51$, $p<.001$, $\eta_p^2=.091$. However, this difference proved even stronger on post-PDT measurement, $F(1, 349)=100.33$, $p<.001$, $\eta_p^2=.195$.

Finally, for the assertiveness facet, we observed a significant main effect of Target, $F(1, 349)=324.17$, $p<.001$, $\eta_p^2=.446$. No other effect proved significant, all Fs<0.77, all ps>.381.

	Morality	Friendliness	Ability	Assertiveness
HCHW targets	4.76 (1.49)	5.79 (1.45)	5.81 (1.13)	5.82 (1.26)
LCLW targets	4.31 (1.78)	2.43 (1.51)	4.48 (1.79)	3.19 (1.73)

Supplementary Table 1. Mean (standard deviation) morality, friendliness, ability, and assertiveness for HCHW and LCLW targets, as measured pre-PDT.

	Morality	Friendliness	Ability	Assertiveness
HCHW targets	5.17 (1.39)	5.72 (1.37)	5.88 (1.23)	5.73 (1.29)
LCLW targets	3.92 (1.73)	2.67 (1.55)	3.80 (1.82)	3.02 (1.66)

Supplementary Table 2. Mean (standard deviation) morality, friendliness, ability, and assertiveness for HCHW and LCLW targets, as measured post-PDT.

Appendices

Appendices

Note: Complete archives of the material used are available through the OSF links in each empirical chapter.

1. Vignette materials

1.1. Vignettes from Chapter 6 – Experiment 1

Participants read the following vignette for the alcoholic social group:

> Les personnes qui présentent une addiction à l'alcool sont considérées comme des **alcooliques**. Les alcooliques consacrent beaucoup de leur temps à des activités qui leur permettent de satisfaire à leur **besoin d'alcool**. Par exemple, les alcooliques peuvent passer de longues heures à boire ou à récupérer des effets de l'alcool. Cela a un fort **impact** sur leurs objectifs, tant professionnels que sociaux. Les alcooliques peuvent également se mettre en danger en consommant de l'alcool dans des situations périlleuses.

Participants read the following vignette for the psychologist social group:

> Les personnes qui possèdent un master de psychologie sont considérées comme des **psychologues**. Les psychologues consacrent beaucoup de leur temps à des activités qui leur permettent d'accompagner correctement **leurs patients**. Par exemple, les psychologues peuvent passer de longues heures à mettre en place des thérapies ou échanger avec d'autres spécialistes. Cela a un fort **impact** sur leurs objectifs, tant professionnels que sociaux. Les psychologues peuvent également se mettre en danger s'ils ne parviennent pas à garder la distance nécessaire avec la souffrance des autres.

2. Tasks

2.1. Chapter 4 – Examples of Empathy Selection Task trials

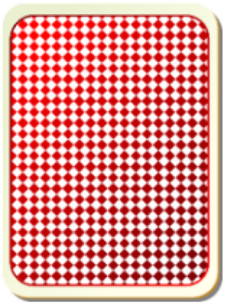
Instructions to select the deck (taken from Experiment 3):

Please read carefully the following instructions. A good understanding of these instructions is crucial. Please ensure that you fully understood each page of instruction before going to the next one. To ensure correct reading, a certain amount of time is imposed before switching to the next page.

This task is constituted of multiple trials. In each trial, you will see a category of people. The categories are: drug addict, disabled, welfare recipient, blue collar.

You will also see two decks of cards. You will be asked to choose one of the two decks. Once you choose a deck, you will then see a picture of a person belonging to the category that was shown. Depending on which deck you have chosen, you will be given one of two possible sets of instructions that will be detailed on the next pages.

DESCRIBE



FEEL

Instructions for the Describe trials (taken from Experiment 4):

