The Influence of Empathy on Episodic Memory for Emotional Details and Theory of Mind

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Abstract

The primary goal of this research was to improve our understanding of how empathy influences other cognitive faculties, specifically episodic memory. We first put forward a working model that attempts to describe the array of processes considered fundamental to empathy and to demonstrate how they emerge from an interaction of cognitive faculties, from primitive state-matching to higher-level episodic simulation, to achieve social goals.

Four studies were then conducted. The first two developed and adapted a novel text-based paradigm in order to identify any differences in the encoding and retrieval strategies of low and high empathy individuals. Study 3 adapted this paradigm into video monologues and introduced a novel empathy measure, the Emotional Resonance Index (ERI). Study 4 introduced a second paradigm that presented participants with written scenarios to investigate how empathy may relate to theory of mind-based inferences.

In study 1 and 2, we found that, at encoding, high empathy individuals were more emotionally impacted by the content of narratives, specifically those with neutral and positive valence. At retrieval, they consistently remembered more emotional details than low empathy individuals, especially from narratives with positive valence.

In study 3, we observed that high empathy participants no longer remembered more emotional details but instead remembered less non-emotional details. All participants demonstrated a stronger emotional reaction to narratives presented in congruent emotional tone, but high empathy individuals reported experiencing stronger emotionality than low empathy individuals.

In study 4, we found that hot empathy predicted a preference for typical responses and responses of positive emotional valence. For certain scenarios, response choices varied with empathy scores and personality traits.

In the final chapter, we considered how these findings correspond to our working model and the dissociable processes it describes. Finally, we discussed the contribution these findings make to prevailing cognitive theories of empathy, before outlining some limitations of these novel paradigms and suggestions for future research.

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Chapter 1

Towards a Cognitive-Behavioural Model of Empathy: A Review of the Literature

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1. A History of the Concept

"Do you look into *yourself* to understand the fury in *his* face?"

—Wittgenstein, Ludwig (1980)

The history of empathy as a concept is a history of terminological shifts. In different guises, it has occupied an important place in philosophical inquiry for centuries. In ancient Greek theatre, πάθος (pathea) is translated as 'suffering' or 'experience' and describes the process by which dramatic representation appeals to the emotions of the audience and brings them to the surface towards catharsis. Deriving from this, ἐμπάθεια (*empátheia*), meaning 'passion', was used to describe an expression of malevolence or feelings of prejudice towards another, making it a false friend of its anglicised counterpart, which typically represents an instance of compassionate understanding or tender receptiveness.

Some of the difficulty in tracing the history of empathy arises from its continual appropriation by different academic traditions. As a term denoting specific forms of human emotional resonance, 'empathy' is a somewhat recent designation. In the 1800s, the term was typically used by the German moral philosophers, in the form of *Einfühlung*, to represent any instance of 'feeling-into' art, nature or the sublime. In fact this word was itself a Germanic version of Hume's 'sympathy'. Only towards the middle of the 1900s was its referent drawn away from aesthetics towards interpersonal psychology. In this chapter, I will explore the journey this term has taken, before discussing its conception in modern empirical research.

During a transitional historical moment, the term became used according to its current definition, particularly by those following in the Hegelian tradition. Droysen (1893), for example, claimed that "…man's nature, at once sensuous and spiritual, expresses every one of its inner processes in some from apprehensible by the sense, mirrors these inner processes, indeed in every expression." This view is shared by contemporary simulation theorists, of which Droysen and Hume (1711-1776) should be considered the first proponents. According to these hermeneutic thinkers, empathy occupies a distinguished epistemic position since it is knowledge acquired through embodiment, rather than reason, and moreover it is tethered to an egocentric understanding of human experience. In this way, it is knowledge acquired by means that are entirely independent from those deployed in the natural sciences. This, I

would argue, is why it has historically been associated with the interpretation of art and its scientific applicability was often disavowed. Droysen and, after him, Theodor Lipps recognised that this concept had important implications for the natural and human sciences alike. It became understood as the basis of intersubjectivity and our closest appropriation to access of other minds.

Heidegger (1889-1976), on the other hand, saw the basic processes of empathy as representative, which he claimed does not give us access to other minds but in effect distances us from them. He therefore relegated empathy to a footnote in his examination of Dasein (loosely, being-for-death) in *Being and Time*. He said empathy cannot provide "the first ontological bridge from one's own subject … to the other subject, who is initially quite inaccessible". This is to say that empathy takes being-with as its condition and so it is derivative rather than ontological. In this way he designated empathy a subject of module psychology, not of ontology, but nevertheless deployed the term in its modern sense of describing a cognitive process that subserves human interrelatedness.

Freud makes mention of empathy tangentially only several times in his body of work, but it is hard to think of a discipline in which empathy plays a more central role than psychoanalysis. It is essential to the therapeutic relationship as well as to understanding how the psyche is shaped through our exchanges with others. The Oedipus Complex itself would not be possible without an implicit understanding of desire in the other. Freud discussed empathy using the vocabulary he had at his disposal. In *Jokes and their Relation to the Unconscious* (1909), he describes how the analyst's unconscious is engaged like the receiver of a telephone, sensitive to the expressions of the analysand's unconscious. It is therefore reasonable to assume that he understood the importance of this concept to his work.

Edmund Husserl (1859-1938) arguably made the most important contributions to our conception of empathy, and in recent years his work has experienced an interdisciplinary revival through scholars that attempt to reconcile concepts in psychology with those out forward by phenomenology. He recognised it as not only serving an epistemic function, but also as the primary means by which we become aware of others as minded creatures. In this sense, empathy is fundamental to consciousness, since it is the process by which we become aware of ourselves as an object to other subjects that think and experience as we do.

The aforementioned Theodor Lipps (1851-1914) was among the first thinkers to broaden the concept of empathy to include interpersonal relations as well as aesthetic appreciation. He

saw empathy as a fundamental process that underpins these various forms of emotional resonance. Like Hume and Droysen, he also suggested that empathy begins with unconscious imitation, and so his work stands as another precursor to simulation theory. Whilst largely unread today, was a hugely influential thinker in his time and can be credited with popularising the term '*Einfühlung*'. In *Fundamentals of Psychic Life*, he assigned an inclusive definition to empathy whereby it captures any instance of "projecting oneself onto the object of perception". By this, he also put forward the idea that the necessary precondition for empathy is that the emotional state of one person influences that of another, which corresponds loosely to what is now termed 'emotional contagion'. Prior to this, working with Robert Vischer's definition, empathy pertained exclusively to our interactions with natural and artistic beauty. Now it could also be applied to interpersonal psychology. Lipps was inspired by Hume's prescient work, *A Treatise on Human Nature* (1739), in which he describes the process by which "the minds of men" become "mirrors to one another", which, consistent with modern neuroscientific findings, stands as a remarkably accurate depiction nearly three hundred years later.

> The German philosopher and psychologist Theodor Lipps at the beginning of the twentieth century claimed "our knowledge of others [is] as irreducible and original as our perceptual experience of objects". He believed us to have an instinctive tendency to reproduce gestures or expressions and their connected feelings, if we see them from others. Afterwards we would project these feelings on others (Zahavi, 2010, p. 288).

In saying this, Lipps clearly anticipated the simulation model of empathy. Husserl then vehemently rejected this view, saying it was "a refuge of phenomenological ignorance." And also rejected the term *Einfühlung* in favour of *Fremderfahrung*, claiming there needed to be a firm distinction between imitation and projection. Stein (1891-1942) further criticised Lipps' theory, claiming that it described only emotional contagion and did not explain "how I come to understand the other." Finally, Merleau-Ponty (1908-1961) advances something like an interaction approach, claiming there is a direct link between the *observed* bodies of others and the *sensed* body of oneself, that is, between perception and proprioception.

The British psychologist, E.B. Titchener (1867-1927), coined the Anglicised term 'empathy', which was intended as a direct translation of *Einfühlung*. This marked the final movement away from *Einfühlung* as an aesthetic phenomenon towards empathy as a cognitive process in

the sense that Hume and Lipps spoke of it. This appropriation by the empirical sciences sparked a debate regarding how best to define and operationalise empathy, which continues today.

Inspired by the phenomenologists and working from Titchener's adoption of the term, Heinz Kohut dedicated much of his career to demonstrating the importance of empathy to psychoanalysis. He said, in a final address at the University of Berkeley, that the concept had undergone "abuse" (1981) and reflected on his attempts to clearly demarcate its role in psychoanalytic thought. He championed the claim by Stein (1961) that empathy is "as basic an endowment of man as his vision, hearing, touch, taste, and smell" and believed the limits of the psyche could be described by the limits of introspection and empathy (1959), since these determine the extent to which we can know ourselves and others. Indeed, it represents the only means we have of acquiring knowledge about "the inner life of another person" (1980, p. 485). In his striving to define this fundamental process, he necessarily considered what empathy is not and, by virtue of this, how to tease it apart from neighbouring concepts. He explained, first and foremost, that empathy is not infallible and, secondly, it is not intuition, and finally, that while empathy is a natural precondition for sympathy and compassion, it must nonetheless not be conflated with them since empathy can just as easily underpin the goals of "hostile – destructive feelings" (p.485).

Another psychoanalyst, Otto Fenichel (1897-1946), one of Kohut's contemporaries, furthered these ideas with a definition of his own (1945). He claimed that empathy consists of two facets: (i) an identification with the other person; and (ii) an awareness of one's own feelings after the identification, and in this way an awareness of the object's feelings. This definition is essentially a watered-down version of simulation theory, which will be explored in a later chapter.

The etymological journey of empathy, then, has been fraught with difficulties in terms of categorisation, assuming variable definitions, some of which are conflicting and all of which attempt to capture the human capacity to emotionally resonate with either objects or other organisms. As our understanding of the concept has evolved, so has our understanding of its place in human society. In the 20th century, inspired by the writings of John Stuart Mill and Adam Smith and Kropotkin, Charles Darwin (1872) painted a new picture of human interrelatedness, suggesting that individuals are constitutionally more cooperative and emotionally interdependent than previously thought. This paved the way for modern research

on empathy as a cognitive faculty, broadening the scope of this concept to consider how the evolving brain has supported the development from basic emotion matching to complex moral judgements, and most of all, opening the field to the study of the antecedents of complex empathy in nonhuman animals.

2. Delineating Empathic Processes

We have already seen that empathy has been assigned varied definitions and cognitive science has struggled to break with this trend. As Batson (2009) notes, definitions are almost as numerous as researchers in the field. Given these difficulties, the first part of this discussion will be terminological, discussing the associated concepts and how they contribute to the cognitive model of empathy presented in section 2.3. More attention will be paid to earlier processes as higher-order processes are more intuitively and socially understood, as well as considerably more difficult to investigate experimentally.

Informally, empathy is taken to mean being sensitive to the needs of others or, oftentimes, pertains to an instance of imagining ourselves in the place of another. However, this is far from adequate. It seems that the fundamental constituents of empathic processing take place automatically, below the level of conscious awareness and reportability. Of course this claim depends on the definition of empathy one adopts.

2.1 The Case for Motor Mimicry as a Precursor to Higher-Order Processes

There is broad agreement across the field that the most primitive form of empathic processing is unconscious physiological imitation (for review see, Cuff *et al*., 2016). The first of these processes is motor mimicry, which has also been called 'facial empathy' (Gordon, 1995) and 'imitation' (Lipps, 1903; Haxby, Hoffman & Gobbini, 2000) and principally includes the matching of bodily states or facial expressions, but may also be extended to include mannerisms (Blairy *et al.*, 1999) and accents (Giles & Powesland, 1975). EMG studies demonstrate that individuals will automatically mimic observed facial expressions and that this occurs approximately 200-1000ms after stimulus onset, depending on valence and contextual factors (Davila, Menzler & Zimmermann, 2008; De Sousa *et al*., 2011; Dimberg & Thunberg, 2012; Korb, Grandjean & Sherer, 2010; Rymarczyk, 2018, 2019). Evidence suggests that such responses can be voluntarily suppressed (Korb, Grandjean & Sherer, 2010)

and that the extent of facial mimicry is modulated by dispositional empathy (Sonnby-Borgstrom, Jonsson & Svensson, 2003), suggesting an important role for top-down regulation in line with the dynamic working model presented below.

Research suggests that motor mimicry generates an autonomic response in the observer which corresponds to the bodily state or facial expression being mimicked. For example, observing and even thinking about another person in pain can cause topographic activity in the same network that processes first-person pain (Fitzgibbon et al., 2010). Research in the fields of embodied cognition (Neal & Chartrand, 2011), simulation models of emotion processing (Goldman & Sripada, 2005) and perception-action coupling (Preston & de Waal, 2002) have found support for this idea. As Decety (2011) puts it, "The core assumption … is that perceiving a target's state automatically activates the corresponding representations of that state in the observer, which in turn activates somatic and autonomic responses" (p. 97).

Still, a growing body of research is failing to find support for this idea. A series of meta-analyses by Cacioppo, Bernston, Larsen, Poehlmann and Ito (2000) found no conclusive evidence that viewing facial expressions of discrete emotions (anger, happiness, etc) differed significantly from visceral activity alone. fMRI studies have found that *imagining* emotional situations, rather than observing them, also activates neural networks that generate first-person emotion (Ruby & Decety, 2004). It may therefore be the case that emotional contagion or state matching is driven less by perception of facial expressions in others and more by top-down, prospective cognition. There is little doubt that such higher-order abilities can compensate when necessary: a seminal study by Keillor, Barrett, Crucian, Kortenkamp and Heilman (2002) reported that a patient suffering complete facial paralysis did not demonstrate impaired recognition or diminished affective experience in response to the emotional expressions of others. It follows that either higher-order mentalising processes can compensate when necessary or facial mimicry is not vital to emotion understanding, and may be residual or even atavistic. Still, both processes, motor mimicry and higher-order mentalising, appear to play a role in the understanding of emotions in others, the question remains of how interdependent these constructs are and how, if at all, they interact.

What emerges is a picture of empathy that is far from unified, and involves an array of processes. Humans can resonate emotionally with others and potentially understand their physiological state through a mirroring process that is automatic and occurs rapidly during social interactions. However, complex appraisals of situations and corresponding behaviour

of the kind seen in humans most likely requires explicit representations of the other's feelings and thoughts, which are likely contingent on language and memory.

2.2 The Impact of Personal Distress

Personal distress is described as self-oriented aversive feelings aroused by the suffering or sorrow of others (Davis, 1980). This concept, as the name suggests, need only be applied to situations which evoke negative affect. Studies have indicated that personal distress must be effectively down-regulated to permit higher-order emotional responses like compassion or empathic concern (Singer & Klimecki, 2014), which is other-oriented and best described as feeling *for* rather than feeling *as* the other. If it is not effectively down-regulated, it may overwhelm the observer and lead to withdrawal, avoidance or self-consoling (Eisenberg, 1989; Decety & Lamm, 2009; Decety, 2011; Singer & Klimecki, 2014). This has initiated a debate as to whether empathy is fundamentally selfish, in that its primary function is to neutralise one's own affect.