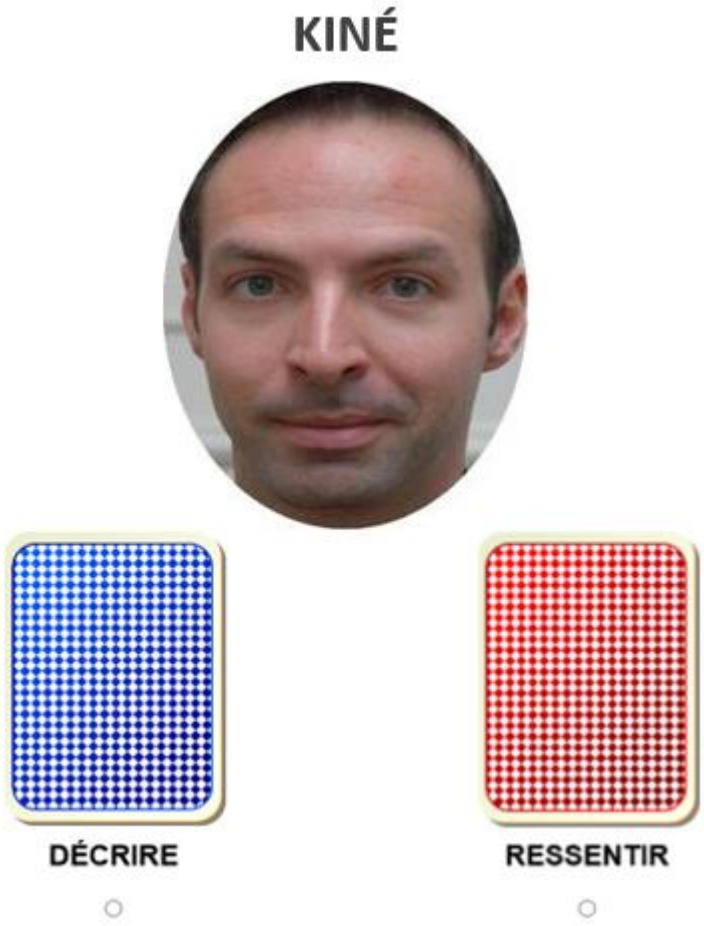
> If you choose from the deck labeled "DESCRIBE", you will be told to be objective and focus on the external features and appearances of the person in the image. When completing this kind of trial, try to be as objective as possible. To be objective, do not let yourself get caught up in imagining what this person feels. On these trials, describe for example the age, gender or look of the person. Your answer must be composed of a minimum of 10 words, equivalent to one or two sentences.
>
> It is ok to use the same keywords multiple times, just make sure you are describing the physical appearance of the person in the image.

Instructions for the Feel trials (taken from Experiment 4):

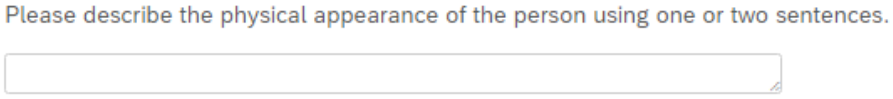
> If you choose from the deck labeled "FEEL", you will be told to have empathy and focus on the internal feelings and experiences of the person in the image. When completing this kind of trial, try to feel as much empathy as possible. To be empathic, let yourself get caught up in imagining what this person feels. On these trials, describe the feelings and experiences of the person. Your answer must be composed of a minimum of 10 words, equivalent to one or two sentences.

It is ok to use the same keywords multiple times, just make sure you are describing the feelings and experiences of the person in the image (e.g., mood, emotion, etc.).

Example of a trial (taken from Experiment 2):



Example of a Describe trial (taken from Experiment 4):

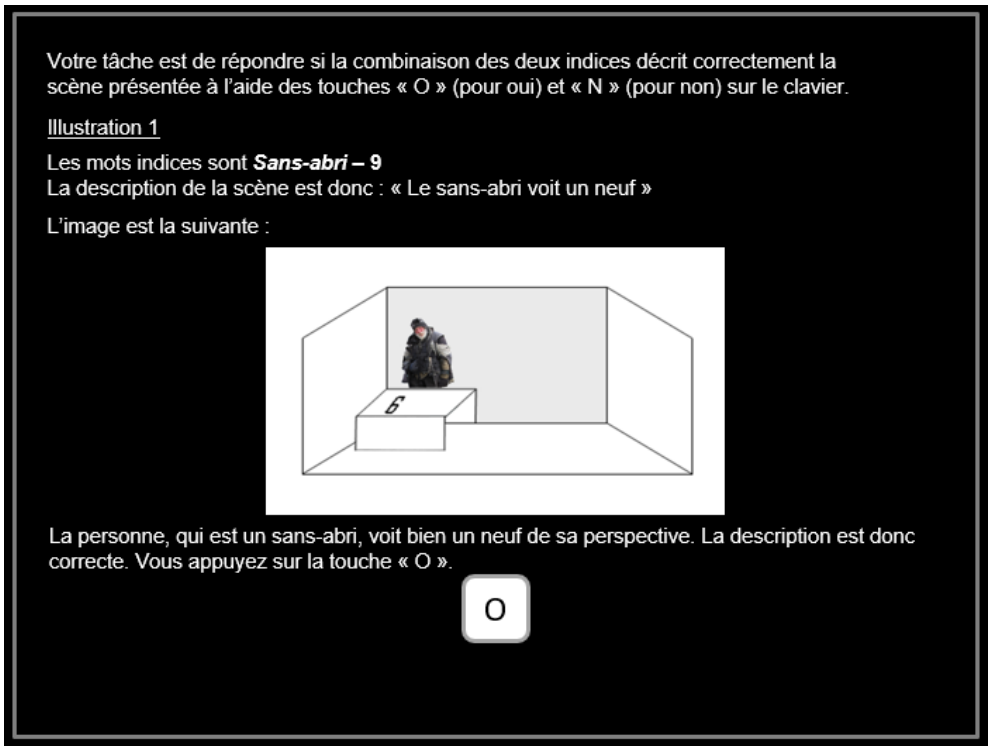


Example of a Feel trial (taken from Experiment 4):

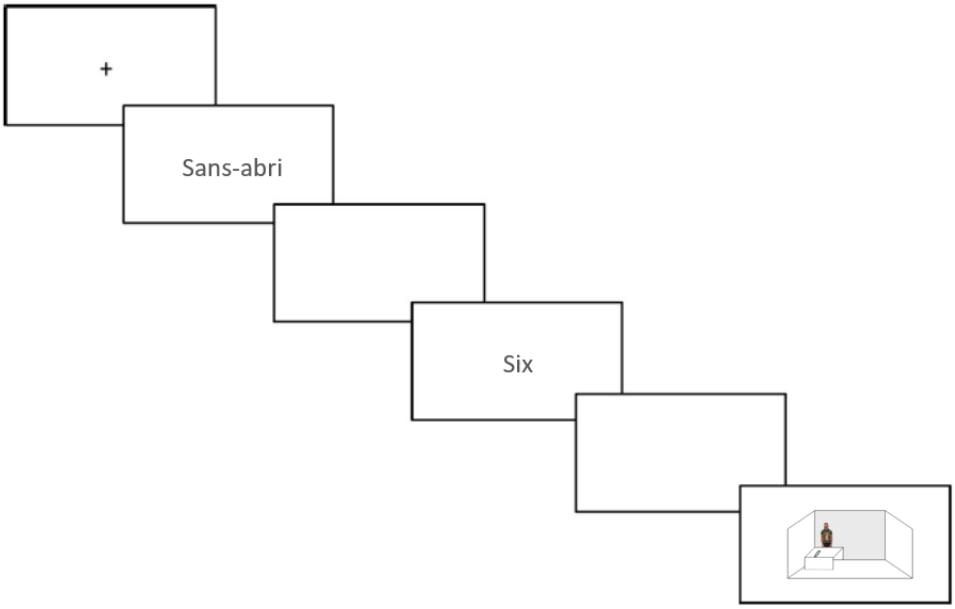
Please describe the internal experiences and feelings of the person using one or two sentences.

2.2. Chapter 5 –Visual perspective taking task

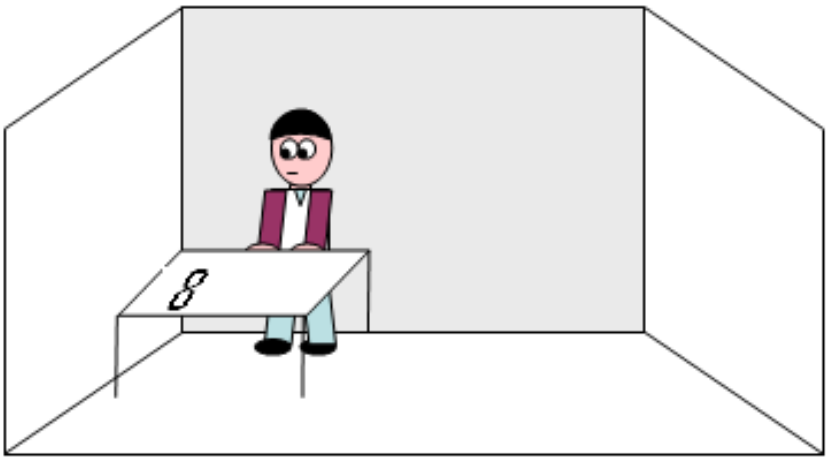
Example of instructions (taken from Experiments 3-4):