Personal distress is often presumed to be a distinct construct. However, if personal distress is considered merely a negative form of emotional contagion, it may reasonably be taken as a motivator as well as an inhibitor to prosocial behaviour. Consider that if we observe someone hit by a car, our initial reaction may be to flinch or grit our teeth, as though we are in pain ourselves, and this resonance can be quite paralysing. It is only after, when this intense autonomic reaction has subsided, that we may rush towards the scene and help. It may therefore be the case that the subsequent behaviour is more contextual, depending on the intensity of the personal distress and the constitution of the observer. For example, individuals with Borderline Personality Disorder are observed to have above-average empathy scores but also to report heightened personal distress (Guttman & LaPorte, 2000, Jeung & Herpertz, 2014). This condition is associated with emotional instability, and so this combination of factors may inhibit down-regulation, presenting a barrier to prosocial behaviour. One can imagine, for example, being so distressed by seeing someone hit by a car that the observer is unable to take coordinated action.

2.3 A Working Model

The question of what process is specifically described by the term empathy remains, however. It is clear that there are many processes considered to be empathic.

In the literature, there are broad definitions of empathy that subsume the array of associated processes (Preston & De Waal, 2002; Hoffman, 2000) and narrower definitions that limit the concept to specific instances (Eisenberg & Fabes, 1990; Wispé, 1986). Of these, Vignemont & Singer (2006) have provided one of the most frequently cited definitions: "There is empathy if (i) one is in an affective state; (ii) this state is isomorphic to another person's affective state; (iii) this state is elicited by the observation or imagination of another person's affective state; (iv) one knows that the other person is the source of one's own affective state." They later added a fifth point: "B must care about A" (2016). By this view, empathy is a discrete process that exists in the space before cognitive perspective-taking but after emotional contagion, acting as a bridge between state matching and cognitive appraisal (Figure 1).

We struggle to see the merit of such a constrained definition, except with the express purpose of keeping empathy distinct from primitive and higher-order processes. However, this can be accomplished by the introduction of a novel term. We therefore propose the term 'affective perspective-taking' as a bridging concept and retain empathy as an umbrella term for more clearly defined and operationalised underlying processes. This may be distinguished from emotional contagion because it accounts for the self-other distinction. To maintain these distinctions, we will tend to speak of *empathic processes* rather than empathy itself.

Empathy theory is deeply indebted to the phenomenological tradition and we can appeal to Husserl to justify this conceptual organisation. Considered to be the father of phenomenology, Husserl broadened 'empathy' to incorporate the concept of intersubjectivity and describes it as a special epistemological case distinct from 'primordial perception', through which objects are given to the senses. Empathy, he argues, is the only bridge between personal experience and the experience of others. He writes, "We 'behold the living experience of others' through the perception of their bodily behaviour … The other man and his psychical life is indeed apprehended as 'there in person', and in union with his body, but, unlike the body, it is not given to our consciousness as primordial" (Husserl, 1931, p.10). It therefore occupies a unique position as an epistemological category *sui generis*. It follows that when we speak of empathy, we are not speaking of a discrete process, but rather a means

by which we come to know about the experience of other minded beings, distinct from object-givenness and inferential reasoning. For this reason, we retain it as an umbrella term.

Thereafter cognitive appraisal may develop into higher-order processes which motivate prosocial behaviour. Sympathy, compassion and empathic concern are variously assigned nuanced definitions, but generally capture feeling *for* another, which implies other-oriented feelings of tenderness, fellow-feeling and concern, especially for those perceived to be the victim of unfair circumstances (Post *et al*. 2014).

It follows that a progressive model should resemble the one supplied as Figure 1 below.

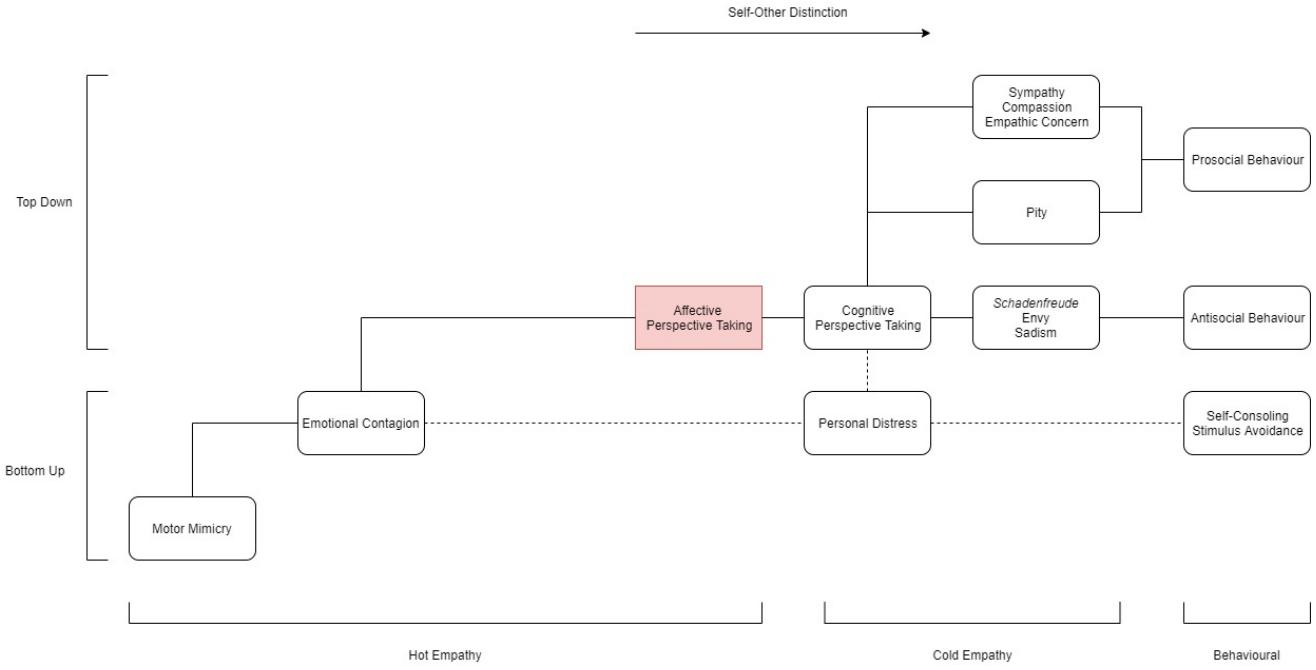

Figure 1. Processes of Human Empathy. Inspired by De Waal (2008) and Vignemont & Singer (2006)

The order of these processes should not be taken as fixed or necessarily hierarchical, however. Depending on the circumstances, certain faculties may predominate, interact with a variety of others or be omitted entirely. For example, reading a work of fiction requires that the individual either infer the character's emotional state from given information or construct it based on contextual factors. In either case the emotional state in question is imagined, and individuals cannot exploit direct perception of emotional displays to generate action

understanding. In this way we find evidence for the variable influence of bottom-up and top-down processes.

Nonetheless, with these processes now delineated, we can begin to square our working model with those that are broader in scope. Among these, we find De Waal's Russian Doll (2007) to be preferable for it highlights the dependence of cognitive processes on somatic antecedents and also addresses how these processes may have been 'stacked' over the evolutionary timeline. De Waal's is intended to capture the phylogenetic progression of empathy observed in nonhuman primates, which he assigns three primary levels. At the innermost core is state-matching supported by perception-action mechanisms, which are neural networks that are activated both when we observe and when we perform an action, hypothesized to be supported by a substrate of mirror neurons (Gallese, 2001). The next layer is cognitive empathy and targeted helping and the outermost layer is attribution of mental states to others and perspective-taking. For some time this last level was said to be exclusive to the human animal, although recent research, reviewed in the following section, finds evidence for perspective-taking in nonhuman primates in the weak sense.

The innermost level captures processes that are mandatory, automatic and, most notably, preconscious. As De Waal (2008) notes, the self-other distinction becomes more pronounced as we move towards the outer layers. Motor mimicry and emotional contagion, then, lead to an experience of emotion that is subserved by neural networks involved in generating first-person emotion, as discussed in the previous section. The ostensible position of empathy by Vignemont and Singer's definition would be as a precursor to cognitive perspective-taking.

The inner layer corresponds to Davis & Kraus' (1991) hot empathy, while the outer two layers correspond to their definition of cold empathy. Further, these three layers correspond respectively to the types of cognition outlined by Panskepp (2011), which reflect cognitive abilities made possible by neocortical expansion: primary process (deeply subcortical functions such as sensory affects, homeostatic regulation and emotional affects), secondary process (intermediary brain functions that mediate learning and memory), and tertiary process (higher brain functions dependent on neocortical expansion). All of these reflect an evolutionary progression from state matching to complex social behaviour.

To summarise, the theory suggests that before we mentally project ourselves into the place of the target or otherwise visualise their circumstances, we first unconsciously become an physiological mirror to them. Having mimicked their physiological state, we can then reflect

on how it feels to be them in a more explicit sense. Depending on situational factors and disposition, this complex social analysis may lead to three distinct outcomes: (i) prosocial feelings of tenderness and concern for the individual, promoting a willingness to help. Here, pity is categorically distinct from sympathy, compassion and empathic concern as it considered less socially desirable. (ii) On the other hand, perspective-taking may lead to an enjoyment of another's distress (schadenfreude), pleasure in their pain (sadism) or jealousy, which can act as motivators for antisocial behaviour. (iii) Lastly, personal distress may not be effectively downregulated, leading to avoidance or self-consoling. According to this model, then, individual differences and circumstances modulate whether empathy terminates in *helping, inhibiting* or *avoiding*.

We have situated empathy as an umbrella term and described the processes it subsumes, separating them broadly into hot or affective empathy and cold or cognitive empathy. We then outlined De Waal's Russian Doll model, relating his three layers to categories put forward by other researchers. What emerges is a picture of empathy that begins with phylogenically primitive emotional state-matching and is mediated by top-down cognitive appraisal of internal and external factors. Evidence in support of this working model is supplied in the next chapter through an examination of empathy in other animals.

3. Empathy in Nonhuman Animals

The stages of understanding, sharing and responding to the affective responses of others teaches us as much about our phylogenic evolution as it does about ontogenic development. The fundamental processes of empathy are primitive in the sense that they emerge early in the development of the individual human animal and in the sense that they appear to have developed early in the mammalian evolutionary timeline. Tracing this evolutionary history sheds light on the cognitive processes that underpin empathy. In this way we can determine the subsystems that support higher-order processes and ethical reasoning in humans.

Mammals favour care of limited offspring over quantity. As such there is a high premium on genetic preservation which necessitates extensive parental involvement. Empathy is therefore thought to originate in the need for maternal care, where it confers an obvious evolutionary advantage—in order to effectively care for her young, the mother must be attuned to their needs, both biological and succorant. As empathic ability was reinforced by conferring this survival advantage, it could later be applied outside of the parental care context to the broader context of kinship relations (De Waal, 2008).

Even in mammals with more limited cognitive faculties, there is strong evidence of empathy-based prosocial behaviour. Bartal, Decety and Mason (2011) found that if one rat was exploring a free arena whilst another was detained within, the first rat would quickly learn to free the caged rat. When presented with two containers, one containing chocolate and the other one containing a rat, in most cases the free rat was observed to open both containers and subsequently share the food. As Panskepp (2011) notes, behaviourists may contest that such choices are arrived at "mindlessly", without any need for emotional state-matching or subsequent evaluation. However, distress signals from others seem to engage the amygdala which is also engaged during first-person distress (Knapska, Boguszewski, Walasek & Blaszcyk, 2006) in a state-matching process that is taken to be the foundation of empathy.

Humans are often depicted as violent war-prone apes but De Waal (2008) considers this a reductive view that neglects our obvious propensities for compassion and cooperation. He highlights the fact that our surviving relatives, the Chimpanzee (*Pan troglodytes*) and the Bonobo (*Pan paniscus*), both demonstrate heightened empathic abilities (De Waal, 2008). By degrees, these abilities are widespread in primates: Rapid facial mimicry of the kind observed in humans can be observed in chimpanzees (Myowa-Yamakoshi, 2004) and orangutans (Ross, Menzler & Zimmermann, 2007), as well Geladas, an Old World monkey (Mancini,

Francesco, Ferrari & Palagi, 2013). The existence of perception-action mechanisms (PAM) networks in Old World Monkeys underpins their capacity for imitation learning and, at least, emotional contagion, but here there is no evidence of targeted helping.

Higher-order processes are typically observed in New World monkeys. Premack & Woodruff (1978) put forward the term Theory of Mind to explain the ability to "impute mental states to the self and others" (p.1). The original study has been criticised on the grounds that chimpanzees do not appear to recognise false beliefs (Call & Tomasello, 2011), which is taken to be fundamental to a Theory of Mind. Still, there is little doubt that apes have some aptitude for mental state attribution. Apes are known to console other apes who have recently been victim to an altercation (de Waal & van Roosmalen, 1979). Males chimpanzees will adopt orphaned infants, even when there is no shared lineage (Boesch et al., 2010). In a unique case documented by Pruetz (2011), the injured mother of a chimpanzee captured by poachers and later returned to its natal group was cared for by a male conspecific. It is difficult to see how these instances could be explained without appealing to De Waal's targeted helping, the outer layer of the Russian Doll model supported by what Panskepp calls tertiary process. The last, specifically, demonstrates an appraisal of both the injured female and strategies aimed at alleviating her distress, without conferring any economic benefit to the male helper.

However, cooperation is only one side of the coin and the competitive side can be equally revealing. Here there is strong evidence that apes will engage in deception, however there is debate surrounding what kind of ToM this is exemplary of. Most researchers agree this demonstrates an awareness of the perceptual states of others, but this is not taken to be evidence of the kind of decoupled representational states observed in humans (Martin & Santos, 2016). These correspond to the attribution of mental states that depart from our present reality, by embedding representations in metarepresentations. For example, a friend has a belief that was true in the past (their pen is on the table) but you have information that now disproves this, you can therefore embed the content of their mental state within this contextual frame and attribute a false belief. This is a decoupled representational state because its content references situations beyond our immediate reality. Humans are remarkably adept at this. We can represent both hypothetical or counterfactual situations (what if the pen was stolen by someone) and past and future states of the world (maybe the pen was borrowed and will be back on the table tomorrow).

In chimpanzees, there is particularly strong evidence for a capacity to deceive reflecting an awareness of perceptual states and knowledge states in others, and predictions of how they will act based on these. This comes from a food competition paradigm in which a low-ranking individual knows the location of hidden food and uses this knowledge to outmanoeuvre naïve conspecifics (Hare, Call, Agnetta, & Tomasello, 2000; Schmelz, Call, & Tomasello, 2011). In some cases, the informed ape will conceal visual or auditory cues so that the location is not revealed to others (Hare, Call, & Tomasello, 2006; Melis, Call, & Tomasello, 2006).

De Waal suggests that to some extent "the full spectrum of empathy-based altruism may be represented among nonhuman primates, including the cognitive perspective-taking that marks human altruism" (2008, p. 875). Upon acknowledging the existence of these behaviours in nonhuman primates, it is also necessary to remark that many of them are served by faculties that developed to meet other evolutionary needs. It appears, for example, that primitive processes provide the foundation for complex inferences about the mental lives of others and simulatory cognition, which likely evolved as a means of storing information necessary to survival and have come to play a key role in social problem-solving. This effect can be observed in other domains and is neatly explained by Anderson's *massive redeployment hypothesis* (2007). The premise here is that, since processing power uses extensive resources, evolved brain modules are deployed in service of multiple functions where possible. Gallese *et al*. (2009) put forward a similar argument to explain how we might have evolved the mental faculties for action understanding. They speculate that we first evolved a module for better control of action performance, and this system was later generalised to interpreting the actions of others, and therefore applied to a wholly different function. We can see from this how extensive empathic cognition is and therefore why it is so hard to categorise. In line with de Waal (2008), we expect that empathic processes are 'stacked' in this way over the evolutionary timeline and employ both primitive state-matching and advanced representational modes of cognition.