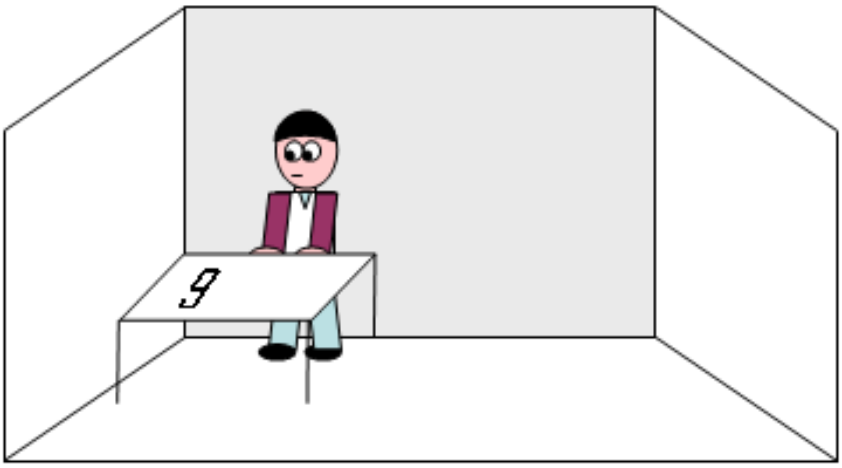
Example of a trial's course (taken from Experiments 3-4):



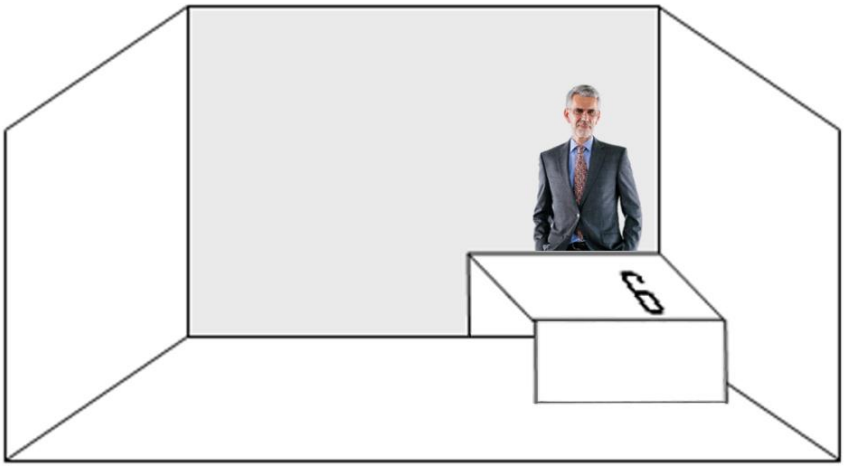
Example of a congruent trial (taken from Experiments 1-2):



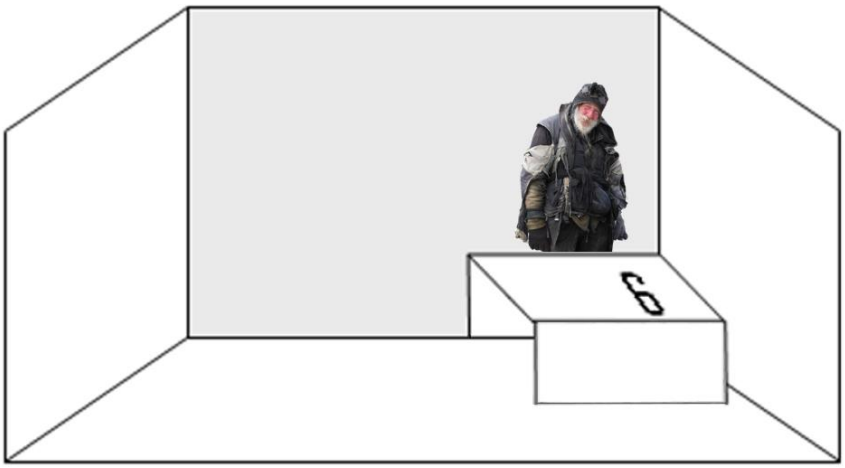
Example of an incongruent trial (taken from Experiments 1-2):