4. The Ontogenic Development of Empathic Processes

When the study of empathy was first introduced to neuroscience by MacLean (1967), he proposed first that this was a capacity unique to human beings, which, as demonstrated in a earlier chapter, has been revealed as an oversight. He also suggested empathy relied primarily on the prefrontal cortex. This was without doubt a gross undersight. Recent research has instead demonstrated that the many processes considered empathic engage vast neural populations that are by no means localised in the brain. Here I will discuss which the development and neural correlates of broadly defined empathic processes.

The extent to which empathy is supported by a core network of brain regions is debated. There is evidence of consistent activation across a variety of empathic tasks in the dorsomedial prefrontal cortex, medial prefrontal cortex, temporoparietal junction, amygdala, ventral anterior insula, and septal area (Morelli & Lieberman, 2013). However, given that there are distinct regions activated during, for example, empathy for pain (Singer *et al*., 2004; Lamm *et al*., 2011), it is difficult to determine if these core regions are involved in integration from different modalities or if they subserve mentalising in a more general way.

As Marsh (2018) notes "simulation-based accounts of empathy require that empathic pain be subserved by different processes than empathy for other sensory and affective states, as empathy for any given state would rely on the recruitment of systems that support the first-hand experience of that state" (p 111). This means that when we speak of the neural correlates of empathic processes—at least in regard to state-matching and emotional contagion—we should expect to find as many regions as there are distinct and fundamental emotional experiences. Accordingly, empathy for disgust should rely on the brain region that supports the generation of firsthand disgust; empathy for joy for the same limbic networks that generate firsthand experiences of joy; and so on. The same logic does not hold for cognitive appraisal, of course, which is informed by information fed forward from these corresponding regions and appears to rely primarily on prefrontal and other cortical regions (see Harris, 2003 for review).

Looking at the ontogenesis of empathy can give us hints as to how these processes can be dissociated. Primitive forms of empathy observed across mammalian species can also be observed early in the human lifespan. The capacity to resonate with the emotions of others can be observed in newborns, who will become distressed when other infants begin to cry (Dondi, Simion & Caltran, 1999). Similarly, facial mimicry, which is seen to underpin affect

sharing through afferent feedback, is observable at just 10 weeks of age (Field, Woodson, Greenberg & Cohen, 1982; Haviland & Lewica, 1987). This provides further evidence that such processes are fundamental to empathic awareness and that they may act as precursors to more complex processes.

At 6-months-old, infants display a preference for characters that help others over characters that are antagonistic or competitive (Hamlin, Wynn & Bloom, 2007), suggesting a primitive inclination towards prosocial behaviour. There is also compelling evidence that prosocial behaviour emerges early in childhood. Infants will comfort victims of distress at 12-months-old and at 14-18 months demonstrate spontaneous and unrewarded helping behaviours (Warneken & Tomasello, 2009). From this we can see that even behaviours such as consoling and targeted helping develop very early in the human lifespan, indicating an evolutionary motivation, possibly in terms of strengthening familial relations as discussed above.

At 18-25 months, children will sympathize with others in strife even when emotional cues are absent, suggesting early dissociation between motor mimicry and prelinguistic perspective-taking (Vaish, Carpenter & Tomasello, 2009). This does not hold up as early evidence of cognitive perspective taking since areas of the prefrontal cortex implicated in the appraisal of social situations do not reach maturation until much later in early adulthood. This suggests that higher-order emotional responses, such as sympathy, can be observed before the child is understood to have a developed theory of mind (Frith & Frith, 2005), suggesting such responses do not require cognitive perspective-taking and empathic awareness to the suffering of others may be hardwired to some degree. ToM is here understood as the capacity to attribute mental states to others and is closely related to cognitive empathy processes.

However, it is not until 4-5 years of age that children begin to recognise others as mental agents with beliefs and desires different from their own (Tomasello, 1999). It should not be surprising given that neuroscience indicates the higher-order empathic processes combine elements of ToM, emotion self-regulation, attention, working memory and inhibitory control, which rely on the Prefrontal Cortex, a structure that is known to follow an extremely protracted developmental course (Bunge, Dudukovic, Thomasson, Vaidya & Gabrieli, 2002; Casey, Tottenham, Liston & Durston, 2005; Toga, Thompson & Sowell, 2006; Decety, 2011).

Taken together, this research strongly suggests that the affective components of empathy develop far earlier than cognitive and top-down aspects. More interesting is the suggestion

that prelinguistic forms of perspective-taking emerge earlier than previously thought. The earliest stages rely on limbic-related anatomical structures that are established at birth (amygdala), and later, as encephalization progresses both phylogenically and through adolescence in the individual, shift towards frontal lobe regions (Killgore, Oki & Yurgelun-Todd, 2001; Killgore & Yurgelun-Todd, 2007), which regulate processing and allow for higher-order processes. Research has found, firstly, that these regions interact differently as we mature (De Haan & Gunnar, 2009) and, secondly, that there are partially non-overlapping neural populations that process affective, cognitive, and regulatory aspects of empathy (Lamm, Batson & Decety, 2007; Lamm, Nusbaum, Meltzoff & Decety, 2007; Lamm, Meltzoff & Decety, 2009). These higher-order processes are closely related to Theory of Mind (Decety & Michalska, 2010), again hypothesized to engage the PFC. This co-dependency that seems to rest on an ability to self-regulate personal distress to allow for sympathetic responding (Eisenberg, Fabes, Murphy, Karbon, Maszk, Smith, O'Boyle & Suh, 1994; Eisenberg, Fabes & Spinrad, 2006), as mentioned early.

More than this, we see also how social of an animal we truly are in that our most basic empathic responses are to distress and the state-matching recognition of facial expressions, supporting the idea that empathy first developed to cultivate parental relations.

Empathy appears to not be stable, lending weight to the idea that responses are more state- than trait-oriented. In fact, empathy appears to be plastic in that it can vary widely according to a range of factors. Ward *et al*. (2012), for example, found that students of nursing experience a notable decline in empathy over the course of their degrees, especially those with more clinical encounters. Again supporting the notion that personal distress must be downregulated or it risks inhibiting effective behavioural responses. Further to this, empathy differs by chosen discipline, with Myyry & Helkama (2010) finding that students of the social sciences demonstrating higher empathy than those of business studies.

Finally, there is evidence that empathy differs with age, which may be attributed to lived experience, a change or decline in cognitive ability, or both. Wieck & Kunzmann (2015) found that younger women (M=24 years) were more accurate at perceiving emotions in response to film clips relating an emotional autobiographical memory but reported similar levels of emotional congruence as older women (M=69 years). Older women, on the other hand, exhibited greater sympathy. Similarly, Khanjani *et al*. (2020) found that hot or affective empathy was significantly higher in older adults but were less adept at performance-based

cognitive empathy tasks and this correlated with a decline social functioning. These studies find further evidence for the idea that a theory—theory cultivating higher-order empathy processes develops over time and that this construct should be distinguished from lower-level emotion understanding.

5. Cognitive Theories of Empathy

To further disambiguate empathy, we will first look at the cognitive accounts and then, in the following section, narrow our scope to consider the neural substrate of these processes.

Simulation theory (ST) and Theory—Theory (TT) are the leading cognitive accounts of how we understand other minds. Neither can be dismissed out of hand and so the majority of theorists opt for an interactionist approach, with the two theories supporting varying levels of action interpretation and mentalization. While they offer insights for the empathy theorist, they were initially intended to explain ToM, offering new paradigms for understanding the actions and intentions of others. Here we will briefly describe each theory before putting advocating a hybrid model.

4.1 Theory—Theory

TT proposes that we employ a "set of causal/explanatory laws that relate external stimuli to certain inner states (e.g. perceptions), certain inner states (e.g. desires and beliefs) to other inner states (e.g. decisions), and certain inner states (e.g. decisions) to behaviour" (Gallese & Goldman, 1998, p. 496). This understanding is arrived at by cognitive appraisal of external stimuli, guided by a pseudoscientific theory of axioms and principles that can be used to generate knowledge of what others want, know and feel (Gopnik & Wellman, 1992).

Theorists agree that the TT is a system which takes observed behaviours as input and integrates them with an offline body of schema to generate inferences and predictions as outputs. However, beyond this, agreement falters with some proposing that this system must operate at the subpersonal level, organized and processed by an implicit Language of Thought (Stich & Nichols, 1992), while others suggest it occurs at the level of conscious accessibility (Gopnik & Wellman, 1992).

The TT would seem to be more adept at explaining complex forms of empathy where an awareness of cultural and historical context, individual differences and narrativization are crucial for making judgements. Theorists typically argue for TT as means of refuting ST, which is claimed to be inadequate at explaining these phenomena, and therefore make an appeal to higher cognitive faculties. The question, however, is constrained by the definition of empathy alone. If empathy is taken as *feeling with* others, then simulation theory, as explained below, might suffice. However, the limits of empathy are not easily prescribed.

Surely it cannot be the same neural substrate that supports, say, sympathising with an injured animal and observing a someone stub their toe? In fact, empathy, as the ability to resonate with other organisms, appears quite global in its neurological expression, deeply enmeshed in the lived experience of others. In order for TT to be a comprehensive theory, empathy would have to be limited to complex cognitive processes as argued by Slaby (2014). Broad definitions like the one outlined in this paper certainly call for a TT at higher levels, but this does not dismiss ST at any level out of hand.

4.2 Simulation Theory

Unlike the TT, the ST suggests that, because mental architecture is necessarily similar across individuals, no theorizing—or at least far less—is required to gain access to the mental states of others. Instead, intersubjectivity relies on observing the expressions of cognitive and affective mental states on physiology, which activate corresponding mental states in the observer and so we understand through this embodiment. As such, state-matching is the primary mechanism by which we understand others, rather than offline cognitive analysis.

Simulation theory has its roots in reactionary theories to strong forms of TT (Gordon, 1994; Heal, 1998) and early neuroscientific research on the primate brain by Rizzolatti and colleagues (1987; 1988). Goldman (2006), however, has advanced a comprehensive theory which outlines the minimal requirements for simulation. In this case, if an individual observes another in brain state S, then s/he will have a replicant brain state, S'. Since the individual cannot directly perceive the other's brain state, s/he relies on this virtual state S' for action understanding that, if not inhibited, would result in execution of the replicated action. Importantly, from a neurological standpoint, this brain state is differentiated from an executed action only by this inhibition. Having simulated brain state S as S', the individual then comes to understand the other's internal state as if it were his/her own. Goldman proposes that this ability can be deployed *retrodictively*, whereby it is used to understand what mental state may have caused the observed behaviour, or *projectively*, whereby it is used to anticipate how the other might behave next based on preceding mental states.

In accordance with Anderson's 'massive redeployment hypothesis' (2007), these theories suggest that networks initially used in the planning of complex actions are later exploited, or repurposed, towards the goal of understanding observed behaviour in others. At an even higher level of specialisation, there is evidence for subordinate neural networks that only fire

in response to specific goal-directed actions (Rochat *et al*., 2010). As such, the mirror neuron system (MNS) has been proposed as the neural substrate underlying predictive coding theory (Brown & Brüne, 2012), perception-action mechanisms (Preston, 2007). However, research has been hindered by the difficulty of studying these neurons without the use of invasive procedures. Consequently, the role of the MNS in low-level imitation and action understanding is far from determined (Hickok, 2009; Molenbergh, Cunnington, & Mattingley, 2009) and evidence that this neural substrate also underpins empathy is, to date, largely speculative (see Baird, Scheffer & Wilson, 2010 for review).

Decety (2010) finds this account inadequate and appeals to the need for higher-level cognitive appraisal:

> "While the capacity for two people to resonate with each other affectively, prior to any cognitive understanding, is the basis for developing shared emotional meanings, it is not enough for mature empathic understanding. Such an understanding requires the formation of an explicit representation of the feelings of another person as an intentional agent, which necessitates additional computational mechanisms beyond the affect sharing level." (p.261).
>
> In sum, simulation may provide an adequate explanation of low-level action understanding but is unlikely to account for the experience of empathy at large. It is therefore best to consider hybrid approaches that regard simulation as a bridge into other minds. As Goldman and Gallese have eloquently put it, "The mirror system 'seems to be nature's way of getting the observer into the same 'mental shoes' as the target.'" (2007).

4.3 Hybrid Theories

ST and TT have come under heavy scrutiny, with many arguing they fail to explain even a narrow range of social interactions. However, by identifying the common features shared by both accounts, new proposals have come forward which demonstrate promise. Taken to explain different levels of the same phenomenon, they offer a compelling account. This will

be evaluated before a Zahavi's Direct Social Perception (2011) alternative model is briefly explained.

There are suppositions that underpin both theories, however, suggesting that a marriage of the two may be the preferred approach. As Zahavi puts it, "both accounts share certain presuppositions that underlie and shape the very theory of mind debate. In particular, they both share certain assumptions about the mind–body relation" (Zahavi, 2007). What is at stake here is which plays the formative role. That is, does empathy proceed from egocentric mirroring or are these adjunct states to a set of abstract principles that permit understanding? No theorist, as Stueber (2010) notes, denies the role of cognitive appraisal outright.

Interactionist approaches are the norm. Depending on the proponent, ST and TT are invoked to explain different stages of the mentalising process. Most notably, simulation theory is often said to provide an explanatory account of subpersonal or *basic* empathy, while it is suggested that TT facilitates higher-order processes. Goldman, for example, stresses the fact that mirroring is not to be taken as an explanatory mechanism in and of itself (2009), saying that mirroring may either (a) itself be an attribution of a mental state to another, or (b) may *cause* a set of neural events that result in an attribution (2009).

Spaulding (2016) designates this as low-level simulational mindreading but fails give a satisfactory account of how simulation alone can explain high-level mindreading. She extends the concept of simulation to include imagination, and reasonably explains that the lack of a unified conception of simulation detracts from its validity. However, I find it problematic to extend mirroring or simulation to include imagination, since this process is more closely associated with scene construction and visualisation, guided by memory and causal principles, and it is no longer clear how this should be distinguished from the principles of a theory—theory. Instead I limit its usage to strictly low-level simulation, meaning direct mirroring of behaviours and their corresponding mental states. By this definition, activation of corresponding neural populations in the observer elicits comparable experiences. For example, processing a disgusted facial expression would activate regions of the amygdala that also generate feelings of disgust in the self. Imagination would be distinct in that it employs a domain-general faculty to represent and analyse the experience of the other, and is the product is effortful conscious cognition.

While it is conceivable that biological action is understood by such mirroring, this does not suffice to explain complex instances of ToM. This account may even be adequate to explain

how we share in the emotional experience of others, since these are typically accompanied by facial expressions and other bodily signals. However, mirroring is already an interpretive act based on how the observer *believes* the other is thinking and feeling based on behavioural evidence, and conceptually it is hard to see how in certain cases that could be achieved without some kind of contextual mediation. I therefore agree with Spaulding (2016) therefore that abstract representations of this kind are best explained by a Theory—theory, while ST is adequate to explain concrete representations.

So there is no doubt compelling evidence on both sides. Through observation of children and from our own experience, we know that as humans interact with others, they develop more sophisticated ideas of their beliefs and desires and how they differ, and this impacts upon their interaction. This is in line with Theory—Theory. However, we also know that the emotional states of other can affect us in a profound visceral way: when we see someone suffer an injury, we often have a phenomenologically comparable experience to when we are actually in pain. It is also important to consider that it is far less daunting to observe state-matching processes at the neural level than it is to prove the existence of an abstract theory of mind, so the burden of proof is considerably lighter for simulation theory.

We therefore take the position that simulation and abstract theorising have explanatory power at different stages of empathic processing, and so their relative contributions should be assessed. Neither theory can be dismissed out of hand. As Stueber (2010) says, no theorist would deny that effortful appraisal of other minds occurs, what is at stake here is the extent and manner of influence, and whether simulation should be regarded as playing the formative epistemic role.

4.4 Concluding Remarks

For the study of empathy there is validity in both approaches, and it may be more useful to consider how unconscious state matching informs perspective-taking from the bottom-up and cognitive appraisals from the top-down. But it is also important to acknowledge that theoretically neither state matching nor mental projection are necessarily required to understand another's emotional state. We may know someone is angry simply by looking at them, but appraisal of contextual factors may be required to understand *why* they are angry, and in more subtle cases where somatic cues are sparse, we may need to rely more on these contextual factors to know *that* they are angry. A shake of the head can alternatively mean

disproval, disbelief or disagreement. It is possible that the various influence of these processes is context-dependent, and any combination of them may be employed to reach understanding. Certainly, though, state-matching is more likely than cognitive appraisal to support an understanding of goal-directed movement and what was termed basic empathy (identification of facial expressions) but whether it provides a foundation for perspective-taking and higher-order processes remains to be understood.

Gallagher (2012) makes the broad claim that "the other's situation is … facilitated more by narrative than by simulation abilities" (p.369). he defines narrative as a temporal structure (typically with a beginning and end) whose content is about a particular person or event. These structures are tied to particular contexts in this way, rather than being general principles. He advances the theory that case-by-case narrativization is used to arrive at understanding and claims that this relies primarily on faculties of episodic simulation or imaginative cognition. He draws on the work of Nelson (1992; 2009) to argue in favour of this. Such an account does not necessarily preclude a theory—theory but instead suggests a different and more context-dependent model for theorising.

Finally, some theorists have put forward what are essentially eliminativist accounts (Scheler, 1953; Zahavi, 2011) suggesting that neither ST nor TT are needed to explain action understanding. As Zahavi (2008) says, "There is a crucial difference between claiming that my recognition of a certain emotion in you requires me to experience the very same kind of emotion immediately prior to ascribing it to you and claiming that the same neural substrate subserves both the experience of an emotion and the recognition of the same kind of emotion in others" (p. 9). These accounts argue that perceptual information is enough to generate understanding. By this account, seeing an angry expression is enough for us to make the connection without the need to either simulate or theorise. However, it is beyond the scope of this paper to review Zahavi's extensive body of work.

Being such a complex form of cognition, it is not surprising that a combination of theories may be required to explain empathic processes. When we discuss the recognition of facial expressions, for example, we are discussing something that is categorically different from feelings of compassion for someone less fortunate for ourselves. As such, I propose that an interaction of simulation and theory—theory may explain affective empathy and some low-level aspects of perspective-taking, but that higher-order processes, as a means of sense-making, also necessitate processes of narrativisation.

6. Empathy & Memory: The Present Research

Our working model identifies the span of processes considered empathic and proposes some ways in which these may interact to give rise to the complex emotional behaviour we observe in humans. We then discussed how such processes may have developed and 'stacked' over the evolutionary timeline, with higher-order processes exploiting a mixture of primitive mechanisms and more advanced domain-general faculties like imagination. We detailed the case for memory systems supporting the faculty of imagination, and thereby identified a potential link between this and cognitive perspective-taking. Finally, we discussed the often competing theories of ST and TT, and argued for an interactionist approach, which also relies on memory systems to call upon principles and draw comparisons with past experience to achieve cognitive appraisal. We suggested that higher-order processes, which are highly contextual in nature, may be supported by narrativisation. While this was established as an alternative to theory—theory, it nonetheless also relies on faculties of imagination, and by extension memory systems. Finally, we reviewed some evidence for the neural distribution of empathic processes through the brain, and attempted to demonstrate how widespread these neural networks are.

Schacter & Addis (2007) have called our capacity to recombine elements from memory to create novel scenes 'episodic simulation'. Allowing us to then make predictions and inferences, this faculty has been associated with social problem-solving (Sheldon et al., 2011) and willingness to help people in distress (Gaesser & Schacter, 2014). Moreover, brain regions understood to support ToM have been found to overlap significantly with memory systems (Vignemont & Singer, 2006; Buckner & Carroll, 2007; Ciaramelli et al., 2013). This provides strong evidence both for the predominance of a theory—theory, since memory for others' past experiences appear to mediate our appraisal and response to them in the present, and also of a core network that supports episodic simulation and by extension, cognitive empathy processes.

Cuff *et al.* (2016) considers the role of memory in empathic processes on a number of occasions, most notably when suggesting that retrieval of memories is necessary when inferring emotionality either in the absence of physiological cues, or when elicited by verbal report. They also mention that congruency of shared emotions relies on personal experience,

imagination and simulation (Coplan, 2011), suggesting that empathic accuracy relies on these faculties.

They finally outline three cases in which a target need not be physically present to elicit empathy: (1) encountering someone who has just experienced an emotional event, but who is minimising emotional cues; (2) empathy for an absent target elicited by verbal report; and (3) empathy evoked by a fictional or imaginary person. All of which directly implicate simulatory cognition, which, as established, draws on memory items to permit scene construction.

Following from this, episodic memory is understood to support cold empathy by appealing to past experiences and reconfiguring them in accordance with episodic simulation, so that they can be applied to the circumstances of others. Bateson (2009) notes that some cold empathy represents this kind of self-focused simulation, whereas in other cases we attempt to place ourselves directly into the shoes of the other person. Whichever the case, the theory—theory suggests that it is only through the recombination of memory items into novels scenes that this is possible.

Although there is a distinct lack of research into how qualitatively different memory systems may support empathy, we conjecture that semantic memory is required to extract principles from experience and organise them into a theory—theory which can then inform appraisals.

While there is no discernible role for episodic or semantic memory in hot empathy processes, we can nonetheless see how these systems can mediate responses, and indeed there is a body of literature to support this view. For example, one's relationship to the observed other clearly influences the degree to which we emotionally resonate (Sachisthal *et al*., 2016), which indicates at least that autobiographical and episodic memory systems integrate to determine the degree of familiarity. Clearly, then, a top-down role for memory as either enhancing or inhibiting emotional contagion must be considered, which again nods towards hybrid theories even at the lower levels of emotion understanding.

In the following chapters, we make use of a novel narrative-based paradigm to investigate these aspects of the theory with the intention of better understanding the position of empathy in relation to other cognitive faculties, specifically to the common platform of episodic memory and cognitive simulatory processes. We later discuss the case for empathy as supported by a combination of ST, TT and narrativisation in light of our findings.

The aims of this research are to determine if self-reported empathy scores mediate the encoding and retention of emotional details, giving some insight into how these are made accessible to instances of future perspective-taking. The present studies make use of a between-subjects experiment design to determine if individual differences in empathy impact encoding and retrieval strategies for information with emotional content.

These studies will also explore the degree to which sensitivity to emotional information is modulated by empathy as a potential mechanism for promoting deeper encoding. This will first be investigated using a text-based paradigm and later using a video-based paradigm to better understand how these processes of narrativisation are sensitive to modality as well as to consider the role played by motor mimicry in contributing to higher-order empathic processes.

Finally, we will ask the question of whether certain personality traits associate with particular empathic abilities, as suggested in studies by … Empathic abilities, as measured by the Davis IRI and a novel empathy measure, will be considered against Big 5 personality traits and further linked to Theory of Mind style through the use of a novel interpretative paradigm.

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Chapter 2

The impact of empathy on the encoding and retrieval of social information: A text-based narrative study

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Abstract

Empathy describes the ability to identify and resonate with the emotional experience of others. The shared neural networks that support episodic memory and perspective-taking, an imaginative aspect of empathy, are beginning to be identified. There is, however, a need for behavioural research that investigates how memory encoding and retrieval strategies are mediated by dispositional empathy. Two studies were conducted, making use of a novel text-based paradigm. In both studies, during the encoding phase, high empathy individuals reported stronger positive emotionality in response to narratives with positive and neutral valence, as compared to the low empathy group. At retrieval, high empathy individuals demonstrated significantly enhanced recall of emotional details compared with low empathy individuals. In addition, it was found that high empathic individuals were more likely to remember emotional details from narratives that evoked strong emotionality, suggesting that empathic individuals are more sensitive to their own emotional states. These findings may reflect an encoding strategy that selects for emotional information so that it can be made available for simulatory cognition. These results are considered vis-à-vis their contribution to the prevailing cognitive accounts of empathy: simulation theory and theory—theory.

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1. Introduction

1.1 Definitions of Empathy

Humans are profoundly social animals with seemingly unique empathic abilities. Empathy can be described as the ability to identify and share in the emotional experiences of others (Gallese, 2003), and may be extended to include behavioural responses. Cuff et al. (2016), in their review, compare no less than 43 discrete definitions. Still, definitions typically fall into two camps. Either they designate empathy as an overarching category (Preston & de Waal, 2002) or they attempt to delineate empathy as one aspect in a string of associated concepts (Eisenberg *et al*., 1991). In the previous chapter, a working definition and model of empathy was put forward.

Decety & Jackson (2004) outline three requirements for an instance of social processing to be considered empathic: (i) the sharing of emotion between self and other, (ii) awareness of self-other distinction, and (iii) the regulation of perspective-taking whilst maintaining the self-other distinction.

I contend that this definition puts unnecessary constraints on the concept. They appear to describe a *type* of empathic processing, while simultaneously implicating a vast array of cognitive resources that correspond to perception, memory, reasoning, and the generation of emotional states. This runs the risk of confusing empathy with subordinate processes. It is therefore my opinion, in line with Preston & de Waal (2002), that the term ‘empathy’ is only epistemically useful as an umbrella term for a string of interdependent concepts and associated processes.

Within this framework, the broadest subordinate categories are understood to be the affective and cognitive (Decety & Jackson, 2004), elsewhere referred to as ‘hot’ and ‘cold’ empathy (Davis & Kraus, 1991). These were outlined in the previous chapter and will be briefly surmised in the following section.

1.2 Hot or Affective Empathy

Hot empathy is considered more primitive, both ontogenetically and phylogenetically (De Waal, 2006). It incorporates concepts of empathy that are emotionally loaded, automatic, bottom-up and mandatory in the Fodorian sense (Fodor, 1983). Wincing whilst observing someone in pain is a clear example of hot empathy.

Motor mimicry is considered to be the most rudimentary process under the rubric of empathy. This is the unconscious mirroring of a target's physiological behaviour by an observer. Motor mimicry has also been called 'facial empathy' (Gordon, 1995) and 'imitation' (Haxby, Hoffman & Gobbini, 2000) and primarily includes the matching of facial expressions and posture.

Emotional contagion describes how we come to automatically share in the emotions of those around us. For example, laughing during a comedic performance or finding ourselves overwhelmed by grief at the sight of someone crying.

As is apparent, motor mimicry and emotional contagion are closely related. The first, however, is a bodily or action-oriented response, while the second pertains to an emotional experience that is consciously accessible to the observer. Still, they may not be necessarily co-dependent.

Importantly, both motor mimicry and emotional contagion occur before the self-other distinction has been instantiated, meaning they are experienced from the first-person perspective, not vicariously. Wincing is the example *par excellence* because the very act suggests that the observer is drawing away from a painful stimuli, despite there being no threat to the observer. It is only later, through projective and imaginative cognition, that we become aware of appraising the emotional state of another. Indeed, research in neuroscience has found support for this idea, demonstrating that overlapping neural networks support self-generated and vicarious emotions. For example, observing and even thinking about another person in pain can cause topographic activity in the same network that processes direct responses to painful stimuli (Fitzgibbon et al., 2010). Similar results have been observed in the domains of disgust (Wicker *et al*., 2003) and fear (Goldman & Sripada, 2005).

Hot or affective empathy also incorporates the concept of personal distress, which is pertinent to the present studies. Personal distress describes self-oriented feelings of discomfort, "anxiety or unease during tense interpersonal situations" (Davis, 1980) or upon observing another experiencing negative affect. Kim & Han (2018) argue that personal distress represents an overtly negative aspect of hot empathy, since it is positively correlated with ruminative self-focus, negative self-concept, self-criticism and neuroticism. Personal distress can lead to overstimulation which presents a barrier to empathic interaction and prosocial behaviour, often leading to stimulus avoidance (Kim & Han, 2018).

1.3 Cold or Cognitive Empathy

Cold empathy, on the other hand, refers to capacities for perspective-taking or Theory of Mind, whereby we ascribe mental states to ourselves and others based on behavioural cues, or more colloquially, we 'place ourselves in their shoes'. Rather than an emotional state that grips the observer spontaneously, cold empathy pertains to effortful projection that seeks to evaluate how the target might think and feel, why they think and feel this way, and how they are likely to behave as a result. This relies on top-down analysis that engages an array of cortical regions and integration of the self-other distinction (Wellman, 2018; Spunt & Adolphs, 2019).

Research suggests that episodic memory provides the building blocks for simulatory or prospective cognition (Schacter & Addis, 2012). By piecing together elements from episodic memory, we can construct novel scenes which provide a basis for understanding the motivations for the observed behaviour of others and thereby to anticipate future behaviour. This may lead to higher-order prosocial responses such as feelings of sympathy, pity or compassion, which can in turn lead to helping or consoling behaviour. Alternatively, we may find ourselves taking pleasure in the other's discomfort (*schadenfreude*) or even wishing harm on them (sadism). A detailed explanation of these processes is beyond the scope of this chapter.

Of particular interest here is sympathy, which in Davis' (1980) taxonomy is synonymous with empathic concern. This construct is described as feelings of tenderness or compassion and differs from personal distress insofar as it describes feeling *for* rather than feeling *as* or *with* the other. As Keen (2006) notes instead of being captured by the statement, *I feel your pain*, we would say, *I feel pity for your pain.* So empathic concern is altercentric, and as such is conjectured to lead towards prosocial behaviour rather than avoidance as in the case of personal distress (Van Der Graaff *et al*., 2014; Grynberg & López-Pérez, 2018).