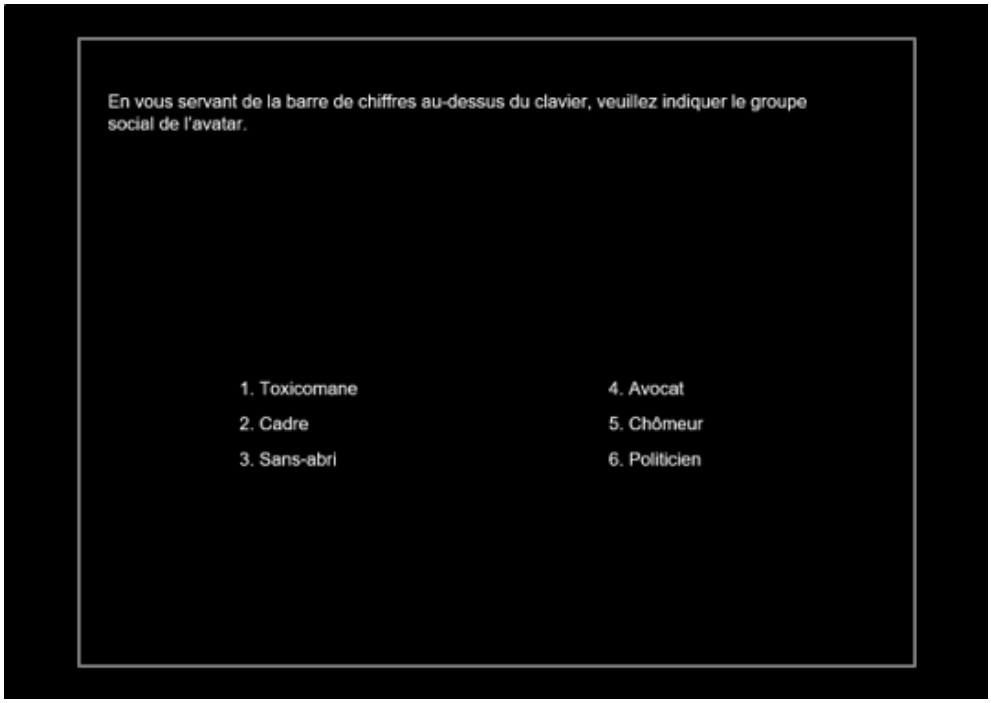
Example of a HCHW target trial (taken from Experiments 3-4):



Example of a HCHW target trial (taken from Experiments 3-4):



Example of a ‘target’s group identification’ trial following a VPT task trial (taken from Experiment 2)



2.3. Chapter 6 – Pain Decision Task

Instructions (taken from Experiment 2):

Durant cette tâche, nous vous présenterons brièvement des visages de personnes faisant partie soit du **GROUPE BLEU**, soit du **GROUPE VERT**.

-- Appuyez sur la barre d'espace pour continuer --

Votre tâche est de dire si le visage est soumis à une stimulation douloureuse {aiguille} ou non-douloureuse {pinceau}.

- Si vous avez vu une stimulation DOULOUREUSE {aiguille} appuyez sur : l

- Si vous avez vu une stimulation NON-DOULOUREUSE {pinceau} appuyez sur : s

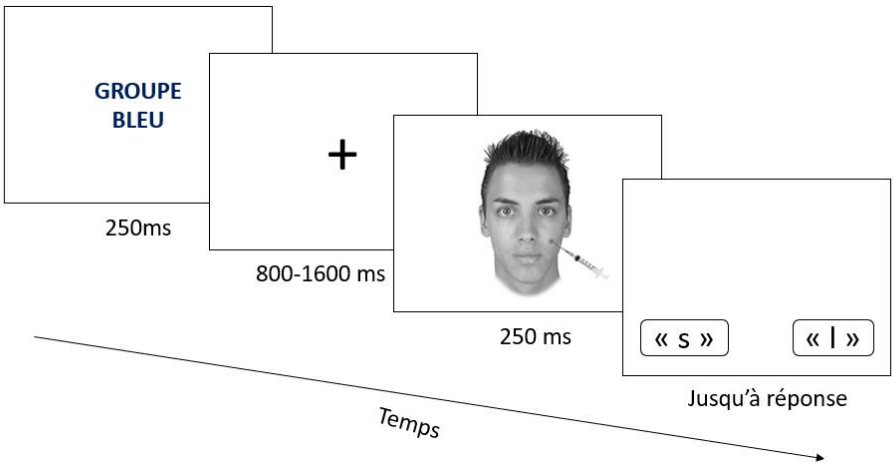
-- Appuyez sur la barre d'espace pour continuer --

Tout au long de la tâche, nous vous demanderons également plusieurs fois d'indiquer à quel groupe appartenait le visage.

Il est donc important de prêter attention si la personne appartenait au **GROUPE BLEU** ou au **GROUPE VERT**.