1.4 Empathy Deficits

Empathy can be selectively impaired in individuals with certain developmental or psychiatric disorders. In nonclinical populations, there is evidence that trauma can lead to both heightened (Greenberg *et al*., 2018) and diminished empathy (Nietlisbach *et al*., 2010), suggesting that the type of trauma, when it occurred and how we reflect on it can impact the

development of empathy. This also highlights the apparent dissociability of empathy since certain capacities can be impaired while other are retained (Mazza *et al*., 2015).
Personality structure can also impact the expression of empathy. Among these the most well-researched are narcissism, psychopathy and Machiavellianism, commonly referred to as the dark triad of personality (Paulhus & Williams, 2002). These traits are each associated with behaviours of self-aggrandizement, manipulative behaviour and a lack of concern for others, which imply empathic dysfunction. It has been shown that psychopathic individuals have a diminished startle reflex and a reduced neurobiological reaction to typically fear-inducing stimuli (Blair, Jones, Clark & Smith, 1997; Blair & Coles, 2001), suggesting that they are less responsive to emotional stimuli more generally. With regards to empathy, studies have found that cognitive perspective-taking is retained in psychopathic adolescent boys compared with controls, while there is a diminished or even absent affective component (Mullins-Nelson, Salekin & Liestico, 2006; Wai & Tiliopoulos, 2012). The opposite is true for males with Autistic Spectrum Disorders (Jones, Happé & Viding, 2010).

Dark Triad traits therefore offer an opportunity to study the impact of empathy deficits in a non-clinical population and offer a valuable counterpoint to individuals that demonstrate high dispositional empathy. Where empathy of the kind described above is expressed as care and concern for the other, often leading to cooperative behaviours, these personality traits are associated with strategies of competitive behaviour based on interpersonal exploitation and manipulation (Furnham, Richard & Paulhus, 2013). The link between personality traits and cold empathy will be explored in more details in chapter 4.

1.5 Simulation Theory (ST) & Theory—Theory (TT)

Hogan (1969) claimed that empathy is "the act of constructing for oneself another person's mental state." While such definitions may seem correct prima facie, they assume that simulation is necessary to achieve understanding. In this section we will consider the longstanding debate regarding the relative contributions of ST and TT to empathy and Theory of Mind.

ST proposes that we embody or simulate the internal state of the other using our own mental architecture, and this provides a template for understanding. TT claims that, through lived and observed experience, humans acquire a set of psychological laws that determine how people will feel and act in given situations. These are applied to social scenarios and permit

the inference of mental states based on behaviour, amounting to a personalised theory of mind. While it is typically understood that both accounts have explanatory power, the relative importance of each is the subject of controversy.

Mirror neurons have been proposed as a potential neural substrate for simulation (Corradini & Antonietti, 2013). These visuomotor neurons, that discharge both when an action is performed and when that same action is executed, are proposed to help identify such behaviours in others by way of physiological template. Activity consistent with that of mirror neurons has been observed in human subjects using fMRI (Molenberghs, Cunnington & Mattingley, 2009; Fuelscher et al., 2019). However, due to the restricted spatial resolution of this neuroimaging technique, the hypothesis that this supports simulation even at this rudimentary level, is heavily contested (Spaulding, 2012). Nonetheless theorists have proposed that such neural networks may also be responsible for the representation of emotional states in humans.

Still, there is little doubt that a theory—theory must be invoked to explain more complex instances of perspective-taking. I therefore proposed earlier that these accounts are epistemically useful for explaining different stages of empathizing. Namely, that simulation has an important role to play in hot empathy but it is insufficient to explain cold empathy processes.

In line with Goldman (2006), we argued for an interactionist approach in Chapter 1, making the case that these simulations are not propositional in their own sense, rather they form a somatic foundation and, later, following top-down analysis, they are interpreted and come to shape explicit beliefs about the target's emotional state that can inform subsequent behaviour. In short, ST plays a foundational role in emotion understanding but this must be supplemented by theorizing to make accurate inferences.

There is therefore an integral role for memory with regards to cold empathy and this relationship may be mediated by emotional states generated through hot empathy processes, which facilitate the selective encoding of information.

1.6 The Present Studies

Although Tulving (1985) put forward the idea that episodic memory provides the basis not only for recalling past experiences but also for 'mental time travel' into future events, there

has traditionally been theoretical autonomy between the faculties of memory and imagination, and by extension, cold empathy. However, the interdependence of these faculties has become increasingly apparent with the advent of neuroimaging techniques. Episodic memory is now seen as undergoing transformations throughout life and upon each reiteration, lending support to the notion that memory is a constructive process that provides the building blocks for pre-experience or simulatory cognition and demonstrating that memory and imagination or simulation are supported by the same core network (Schacter & Addis, 2007; Schacter et al., 2012; Addis, 2018). This has come to be known as the 'episodic simulation hypothesis' (Buckner & Carroll, 2007).

Episodic memory is therefore conjectured to support cold empathy by allowing us to draw parallels between our experiences and the observed situation of another, as well as providing an online system that can simulate another's perspective and thereby make predictions regarding mental state and behaviour (Gaesser, 2013). In this way, memories may help us to abstract a theory—theory from our experiences. By providing a space to recombine items in novel ways, episodic memory also allows us to understand the thoughts, feelings and behaviours of other people, from which we can then make informed judgements and simulate experience from another's perspective based on our own past experiences. The question then arises, is there evidence for such a mnemonic strategy? Do high empathy individuals selectively encode and retrieve information differently to low empathy individuals? Presently, very few studies directly investigate the link between empathy and episodic memory at the behavioural level. Crisp *et al.* (2010) found that the more elaborate an imagined contact scenario was, the greater the likelihood of positive contact with an outgroup member. This demonstrates how imagination may influence prosocial behaviour and, beyond this, that later stages of empathy may depend to some extent on the memory-simulation system.

In another study, Gaesser & Schacter (2014) asked participants to read news stories featuring people in need (e.g., locked out of the house in a storm; recovering from illness; etc). Participants were then asked to either vividly imagine helping the protagonist or to complete mathematical problems. Vividly imagining how to help was found to predict subsequent willingness to help when compared to the baseline condition (merely learning about someone's plight), suggesting that such engagement encourages prosocial behaviour. Building on this, Gaesser, Shimura & Cikara (2020) also found that imagining helping another significantly increased willingness to help both in- and out-group members,

suggesting that episodic simulation contributes to empathic responses more so even than relation dynamics.

Ciaramelli, Bernardi & Moscovitch (2013) used a faux pas scenario paradigm to demonstrate that the way we empathise with individuals in the present is influenced by memories we have about those people. Participants read life stories of two individuals, one who had suffered many romantic failures and another who had suffered many professional failures. They subsequently found that participants reported more empathy for characters who had suffered romantic failures in a romantic faux pas scenario, and more for characters that had suffered professional failures in work-related faux pas scenarios. So knowledge of prior failings in each domain led to greater sympathy for the victim of a faux pas in the chosen domain. They argue that this is evidence for an individualised ToM (iToM). That is, general principles that can be adapted according to context and prior knowledge to make inferences about individual cases.

Finally, a study by Beadle *et al.* (2013) found that patients with bilateral hippocampal damage resulting in impaired episodic memory reported diminished affective and cognitive trait empathy, as compared to controls participants. Following an empathy induction paradigm (Beadle, 2009), hippocampal amnesia patients also reported no increase to empathy or prosocial behaviour following empathy inductions. Beadle *et al*. interpreted their findings as indicating a crucial role for hippocampal memory processes in cold-cognitive empathy. The authors argued that the hippocampus' regulatory functions such as online monitoring and relational binding may allow for the integration of signals from different modalities and thereby foster the necessary preconditions for empathic responding. However, how this brain structure may contribute to affective-hot empathy remains to be clarified theoretically and empirically.

Given the compelling evidence for a common neural basis for simulation and episodic memory and the fact that perspective-taking is form of prospective cognition, one would expect to find that dispositional empathy exerts an influence on encoding and retrieval strategies so that this information is available for simulatory cognition. In short, if episodic memories are employed to aid empathic simulation and abstracted to develop a theory—theory, we expect that individuals demonstrating high levels of empathy will selectively encode more emotional details after reading a narrative and that this strategy will in turn enhance their ability to simulate and understand the emotional states of others. Here 'emotional' should be understood as any unit of information that relates to the affective state

of a character as expressed by them or by way of emotive behaviour. For example, a character may explain that they feel anxious around other people and that this makes them unhappy.

Further to this, narrative and narrativisation have been identified as an important construct in the development and deployment of empathy (Moore & Hallenbeck, 2010; Keen, 2006; Gallagher, 2012), but the ways in which empathy mediates the encoding and retrieval of details from narrative fiction remains to be explored. We believe this medium offers useful tools for understanding how empathy may be supported by memory and narrativization.

To investigate how dispositional empathy mediate encoding and retrieval strategies of social information, a novel text-based paradigm was developed. Given the medium, participants were called upon to imagine these scenes while reading and so the effect of motor mimicry will be diminished. We therefore expect that this will lead to vivid imagining and, in empathic individuals, special attention will be paid to emotional details, leading to deeper encoding and enhanced retrieval.

This paradigm incorporated short narratives with emotional (e.g. “Rianne struggled with addiction and had recently been gambling too often”) and non-emotional (e.g. “Rianne was seventy-two years old”) details, and which depicted either a positive, negative or neutral outcome for the protagonist (Appendix 1). During the encoding phase, participants were asked to report their own feelings about the narrative (on a likert scale from very negative to very positive), and to indicate how they thought the character felt. Lastly, they were asked to report how self-relevant they found the narrative to be (on a likert scale from “Not relevant at all” to “Very relevant”). During the subsequent retrieval phase, participants were presented with a title for each narrative and asked to free recall as many details from the narratives as possible. Participants were also asked to recall their own emotion responses to the narratives (“Do you remember how this made you feel?” and “Do you remember how you thought the character felt?”).

1.7 Hypotheses

Predictions based on the theory discussed above are as follows:

(i) High empathy individuals will be more affected by narrative content and therefore will demonstrate heightened emotional arousal in response to narratives at the encoding phase.

(ii) This emotional arousal will lead to deeper encoding and enhanced recall of emotional details in high empathy compared to low empathy individuals.

(iii) Perspective-taking and fantasy, being measures of cold empathy that require faculties of imagination, will correlate most strongly with recall of emotional details.

(iv) Individuals scoring high on the Dark Triad scale (predominantly psychopathy) will empathise less with characters and thereby will exhibit diminished recall of emotional details.

2. Study 1

2.1 Method

2.1.1 *Participants*

Participants (n=48, 25 female) were undergraduate students at University of East Anglia. All were aged between 18 and 29 ($\bar{x}$=21.5). The majority of participants were recruited on SONA and were granted course credit for participation. Some participants were recruited from the Paid Participant Panel and were awarded £10 for participation. Participants who remembered 10 or less details of the narratives overall, or who forgot two or more narratives, were disregarded on the basis that different valences could no longer be reliably compared. Four individuals were excluded for this reason and the final sample was n=44 (22 women).

2.1.2 Materials

The study received ethics approval from the Research Ethics Committee of the School of Psychology at the University of East Anglia. The study was written in Python by the author and was run in the software Psychopy and presented to participants on a desktop computer in an isolated cubicle on the UEA campus. Two questionnaires were administered. These were the Interpersonal Reactivity Index (Davis, 1980) and the Short Dark Triad-III (Paulhus, 2002).

2.1.2.1 IRI

The Interpersonal reactivity index is 28-item questionnaire that provides an overall measure of dispositional empathy. Participants respond to statements on 5-item Likert scales that range from Strongly Disagree through Neither Agree nor Disagree to Strongly Agree. There are four subscales: personal distress, empathic concern, fantasy and perspective-taking. Personal distress denotes feelings of discomfort that are not directed towards an external agent. Empathic concern describes ‘other-oriented’ feelings of sympathy and concern. Fantasy assesses the ability to transpose oneself into the feelings and action of fictitious characters. Perspective-taking assesses one’s capacity to spontaneously adopt the viewpoint of another person.

2.1.2.2 SDT-III

The Short Dark Triad is a revised and shortened version of the Dark Triad questionnaire developed by Paulhus (2002), which provides a measure of three socially aversive traits, all of which include some form of empathy deficit: narcissism, Machiavellianism and psychopathy. There are 9 questions for each category, totalling 27 items. Responses are given on 5-item Likert scales that ranged from 1 Strongly Disagree through 3 Neither Agree nor Disagree to 5 Strongly Agree.

2.1.3 Procedure

2.1.3.1 Encoding

Participants were presented with 15 text narratives, which had either a positive (n=5), negative (n=5) or neutral (n=5) outcome for the protagonist. Each narrative contained 3 emotional and 8 non-emotional details. Before the climax of the narrative, at which point it was unclear what would transpire, participants were presented with a text entry field and asked to predict how the character felt before the outcome was revealed. This was intended to encourage more active involvement with the material. They were then presented with the narrative climax. This was followed by three Likert scales: one to assess their own feelings about the narrative (from 1=very negative to 7=very positive), one to indicate how they thought the character felt (same rating scale) and one to give a measure of self-relevance (from 1=not relevant at all to 7=very relevant).

2.1.4 Retrieval

After a trail-making distractor task, participants completed a recall phase. They were presented with a title for each narrative and then asked to free recall as many details from the narratives as possible. There was then a cued recall phase which asked participants to remember the character's name, age and where they lived. Finally, they had to recall their own emotional responses to the narrative ("do you remember how this made you feel?" and "do you remember how you thought the character felt?"). The whole experiment took approximately 40 minutes for participants to complete.

3. Results

Participants were split into high and low empathy groups based on their overall IRI score. The median empathy value was 97 (SD=13.16). There were 22 participants (14 females) in the high empathy group ($\bar{x}$=106.18; SD=8.05) and 22 (7 females) in the low empathy group ($\bar{x}$=85.36; SD=7.91).

To evaluate the impact of empathy on particular variables, a median split was performed. The authors recognise that this is an arbitrary divide and presents inherent limitations (Iacobucci *et al*., 2015), particularly that individuals tending towards the centre point may be cast in either the high or low group. To counteract this, correlations were also performed to further investigate the main hypotheses.

To assess the validity of our median split, we compare to a study by Gilet *et al*. (2013) and another by Cliffordson (2001) which each took an average of global IRI score. We report an average of all responses ($\bar{x}$=4.40) that is similar to the findings of both Gilet *et al*. (2013) ($\bar{x}$=4.53) and Cliffordson (2001) ($\bar{x}$=3.92). We therefore find evidence that this median split can be generalised to broader populations.

3.1 Encoding Phase

We first considered whether self-emotionality (how emotional the participants found the narratives to be) and other-emotionality (how emotional they thought the character felt) interacted with narrative emotional valence and with empathy group (high versus low). Across all participants, at encoding, the mean response for self-emotionality was 4.45 (SD=2.03) on a 7-point Likert scale where 4 denotes neutral and 7 very positive affect. The mean response for other-emotionality was 4.61 (SD=2.90).

A repeated measures ANOVA with emotionality type (self-, other-emotionality) and valence (positive, neutral, negative) demonstrated a main effect of valence ($F(2,42)=220.41$, $p<.01$, $\eta_p^2=.88$) but the main effect of emotionality type narrowly missed significance: $F(2,42)=3.61$, $p=.07$, $\eta_p^2=.09$). There were also significant interactions between emotionality type and valence ($F(2,42)=18.29$, $p<.01$, $\eta_p^2=.32$), emotionality type and empathy group (high, low) ($F(2,42)=3.94$, $p=.03$, $\eta_p^2=.17$) and valence and empathy group ($F(2,42)=4.13$, $p<.01$, $\eta_p^2=.18$). Further analyses were conducted for each emotionality type separately, self followed by other.

3.1.1 Self-emotionality

A repeated measures ANOVA with mean self-emotionality ratings in response to three levels of valence revealed a main effect of valence: ($F(2,42)=78.22$, $p<.01$, $\eta_p^2=.72$).
For narratives with negative valence, the mean self-emotionality rating was 2.18 (SD=.58). For narratives with neutral valence, it was 5.07 (SD=.60). For narratives with positive valence, it was 6.09 (SD=.63). These differed significantly in the expected directions: negative-neutral ($t(43)=-15.40$, $p<.01$), negative-positive ($t(43)=-4.36$, $p<.01$), neutral-positive ($t(43)=-7.59$, $p<.01$).
We predicted that high empathy individuals would experience heightened affect in response to the emotional content of narratives. We therefore conducted a mixed-factor ANOVA, which revealed a significant interaction between empathy group (high, low) and valence: ($F(2,42)=7.98$, $p<.01$, $\eta_p^2=.29$). Both groups rated the narratives in the expected direction (positive > neutral > negative) for self-emotionality.
In the low empathy group, the mean self-emotionality rating in response to narratives with negative valence was 2.26 (SD=.52), in response to neutral narratives was 4.73 (SD=.52), and in response to positive narratives was 5.65 (SD=.65). These differences were each demonstrated to be significant: positive-negative ($t(43)=14.00$, $p<.01$), positive-neutral ($t(43)=7.21$, $p<.01$), negative-neutral ($t(43)=-13.62$, $p<.01$).
In the high empathy group, the mean self-emotionality rating in response to narratives with negative valence was 2.07 (SD=.60), in response to neutral narratives was 5.29 (SD=.61), and in response to positive narratives was 6.25 (SD=.57). These differences were also demonstrated to be significant: positive-negative ($t(43)=17.89$, $p<.01$), positive-neutral ($t(43)=7.09$, $p<.01$), negative-neutral ($t(43)=-14.20$, $p<.01$).
A series of post-hoc independent samples t-tests demonstrated that self-emotionality differed by empathy group for narratives with positive valence ($t(43)=-3.11$, $p<.01$) and narratives with neutral valence ($t(43)=-3.14$, $p<.01$) but not narratives with negative valence ($t(43)=1.10$, $p=.28$). In these cases, high empathy individuals consistently reported that they experienced more positive affect in response to narratives with neutral and positive valence than low empathy individuals.

3.1.2 Other-emotionality

A repeated measures ANOVA with mean other-emotionality ratings in response to three levels of valence revealed a main effect of valence: ($F(1,43)=148.31$, $p<.01$, $\eta_p^2=.92$).

The mean other-emotionality rating in response to narratives with negative valence was 1.30 (SD=.37). In response to narratives with neutral valence, it was 5.81 (SD=.56). In response to narratives with positive valence, it was 6.72 (SD=.39). These differed in the expected directions: negative-neutral ($t(43)=-31.64$, $p<.001$), negative-positive ($t(43)=-45.94$, $p<.001$), neutral-positive ($t(43)=-8.49$, $p<.001$).
However, there was no significant interaction between empathy group and valence ($F(1,43)=2.41$, $p=.10$, $\eta_p^2=.11$).

3.1.3 Gender and Emotionality

Given the disproportionate number of females in the high empathy (N=14) compared to the low empathy group (N=7), it was important to examine the influence of this variable on emotionality. A repeated measures ANOVA with emotionality type (self, other), valence (negative, neutral, positive) and gender group (male, female) was conducted. There was no interaction between gender group and emotionality type, ($F(1,43)=.13$, $p=.72$, $\eta_p^2<.01$), gender group and valence, ($F(2,42)=.36$, $p=.66$, $\eta_p^2=.01$), or emotionality type, valence and gender group, ($F(1,43)=1.89$, $p=.17$, $\eta_p^2=.05$).

3.1.4 Self-relevance

A repeated measures ANOVA with mean self-relevance ratings revealed a main effect of valence: ($F(1,43)=11.52$, $p<.001$, $\eta_p^2=.23$). On average, participants found the self-relevance of narratives to be 3.57 (SD=.86). Of the three valences, they found the content of narratives with positive valence to be the most self-relevant ($\bar{x}=4.19$, SD=.97), followed by narratives with neutral valence ($\bar{x}=3.92$, SD=1.02) and finally narratives with negative valence ($\bar{x}=2.59$, SD=1.02). Neutral-negative ($t(43)=-5.56$, $p<.01$) and negative-positive ($t(43)=-8.82$, $p<.01$) were demonstrated to differ significantly, while neutral-positive did not: ($t(43)=-1.54$, $p=.14$). However, there was no significant interaction between empathy group and valence: $F(1,43)=1.57$, $p=.16$, $\eta_p^2=.09$).

3.2 **Retrieval Phase**

In general, the additional details provided in the cued recall phase were negligible compared with those provided in the free recall phase. Therefore, the results of cued recall are omitted, and all results in the following sections pertain to the free recall phase.

3.2.1 Comparison of Emotionality Ratings at Encoding and Retrieval

A repeated measures ANOVA was run with a task factor (encoding, retrieval), emotionality type (self, other) and the valence factor. This demonstrated a main effect of valence ($F(2,42)=239.47$, $p<.01$, $\eta_p^2=.87$) and emotionality type ($F(1,43)=4.96$, $p=.03$, $\eta_p^2=.12$) but not of task ($F(1,43)=.05$, $p=.83$, $\eta_p^2<.01$). There was a significant interaction between emotionality type and valence ($F(2,42)=19.97$, $p<.01$, $\eta_p^2=.36$) but not between task and emotionality type ($F(1,43)=.71$, $p=.71$, $\eta_p^2<.01$), task and valence ($F(2,42)=1.05$, $p=.33$, $\eta_p^2=.03$) or task, emotionality type and valence ($F(2,42)=1.75$, $p=.18$, $\eta_p^2=.05$).

Empathy group was demonstrated to interact significantly with emotionality type ($F(1,43)=4.96$, $p=.01$, $\eta_p^2=.22$) but not with valence ($F(4,40)=2.54$, $p=.07$, $\eta_p^2=.12$), or task ($F(1,43)=.05$, $p=.83$, $\eta_p^2<.01$).

At retrieval, participants from the high empathy group gave less negative self-emotionality ratings ($\overline{x}=2.11$, SD=.72) than other-emotionality ($\overline{x}=1.22$, SD=.41) ratings for narratives with negative valence, ($t(43)=5.82$, $p<.001$). They also assigned lower self-emotionality ratings ($\overline{x}=5.27$, SD=.77) than other-emotionality ratings ($\overline{x}=6.00$, SD=.81) for narratives with neutral valence, ($t(43)=-6.04$, $p<.001$). For narratives with positive valence, they assigned lower self-emotionality ratings ($\overline{x}=5.94$, SD=.92) than other-emotionality ratings was ($\overline{x}=6.55$, SD=1.11), ($t(43)=-5.07$, $p<.001$).

At retrieval, in the low empathy group, the mean self-emotionality rating for narratives with negative valence was 2.21 (SD=.64) and the mean other-emotionality rating was 1.28 (SD=.45), ($t(43)=6.19$, $p<.001$). For narratives with neutral valence, the mean self-emotionality rating was 4.79 (SD=.65) and the mean other-emotionality rating was 5.78 (SD=.54), ($t(43)=-6.58$, $p<.001$). For narratives with positive valence, the mean self-emotionality rating was 5.38 (SD=.78) and the mean other-emotionality rating was 6.49 (SD=.47), ($t(43)=-6.89$, $p<.001$).

An average of self-emotionality and other-emotionality ratings at retrieval was computed. Following this, a series of independent samples t-tests revealed significant differences in self-emotionality ratings by empathy group, ($t(43)=-2.53$, $p=.02$), but not other-emotionality ratings, ($t(43)=-.23$, $p=.82$).

3.2.2 Empathy, Detail Type and Valence Recall

A Repeated Measures ANOVA with detail type (emotional, non-emotional detail recall) and valence (positive, negative, neutral) revealed a main effect of valence ($F(1,43)=10.58$, $p<.01$, $\eta_p^2=.20$) and of detail type ($F(1,43)=10.61$, $p<.01$, $\eta_p^2=.20$), as well as an interaction between valence and detail type: ($F(1,43)=25.14$, $p<.01$, $\eta_p^2=.37$).

Due to the weighting of details (each narrative had 3 emotional and 8 non-emotional details), participants remembered more non-emotional ($\bar{x}=28.79$, SD=10.34) than emotional details ($\bar{x}=25.09$, SD=7.12) overall: ($t(43)= -3.34$, $p<.01$).

Within emotional details, participants remembered more details from narratives with negative valence ($\bar{x}=9.34$, SD=2.62, out of 25), followed by narratives with positive valence ($\bar{x}=8.41$, SD=4.36) and finally narratives with neutral valence ($\bar{x}=7.66$, SD=2.98). Participants remembered more details from negative than neutral narratives ($t(43)=4.51$, $p<.01$), more details from negative than positive narratives ($t(43)=2.89$, $p=.01$) and more details from positive than neutral narratives ($t(43)=-2.25$, $p=.03$).

Within non-emotional details, participants remembered more details from narratives with neutral valence ($\bar{x}=11.39$, SD=4.22, out of 75), followed by narratives with negative valence ($\bar{x}=9.73$, SD=4.36) and finally narratives with positive valence ($\bar{x}=7.93$, SD=3.14). Participants remembered more details from neutral than negative narratives ($t(43)=-2.66$, $p=.01$), more details from negative than positive narratives ($t(43)=3.66$, $p<.01$), and more details from netural than positive narratives ($t(43)=6.32$, $p<.01$).

There was also a significant interaction between empathy group and detail type ($F(1,43)=5.00$, $p=.03$, $\eta_p^2=.11$), but not between empathy group and valence ($F(1,43)=.21$, $p=.80$, $\eta_p^2=.01$) or between empathy group, detail type and valence ($F(1,43)=.72$, $p=.29$, $\eta_p^2=.03$). Further analyses on empathy effects in relation to details types are presented below.

3.2.3 The Influence of Empathy on Proportionate Recall by Detail Type and Valence

As mentioned above, the number of details were not evenly split across narratives (each narrative contained 3 emotional and 8 non-emotional details) so for further analyses it was necessary to consider recall by detail type as a proportion of total recall. Following this, a repeated measures ANOVA revealed a significant interaction between empathy group and recall of detail type ($F(1,43)=10.91$, $p<.01$, $\eta_p^2=.21$), but not between empathy group and

valence (F(1,43)=.15, p=.86, η_p^2=.01) or empathy group, valence and detail type (F(1,43)=.49, p=.61, η_p^2=.01).

A series of post hoc independent samples t-tests revealed that participants from the high empathy group remembered a higher proportion of emotional details ($\bar{x}$=50.23, SD=5.94) than those from the low empathy group ($\bar{x}$=44.48, SD=6.99), (t(43)=-2.94, p<.01). In contrast, participants from the low empathy group remembered more non-emotional details (56.35, SD=6.08) than those from the high empathy group (49.87, SD=5.76), (t(43)=3.63, p<.01), as shown in Figures 2 and 3 below.

To further evaluate the main hypotheses, we note that empathy scores represent a continuous variable and that these tests are not sensitive to scores tending towards the median, and therefore performed a series of bivariate Spearman's correlations. These revealed that empathy predicted enhanced proportionate recall of emotional details (r(43)=.41, p=.006) and diminished recall of nonemotional details (r(43)= -.50, p=.001).

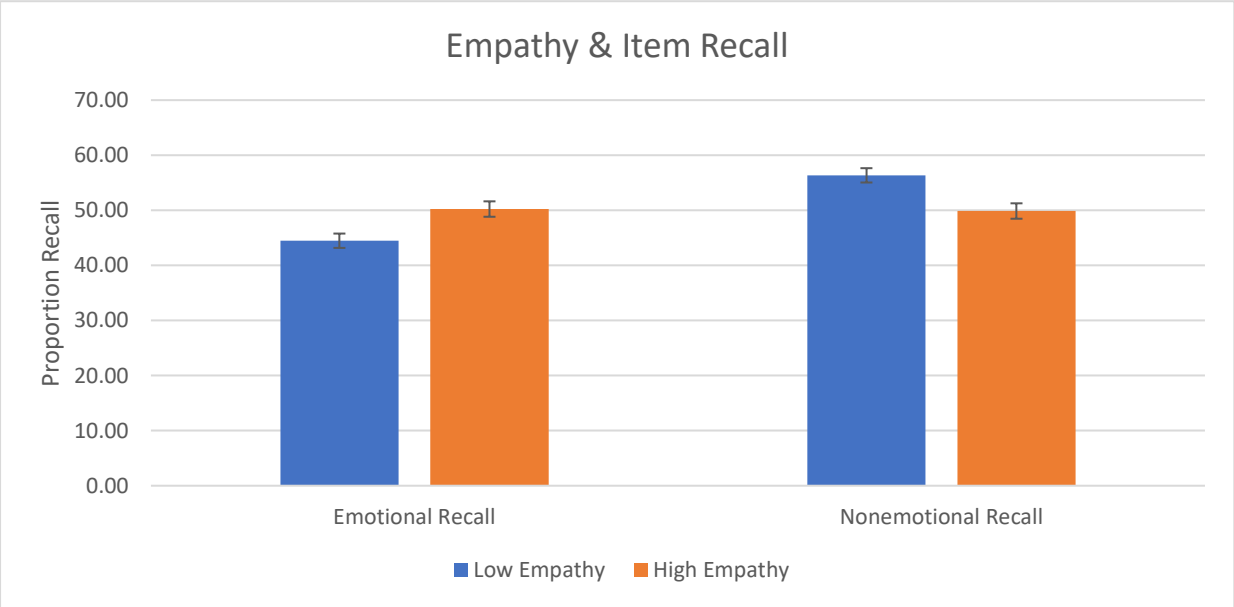

Figure 2. Bar chart with standard error bars displaying proportion of overall emotional and nonemotional free recall between high and low empathy (IRI) groups.