-- Appuyez sur la barre d'espace pour continuer --

Example of a trial's course (taken from Experiment 2):



Example of stimuli (painless on left; painful on right):

Example of a 'target's group identification' trial following a PDT trial (taken from Experiment 2)

A votre avis, à quel groupe appartenait la dernière personne présentée :

GROUPE BLEU ***GROUPE VERT***

presser la touche 'f' presser la touche 'j'

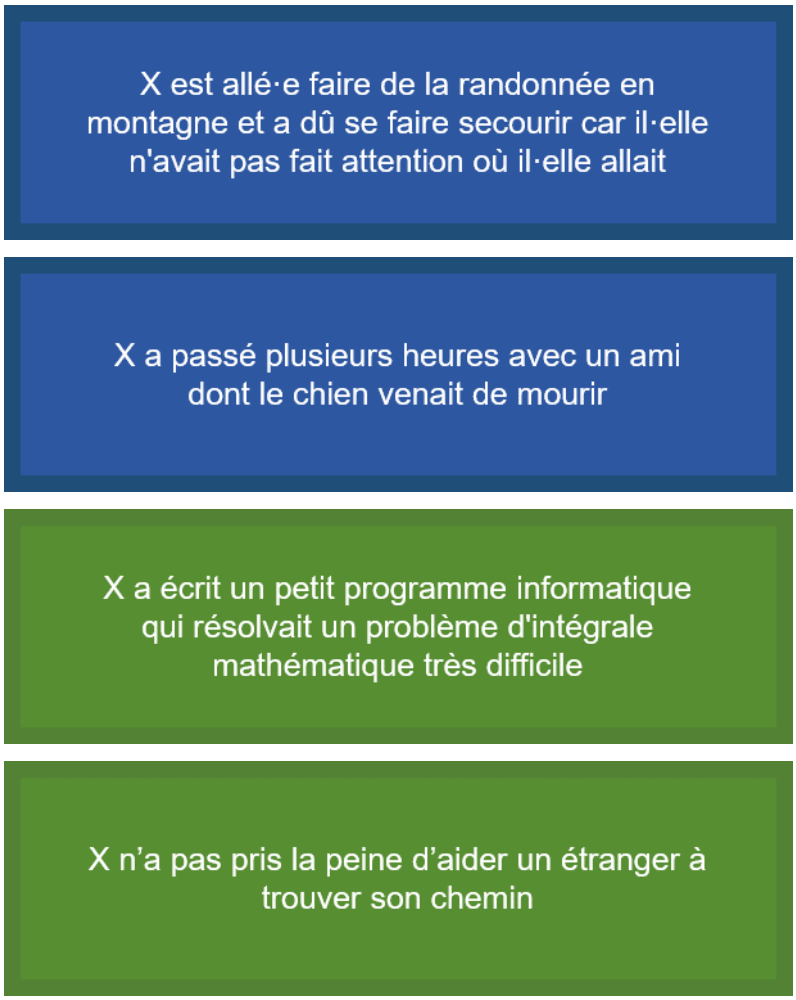
2.4. Chapter 6 – Impression formation task – Experiment 2

Instructions:


FORMATION D'IMPRESSIONS
Dans la tâche qui suit, nous vous présenterons certains comportements (anonymisés) réalisés par les membres de deux groupes distincts :
Le GROUPE BLEU ou le GROUPE VERT
Chaque comportement sera accompagné d'un rectangle de couleur bleu ou vert indiquant le groupe d'appartenance de la personne qui l'a réalisé.
Votre tâche consiste simplement à lire chacun de ces comportements et à vous former une impression de ces deux groupes. Notez qu'il ne s'agit pas ici d'une tâche de mémorisation. Les comportements défileront de manière automatique.
appuyez sur
<ESPACE>
pour commencer la tâche


FORMATION D'IMPRESSIONS
Dans cette tâche nous allons à nouveau vous présenter les comportements mais cette fois-ci, les comportements seront triés par groupe.
Comme précédemment, votre tâche consiste à lire les comportements et à vous former une impression des deux groupes.
Les comportements défileront automatiquement.
appuyez sur
<ESPACE>
pour commencer la tâche

Examples of behaviours:



List of behaviours:

Low competence

- X est allé·e faire de la randonnée en montagne et a dû se faire secourir car il·elle n'avait pas fait attention où il·elle allait
- X a été renvoyé·e de son travail parce qu'il·elle a rarement faire les choses à temps
- La bicyclette de X a été volée plusieurs fois parce qu'il·elle oublie de la cadenasser
- X se perd souvent en conduisant en ville, même s'il·elle y vit depuis plusieurs années

- L'électricité de X a été coupée parce qu'il·elle n'a pas payé la facture à temps
- X a eu des difficultés à trouver du travail parce qu'il·elle était toujours en retard pour les entretiens d'embauche
- X a mis près d'une heure pour trouver sa voiture après l'avoir garée dans un parking de centre commercial
- X a rate son permis de conduire pour la quatrième fois et a fini par abandoner

High competence

- X a écrit un petit programme informatique qui résolvait un problème d'intégrale mathématique très difficile
- X a remporté le prix annuel de l'employé·e qui contribute le plus au profit de l'entreprise
- X a travaillé ardûment sur la tâche d'algèbre linéaire pour des credits extra
- X a pratiqué un concerto de violon 20 fois par jour et après un mois a estimé qu'il·elle savait bien le jouer
- X parle couramment quatre langues différentes
- X a présenté ses recherches lors d'un congrès de chimie
- X a publié une nouvelle dans un magazine littéraire avant la fin de ses études
- X fait très attention quand il s'agit d'épargner afin de pouvoir s'acheter une maison

Low warmth

- X n'a pas pris la peine d'aider un étranger à trouver son chemin
- X a décidé de partir tôt de la fête car il·elle trouvait que c'était trop superficiel
- X préfère aller au cinéma seul·e plutôt qu'avec un·e ami·e
- X a crié sur le conducteur qui lui a pris la dernière place de parking libre
- X parle rarement à ses colocataires
- X ne voulait pas féliciter le gagnant du concours
- X n'est pas allé·e à l'enterrement de sa grand-mère parce qu'il·elle était trop occupé·e par son travail
- X a crié sur une petite fille car elle avait mal colorié le dessin

High warmth

- X a passé plusieurs heures avec un ami dont le chien venait de mourir
- X adore être avec d'autres personnes
- X a aide une femme aveugle à traverser la rue
- X salue toujours ses ami·es avec une accolade amicale

- X sourit toujours aux étrangers dans la rue juste pour render leur journée meilleure
- X rend souvent visite à ses ami·es d'enfance
- X aime avoir de longues conversations avec ses ami·es
- X a cédé sa place dans le bus surcharge quand une vieille dame est montée

3. Scales

Table 1. NASA Task Load Index (Hart & Staveland, 1988) – Chapter 4

Items
1. How mentally demanding was this deck for these categories?
2. How hard did you have to work to accomplish your level of performance with this deck for these categories?
3. How insecure, discouraged, irritated, stressed, and annoyed were you by this deck for these categories?
4. How successful were you in accomplishing what you were asked to do in this deck for these categories?

Note : The term 'category' refers to the target's quadrant ; the term 'deck' refers to the Describe or Feel deck.

Table 2. Social Dominance Orientation scale (Duarte et al., 2004) – Chapter 4

Items
1. Some groups of people are simply inferior to other groups
2. It's OK if some groups have more of a chance in life than others
3. To get ahead in life, it is sometimes necessary to step on other groups
4. It's probably a good thing that certain groups are at the top and other groups are at the bottom
5. Inferior groups should stay in their place
6. It would be good if groups could be equal (*reverse-coded*)
7. Group equality should be our ideal (*reverse-coded*)
8. Increased social equality (*reverse-coded*)
9. We would have fewer problems if we treated people more equally (*reverse-coded*)
10. No one group should dominate in society (*reverse-coded*)

Table 3. Social perception scale (Barbedor et al., 2024) – Chapters 5 & 6

Items
1. Competent
2. Intelligent
3. Capable
4. Clever
5. Efficient
6. Self-assured
7. Ambitious
8. Decided
9. Persistent
10. Determined
11. Honest
12. Moral
13. Trustworthy
14. Sincere
15. Reliable
16. Friendly
17. Sociable
18. Warm
19. Agreable
20. Cordial

Note: Subsets of these items were used throughout the dissertation.