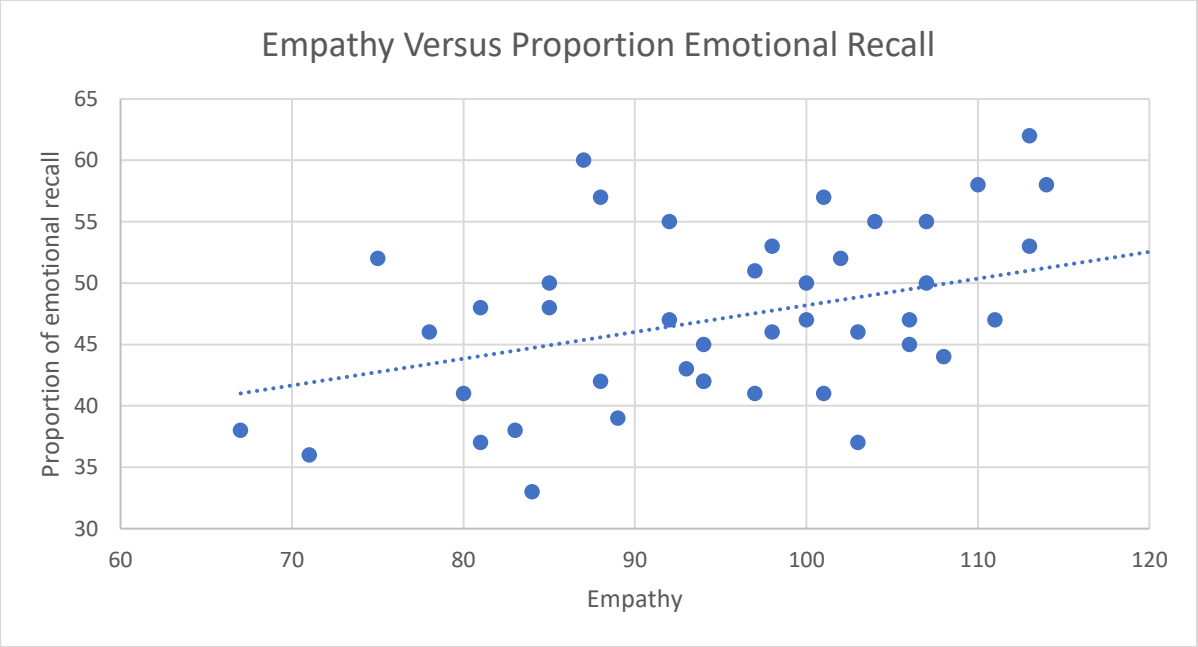

*Figure 3. Scatterplot of empathy quotient (IRI) against the proportion of emotional free recall (*r*=0.41, p=.006).*

1.1.1 The Influence of Gender on Recall by Detail Type and Valence

There were 14 females in the high empathy group compared with 7 in the low empathy group. To investigate whether differences in detail type and valence recall should be attributed to this disparity, an ANOVA was conducted. There was no significant interaction between gender group and detail type ($F(1,43)=.28$, $p=.60$, $\eta_p^2=.01$) or gender group and valence ($F(2,42)=2.58$, $p=.08$, $\eta_p^2=.06$).

1.1.2 The Influence of Empathy on Emotionality Recall

To obtain a measure of the effect of emotionality on recall, as mediated by empathy, the number of emotional details were summed for the narratives that made participants or the character feel very unhappy (2 or less on the Likert scale) or very happy (6 or more on the Likert scale). Hereafter this factor is referred to as emotionality recall. This factor had 2 levels: negative and positive. All participants had relevant data, so none were omitted from this analysis.

A repeated measures ANOVA with emotionality type (self, other) and emotionality valence (positive, negative) revealed a main effect of emotionality valence ($F(1,43)=28.51$, $p<.01$, $\eta_p^2=.40$) and of emotionality type ($F(1,43)=87.85$, $p<.01$, $\eta_p^2=.68$). There were also

significant interactions between emotionality valence and emotionality recall ($F(1,43)=13.37$, $p<.01$, $\eta_p^2=.24$), between empathy group and emotionality valence ($F(1,43)=6.44$, $p=.02$, $\eta_p^2=.13$) as well as between empathy group, emotionality type and emotionality valence ($F(1,43)=9.12$, $p<.01$, $\eta_p^2=.18$).

A post hoc series of independent samples t-tests revealed that high empathy individuals remembered significantly more emotional details from narratives that evoked strong positive self-emotionality: ($t(43)=-3.39$, $p<.01$).

1.1.3 Influence of Empathy Subscales on Recall by Detail Type, Valence and Emotionality Recall

We predicted that perspective-taking and fantasy would correlate with enhanced recall of emotional details. The IRI has four subscales. These are Fantasy, Personal distress, Empathic concern and Perspective-Taking. Descriptive statistics are reported in Table 1 below. A series of bivariate correlations between the IRI subscales and proportion of emotional recall revealed that fantasy ($r(43)=.39$, $p=.01$) and personal distress ($r(43)=.35$, $p=.02$) correlated significantly with proportion of emotional details, while perspective-taking demonstrated a strong negative correlation with non-emotional recall ($r(43)=-.43$, $p=.004$). Following a Bonferroni correction, the p-value was adjusted to 0.013 and therefore the negative correlation between perspective-taking and non-emotional recall was no excluded from significance.

Further to this, a series of exploratory correlations were undertaken to explore the ostensible positivity bias detailed above. Fantasy ($r(43)=.35$, $p=.02$), empathic concern ($r(43)=.41$, $p=.04$) and personal distress ($r(43)=.54$, $p=.02$) were each found to predict enhanced emotional recall from narratives with positive valence.

	Mean (SD)	*Low Empathy Group*	*High Empathy Group*
IRI Score	95.77 (13.16)	85.36 (7.91)	106.18 (8.05)
Fantasy	22.11 (4.26)	19.82 (3.49)	24.41 (3.74)
Personal Distress	22.52 (4.73)	19.86 (3.44)	25.18 (4.37)
Perspective Taking	25.25 (4.05)	22.59 (3.53)	27.91 (2.52)
Empathic Concern	25.82 (4.55)	23.09 (3.62)	28.55 (3.69)

Table 1. Means of IRI and subscales

We finally conducted another exploratory correlation investigating the influence of the IRI subscales on emotionality recall. This found that personal distress demonstrated the strongest positive correlation with emotional recall from narratives that evoked strong self-emotionality: $r(43)=.43$, $p=.003$, followed by perspective-taking $r(43)=.32$, $p=.04$. Only perspective-taking demonstrated a significant positive correlation with emotional recall from narratives where strong other-emotionality was reported: $r(43)=.33$, $p=.03$.

1.1.4 Influence of the Dark Triad on Recall by Detail Type and Valence

A series of exploratory bivariate correlations demonstrated that Psychopathy positively correlated with enhanced recall of emotional details from narrative with negative valence ($r(43)=.35$, $p=.02$) as well as Machiavellianism ($r(43)=.43$, $p=.003$). Descriptive statistics are reported in Table 2 and intercorrelations with IRI subscales are reported in Table 3.

	Overall (SD)	*Low Empathy*	*High Empathy*
Dark Triad Score	67.78 (13.35)	63.04	63.29
Machiavellianism	27.94 (5.46)	28.26	27.81
Narcissism	22.36 (5.51)	22.70	22.86
Psychopathy	17.33 (5.43)	18.43	15.57

Table 2. Means of Dark Triad and subscales

	IRI	*Fantasy*	*Empathic Concern*	*Personal Distress*	*Perspective-Taking*
SDT	-.*10*	.10	-.*22*	-.13	-.*06*
Machiavellianism	-.*37**	-.17	-.*55***	-.15	-.*25*
Narcissism	-.*08*	-.02	-.*02*	-.11	-.*09*
Psychopathy	-.*33**	-.05	-.*27*	-.32*	-.*36**

Table 3. Intercorrelations of IRI, SDT and corresponding subscales

** Correlation is significant at 0.05 level (two-tailed)*

*** Correlation is significant at 0.01 level (two-tailed)*

2. Discussion

The aim of this study was to investigate the influence of dispositional empathy on episodic encoding and retrieval strategies, specifically differences in attending to emotional and non-emotional information. To this end, a novel text-based paradigm was developed in which characters experience scenarios that take either a positive, neutral or negative emotional valence. Each narrative contained three emotional and eight non-emotional details.

We found that high empathy individuals reported stronger positive emotionality in response to narratives with positive and neutral valence during the encoding phase, as compared to low empathy group. At retrieval, high empathy individuals remembered more emotional details from narratives across valence types and, conversely, low empathy individuals remembered significantly more non-emotional details. Further to this, high empathy individuals were more likely than low empathy individuals to remember emotional details from narratives that evoked strong self-emotionality, even when self-reported emotionality is comparable, suggesting a certain sensitivity to one's emotional state that supports encoding and retrieval strategies. We expected that high empathy individuals, being more person-focused, would be more likely to engage with the content of the narratives by vividly imagining scenes and the emotional state of characters, leading to deeper encoding of emotional details and later serving the needs of simulatory cognition in future instance of perspective taking.

The overall finding that high empathy individuals recall more emotional details could be taken as evidence for the idea that perspective-taking is supported by a theory—theory, although such interpretation is broadly speculative. Still, it is reasonable to claim that high empathy individuals make greater use of episodic simulation to infer mental states than less empathy individuals where motor mimicry is limited, as in the case of learning about others actions through written narratives. However, the results strongly imply that high empathy individuals are more people-focused, paying special attention to details that give insight into the character's thoughts and feelings during scene construction, while low empathy individuals are more object-focused, attending primarily to details such as place names and dates.

We found that personal distress was a strong predictor of recall from narratives that evoked strong self-emotionality, demonstrating that hot-affective empathic reactions associated with

exert a prominent influence on which information is encoded and retrieved, in line with the theory on emotion-mediated memory process (Sharot, Verfaellie, & Yonelinas, 2007). This may be taken as evidence that sensitivity to one's own emotional states contributes to a knowledge store which supports imaginative reconstruction of social scenarios. However, these results are insufficient to make a case for or against the role of simulation in this process.

There appeared to be differential processing between high and low empathy group at the encoding and retrieval phases. Specifically, high empathy individuals demonstrated a tendency to report stronger positive self-emotionality in response to positive and neutral narratives. They were then more likely to recall details from narratives that evoked strong emotionality than low empathy individuals. This propensity for inflated self-emotionality presumably leads to emotional states that underpin recall but crucially these are self-oriented emotional states, rather than vicarious states that recognise the other as their point of origin. This was corroborated by the finding that there were no differences in perceived other-emotionality by empathy group and thus contributing to the debate regarding the ego- or alter-centricity of empathic responding (Cialdini *et al.,* 1987; De Waal, 2008). This also raises a question of nativeness: do individuals remember more emotional details because they are empathic or do they become increasingly empathic because they remember more emotional details? This pertains to the debate on theory—theory, but requires further testing to elaborate.

Individuals scoring high on perspective-taking demonstrated enhanced emotional recall, mediated by both self- and other-emotionality, suggesting dissociable empathic processes that influence the encoding of emotional information, in line with our working model. Personal distress was the strongest predictor of emotional recall, demonstrating that some empathic individuals were more likely to recall details because they evoked a strong visceral reaction. This demonstrates that individuals are most likely to remember details from narratives that caused emotional disturbance, and suggests that the intention is to neutralise this emotional state. As such, these results should not be taken *de facto* to suggest that such mnemonic strategies are geared towards prosocial behaviour, since emotional sensitivity and personal distress may in effect hinder one's ability to understand others and engage in helping behaviour (Kim & Han, 2018). However, perspective-taking also exerted a strong influence

on emotional recall suggesting that genuine attempts to access the emotional state of the other, rather than mitigation of one's own affect, also have a role to play.

The finding that positive self-emotionality impacted emotional retrieval and that high empathy individuals remembered most emotional details from narratives with positive valence may be taken as either evidence of a bias towards positive stimuli or an aversion to negative stimuli. Given the influence of personal distress on retrieval, it may be reasonable to assume that narratives with negative valence led to stimulus avoidance. Following from this, high empathy individuals may be more likely to empathise with narratives that evoked positive emotionality simply because they were found to be more agreeable. Again, this suggests that the motivation behind empathy may be notably egocentric. However, high empathy individuals were significantly more likely to experience strong self-emotionality in response to only positive and neutral narratives, which may indicate that they were simply less emotionally affected by narratives with negative valence, and may therefore be a limitation of the paradigm. Further to this, participants found narratives with positive valence to be the most self-relevant, which may have deepened encoding due to the self-reference effect (for review, see Symons & Johnson, 1997).

As predicted, there was no significant interaction between a high Dark Triad score and enhanced recall of non-emotional details. This was expected considering findings that these socially aversive traits correspond to a diminished response to emotional stimuli. Of the Dark Triad subscales, Machiavellianism and psychopathy both predicted enhanced recall of emotional details from narratives with negative valence. Enhanced retrieval of such emotional details may indicate either an opportunity to manipulate vulnerable individuals or an enjoyment of the other's plight, each leading to deeper encoding. This may reflect a bias towards information that is regarded as syntonic with one's goals or inclinations. These may not be reflected in the reported emotionality ratings due to social desirability and so any further interpretation would be speculative. Still, this retrieval pattern is opposed to that of high empathy individuals and therefore lends weight to the notion that stimulus avoidance may lead to a preference for narratives with positive valence in high empathy individuals. However, we remind the reader that our population was subclinical and so these traits are not prominent enough to be considered pathological.

These findings, taken together, lend support to the notion that empathic individuals selectively encode emotional information which may later be used as the building blocks for simulation or pre-experiential cognition. That empathic individuals recall more details from narratives that evoked strong self-emotionality would suggest that an individual's emotional responsiveness leads to deeper encoding and therefore contributes to perspective-taking. These findings are in line with theories of narrative empathy (Keen, 2006; Moore & Hallenbeck, 2010), which suggest that empathy can be cultivated and enhanced over time through engagement with narrative fiction. However, a clear limitation of the present study is that participants may not engage with characters as they would with actual interlocuters. We therefore cannot generalise these findings to the study of empathy more broadly.

To further investigate these findings and clarify the role played by the various IRI subscales in contributing to this retention strategy, a second study was conducted. In this study, longer and fewer narratives were presented, allowing more time for development and characterisation. Finding the detail disparity to be a confound in study 1, emotional and non-emotional details were balanced and distributed throughout the narratives, again allowing participants more time to process the novel information and eliminating the need for proportional measures. Non-emotional details were deployed organically throughout the narrative rather than merely stated. For example, a character, while describing where they grew up, supplies the name of the town. These changes were thought to improve ecological validity by presenting information in a more meaningful and contextualised fashion, and to more closely resemble traditional storytelling methods or anecdotal discourse.

3. Study Two

3.1 Method

Participants (n=54, 44 females) were undergraduate students at the University of East Anglia. All were aged between 18 and 27 ($\bar{x}$=19.5). The same exclusion criteria were applied but it was not necessary to omit any participant data.

The same experimental procedures as in study 1 were applied. All trait measures (IRI and SDT-III) were the same. The 15 short narratives of study 1 were replaced by 6 longer narratives (2 of each valence). They each included a balance of 10 emotional and 10 non-emotional details. Furthermore, non-emotional details, rather than being simply given, played a functional role in developing the narrative (Appendix 2). Lastly, the cued recall phase, for reasons previously mentioned, was omitted.

4. Results

Once again, a median split was performed and correlations were also performed to further investigate the main hypotheses.

We again report an average of all responses ($\bar{x}$=4.22) that is similar to the findings of both Gilet *et al*. (2013) ($\bar{x}$=4.53) and Cliffordson (2001) ($\bar{x}$=3.92). We therefore find evidence that this median split can be generalised to broader populations.

4.1 Encoding

Participants were split into high and low empathy groups based on their overall IRI score. The median empathy value was 100 (SD=12.08). There were 27 participants (5 males) in the high empathy group ($\bar{x}$=107.67; SD=6.49) and 27 (5 males) in the low empathy group ($\bar{x}$=88.33; SD=7.82).

4.2 Emotionality Ratings

We considered whether self- and other-emotionality interacted with narrative valence and empathy group at encoding. Across all participants, at encoding, the mean reported self-emotionality was 3.72 (SD=1.58), on a Likert scale where 4 denotes neutral affect and 7 denotes very positive emotion. The mean response to other-emotionality was 3.82 (SD=2.22).