Table 4. Interpersonal Reactivity Index (Davis, 1980) – Chapter 6

Items
1. Je rêve régulièrement tout éveillé(e) aux choses qui pourraient m'arriver
2. J'éprouve souvent de la tendresse pour les gens moins chanceux que moi
3. Je trouve parfois difficile de voir les choses du point de vue de quelqu'un d'autre (*reverse-coded*)
4. Il m'arrive de ne pas être désolé(e) pour les gens qui ont des problems (*reverse-coded*)
5. Je m'implique vraiment dans les sentiments ressentis par les personnages d'un roman
6. Dans les situations d'urgence je suis inquièt(e) et mal à l'aise
7. D'habitude, je ne suis pas complètement pris(e) par les films que je regarde, je reste objectif(ve) (*reverse-coded*)
8. Lors d'un désaccord, j'essaie d'écouter le point de vue de chacun avant de prendre une décision
9. Quand je vois une personne dont on a profité, j'ai envie de la protéger
10. Je me sens parfois désemparé(e) quand je me trouve au beau milieu d'une situation fortement émotionnelle
11. J'essaie parfois de mieux comprendre mes amis en imaginant comment ils voient les choses de leur perspective
12. Il est relativement rare que je me laisse prendre par un bon livre ou un bon film (*reverse-coded*)
13. Quand je vois quelqu'un de blessé, j'ai tendance à rester calme (*reverse-coded*)
14. Je me soucie très peu du malheur des autres (*reverse-coded*)
15. Si je suis sûr(e) d'avoir raison à propos de quelque chose je ne perds pas mon temps à écouter les arguments des uns et des autres (*reverse-coded*)
16. Après avoir regardé un film ou une pièce de théâtre, c'est comme si j'étais l'un des personnages
17. Être dans une situation de tension émotionnelle me fait peur
18. Quand je vois quelqu'un être traité de façon injuste je ne ressens pas beaucoup de pitié pour lui (*reverse-coded*)
19. D'habitude je suis plutôt efficace face aux situations d'urgence (*reverse-coded*)
20. Je suis souvent touché(e), affecté(e) par les événements qui arrivent

21. Je crois qu'il y a toujours deux facettes à chaque question ou problème et j'essaie de les prendre en compte toutes les deux
22. Je me décrirais comme une personne au coeur tendre, plutôt compatissante
23. Quand je regarde un bon film, je peux très facilement me mettre à la place du personnage principal
24. J'ai tendance à perdre mes moyens dans des situations d'urgence
25. Quand je suis en colère contre quelqu'un j'essaie de me mettre à sa place pendant un moment
26. Quand je lis une histoire ou un roman intéressant, j'imagine ce que je ressentirais si les événements de l'histoire m'arrivaient
27. En cas d'urgence, quand je vois quelqu'un qui a sérieusement besoin d'aide je m'effondre totalement
28. Avant de critiquer quelqu'un j'essaie d'imaginer ce que je ressentirais si j'étais à sa place

Plusieurs décennies de recherche sur le Modèle du Contenu des Stéréotypes témoignent que les groupes perçus comme peu compétents et peu chaleureux sont victimes de stéréotypes négatifs, de dénigrement, de déshumanisation et d'agression. Dans l'ensemble, ces résultats pointent vers un manque d'empathie envers les membres de ces groupes désavantagés. Toutefois, les recherches sur ce sujet sont rares et se limitent souvent à des questionnaires d'auto-évaluation. Notre programme de recherche vise à étudier l'empathie envers les membres de groupes stigmatisés en s'appuyant sur de multiples approches de l'empathie, allant des mesures comportementales à des mesures neurales. À travers ces multiples mesures investiguant diverses composantes de l'empathie, nos données ne soutiennent pas l'hypothèse que l'appartenance à des groupes stigmatisés modère l'empathie. Dans l'ensemble, nos résultats suggèrent que la relation entre les stéréotypes de groupe en termes de compétence et de chaleur et l'empathie s'avère plus complexe que ce que l'on pourrait supposer. Nous appelons les futures recherches sur cette question à prendre en compte des facteurs plus fins afin de mieux comprendre le lien entre stigmatisation et empathie.

As evidenced by decades of research on the Stereotype Content Model, groups perceived as low on competence and warmth are victims of negative stereotypes, strong derogation, dehumanization, and aggression. Taken together, these findings point towards a lack of empathy towards members of such derogated groups, but research on this issue is scarce and often limited to self-report questionnaires. Our research program aims to investigate empathy towards derogated outgroup members by relying on multiple approaches to empathy, ranging from behavioural to neural measurements. Across these multiple measures tapping into various components of empathy, we did not find evidence that membership in derogated outgroups moderates empathy. Taken together, our findings suggest that the relation between group stereotyping in terms of competence and warmth and empathy proves more complex than hypothesized. We call on future research on this issue to consider more fine-grained factors in order to better understand the link between outgroup derogation and empathy.

Antoine Vanbeneden est diplômé d'un master en psychologie de l'Université catholique de Louvain. Il a réalisé cette thèse de doctorat en tant qu'Aspirant FNRS à l'Université catholique de Louvain (UCLouvain), au sein de l'institut de recherche en sciences psychologiques (IPSY), sous la supervision de Vincent Yzerbyt et Karl-Andrew Woltin. Il s'est spécialisé dans les relations intergroupes, l'empathie, et l'intersection de ces deux domaines de recherche.