A repeated measures ANOVA with emotionality type (self- and other-) and valence (positive, negative, neutral) demonstrated a main effect of valence: ($F(2,52)=46.26$, $p<.01$, $\eta_p^2=.65$) but not of emotionality type ($F(1,53)=1.85$, $p<.01$, $\eta_p^2=.18$). There were no significant interactions between emotionality type, valence and empathy group: ($F(1,53)=.86$, $p=.43$, $\eta_p^2=.03$) or emotionality type and empathy group: ($F(1,53)=.53$, $p=.59$, $\eta_p^2=.02$).

It was not possible to analyse emotionality ratings apart from valence as an average would only homogenise towards the midpoint. We therefore continued to investigate the effect of empathy and valence on emotionality ratings by taking an average of self- and other-emotionality ratings. A repeated measures ANOVA with average emotionality rating revealed a main effect of valence: ($F(2,52)=110.23$, $p<.001$, $\eta_p^2=.64$).

For narratives with negative valence, the mean emotionality rating was 1.76 (SD=.54). For narratives with neutral valence, it was 3.91 (SD=.52). For narratives with positive valence, it was 5.91 (SD=.67). These differences were demonstrated to be significant: neutral-negative $t(53)=-24.10$, $p<.001$), neutral-positive $t(53)=-20.18$, $p<.001$), negative-positive $t(53)=-32.64$, $p<.001$). Overall, participants therefore rated narratives in the expected direction (positive > neutral > negative).

There was a significant interaction between empathy group (high, low) and valence: ($F(1,53)=3.69$, $p=.01$, $\eta_p^2=.11$).

In the high empathy, the mean self-emotionality rating in response to narratives with negative valence was 1.64 (SD=.44), for narratives with neutral valence it was 4.08 (SD=.56) and for narratives with positive valence it was 6.13 (SD=.48). These differences were each demonstrated to be significant: neutral-negative ($t(26)=-20.80$, $p<.01$), negative-positive ($t(26)=-42.30$, $p<.01$), neutral-positive ($t(26)=-18.24$, $p<.01$).

In the low empathy group, the mean self-emotionality rating in response to narratives with negative valence was 1.90 (SD=.62), for narratives with neutral valence it was 3.73 (SD=.43) and for narratives with positive valence it was 5.70 (SD=.76). These were each demonstrated to be significant: neutral-negative ($t(26)=-16.07$, $p<.01$), positive-negative ($t(26)=-17.23$, $p<.01$), neural-positive ($t(26)=-11.80$, $p<.01$).

A series of independent samples t-tests demonstrated that self-emotionality differed by empathy group in response to narratives with neutral valence ($t(53)=-2.75$, $p<.01$) and positive valence ($t(53)=-2.75$, $p<.01$) but negative valence narrowly missed significance: ($t(53)=1.94$, $p=.06$). High empathy individuals therefore consistently rated both neutral and positive narratives as being more positive than low empathy individuals.

4.3 Retrieval

4.3.1 Comparison of Emotionality Ratings at Encoding and Retrieval

A repeated measures ANOVA on emotionality ratings was run with a task factor (encoding, retrieval), emotionality type (self, other) and valence (negative, neutral, positive). This demonstrated a main effect of valence ($F(1,53)=88.27$, $p<.01$, $\eta_p^2=.59$) but not emotionality type ($F(1,53)=.47$, $p=.50$, $\eta_p^2=.01$) or task ($F(1,53)=.45$, $p=.51$, $\eta_p^2=.01$).

Again, an average of self- and other-emotionality ratings was calculated. At retrieval, the mean response to narratives with negative valence was 1.90 (SD=.63). For narratives with neutral valence, it was 3.73 (SD=.77). For narratives with positive valence, it was 5.59 (SD=.82). These were demonstrated to differ significantly: negative-neutral ($t(53)=-14.88$, $p<.01$), negative-positive ($t(53)=-25.21$, $p<.01$), positive-neutral ($t(53)=-15.60$, $p<.01$). Participants therefore rated narratives in the expected direction (positive > neutral > negative).

There was an interaction between empathy group and valence ($F(1,53)=2.62$, $p=.04$, $\eta_p^2=.08$). In the high empathy group, the mean response to narratives with negative valence was 1.81 (SD=.59). For narratives with neutral valence, it was 3.91 (SD=.93). For narratives with positive valence, it was 5.77 (SD=.83). These differed in the expected directions: negative-neutral ($t(26)=-10.32$, $p<.01$), negative-positive ($t(26)=-21.66$, $p<.01$), positive-neutral ($t(26)=-10.70$, $p<.01$).

In the low empathy group, the mean response to narratives with negative valence was 2.00 (SD=.68). For narratives with neutral valence, it was 3.54 (SD=.56). For narratives with positive valence, it was 5.43 (SD=.79). These differed in the expected directions: negative-neutral ($t(26)=-11.93$, $p<.01$), negative-positive ($t(26)=-15.01$, $p<.01$), positive-neutral ($t(26)=-10.87$, $p<.01$).

There were no differences in emotionality ratings by empathy group at retrieval.

4.3.2 Empathy, Detail Type and Valence Recall

A repeated measures ANOVA with detail type (emotional versus non-emotional details) and valence (positive, negative, neutral) revealed a main effect of valence ($F(1,53)=12.64$, $p<.01$, $\eta_p^2=.20$) and of detail type ($F(1,53)=97.10$, $p<.01$, $\eta_p^2=.65$), as well as an interaction between detail type and valence: ($F(1,53)=111.02$, $p<.01$, $\eta_p^2=.81$).

Overall, participants remembered more emotional ($\bar{x}$=20.91, SD=8.69) than nonemotional details ($\bar{x}$=15.00, SD=8.68): (t(54)=8.45, *p*<.01).

Within emotional details, participants remembered more details from narratives with negative valence ($\bar{x}$=9.48, SD=3.85), followed by narratives with neutral valence ($\bar{x}$=6.23, SD=3.02) and finally narratives with positive valence ($\bar{x}$=5.15, SD=3.18). These differences were all demonstrated to be significant: negative-positive (t(54)=11.42, *p*<.01), negative-neutral (t(54)=7.10, *p*<.01), positive-neutral (t(54)=-2.93, *p*<.01).

Within non-emotional details, participants remembered more details from narratives with positive valence than any other ($\bar{x}$=6.89, SD=3.83), followed by narratives with neutral valence ($\bar{x}$=4.07, SD=2.61) and finally by narratives with negative valence ($\bar{x}$=4.04, SD=3.30). A series of paired samples t-tests revealed that negative-positive (t(54)=-8.10, *p*<.01) and neutral-positive (t(54)=6.95, *p*<.01) differed significantly, while neutral-negative did not (t(54)=-.11, *p*=.91).

There was also a significant interaction between empathy and detail type (F(1,53)=20.06, p<.01, η_p^2=.28) but not between empathy and valence (F(1,53)=1.65, p=.20, η_p^2=.03) or empathy, valence and detail type (F(1,53)=.45, p=.64, η_p^2=.01).

Participants from the high empathy group remembered more emotional details ($\bar{x}$=23.25, SD=7.63) than the low empathy group ($\bar{x}$=18.38, SD=9.20), (t(53)=-2.40, *p*=.02). Participants from the high empathy group remembered roughly the same number of non-emotional details $\bar{x}$=15.04, SD=8.01) as the low empathy group ($\bar{x}$=14.96, SD=9.45), (t(53)=-.03, *p*=.98). These are represented in Figure 4.

A series of bivariate Spearman correlations were also conducted, finding that IRI predicted enhanced recall of emotional details (r(53)=.27, *p*=.04) but not diminished recall of nonemotional details (r(53)= -.03, *p*=.82).

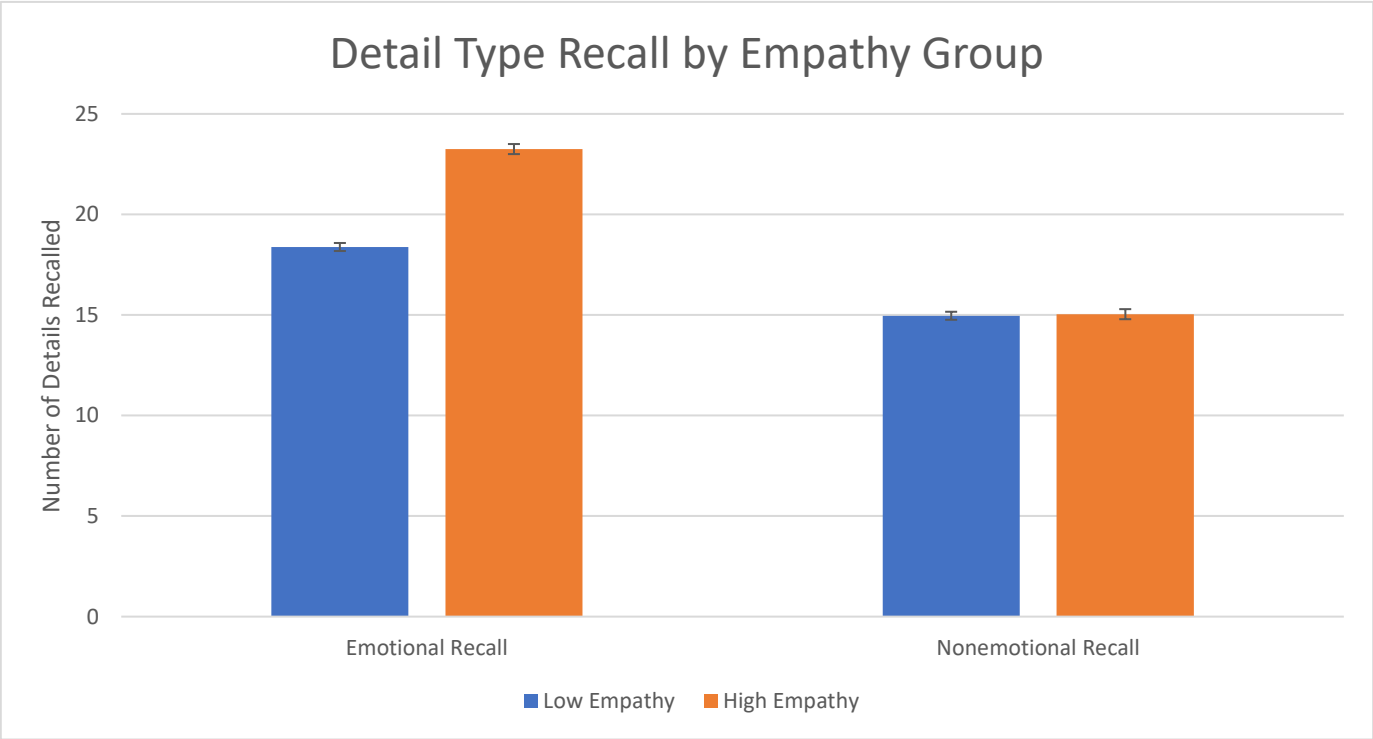

Figure 4. Bar chart with standard error bars displaying mean overall emotional and nonemotional recall of high and low empathy (IRI) groups.

4.3.3 The Influence of Empathy on Emotionality Recall

As in study one, item recall was scored if the participant rated a story as making either them or the character very unhappy (2 or less on the Likert scale) or very happy (6 or more on the Likert scale). This emotionality recall variable had two valence levels, positive and negative. A repeated measures ANOVA with emotionality type (self, other) and emotionality valence (positive, negative) revealed a main effect of emotionality valence ($F(1,53)=39.65$, $p<.01$, $\eta_p^2=.43$) and emotionality type ($F(1,53)=26.67$, $p<.01$, $\eta_p^2=.34$). There was no significant interaction between empathy group and emotionality type ($F(1,53)=.93$, $p=.34$, $\eta_p^2=.02$), empathy group and emotionality valence ($F(1,53)=.06$, $p=.81$, $\eta_p^2<.01$), or empathy group, emotionality type and emotionality valence ($F(1,53)=.002$, $p=.96$, $\eta_p^2<.01$).

4.3.4 Influence of Empathy Subscales on Recall by Detail Type, Valence and Emotionality

A series of bivariate correlations demonstrated that Fantasy (r(53)=.35, *p*=.01) and Empathic Concern (r(53)=.40, *p*=.003) correlated significantly with emotional recall. Following a Bonferroni correction, the p-value was adjusted to 0.013 and so both Fantasy and Empathic Concern remain significant predictors of enhanced emotional recall.

Again, to investigate the observed positivity bias, a series of exploratory correlations were run. Of the IRI subscales, Fantasy predicted enhanced recall from negative (r(53)=.36, *p*=.008), neutral (r(53)=.31, *p*=.02) and positive narratives (r(53)=.31, *p*=.03). Similarly, Empathic Concern predicted enhanced emotional recall from negative (r(53)=.43, *p*=.001), neutral (r(53)=.40, *p*=.003) and positive narratives (r(53)=.35, *p*=.009). Mean IRI and subscale scores are reported in Table 4.

	Mean
IRI Score	98.00 (12.08)
Fantasy	24.17 (5.25)
Personal Distress	21.09 (3.99)
Perspective Taking	25.70 (4.72)
Empathic Concern	27.02 (3.86)

Table 4. Means of IRI and subscales

4.3.5 Influence of the Dark Triad on Recall by Detail Type and Valence

A series of exploratory bivariate correlations demonstrated no significant correlations between overall Dark Triad score and recall of emotionality details (*r*(53)=-.07, *p*=.60) or non-emotional details (*r*(53)=.01, *p*=.93). Descriptive statistics are reported in Table 5 and intercorrelations with IRI subscales are reported in Table 6.

	Overall (SD)	*Low Empathy*	*High Empathy*
Dark Triad Score	66.13 (12.13)	68.41 (12.51)	63.85 (11.55)
Machiavellianism	26.74 (5.39)	26.86 (5.40)	29.63 (5.49)
Narcissism	21.56 (5.79)	23.11 (6.34)	20.00 (4.82)
Psychopathy	17.83 (4.73)	18.44 (4.76)	17.22 (4.71)

Table 5. Means of SDT and subscales

	IRI	*Fantasy*	*Empathic Concern*	*Personal Distress*	*Perspective-Taking*
IRI		.83**	*.70***	.56**	*.56***
SDT	*-.43***	-.22	*-.44***	-.27*	*-.24*
Machiavellianism	*-.16**	-.06	*-.33**	-.12	*-.01*
Narcissism	*-.48***	-.29*	*-.22*	-.47**	*-.27**
Psychopathy	*-.33**	-.14	*-.50***	-.13	*-.16*

Table 6. Intercorrelations of IRI, SDT and corresponding subscales

** Correlation is significant at 0.05 level (two-tailed)*

*** Correlation is significant at 0.01 level (two-tailed)*

5. Discussion

The aim of this study was to test whether findings of study 1 could be replicated, while optimising the paradigm by balancing the proportion of emotional and non-emotional details and modifying the narrative structure. In lieu of fifteen shorter narratives, six longer narratives were presented to participants, in which non-emotional details played a formative role in the progression of the story. For example, a character complains of having back pain and later explains that swimming alleviates these symptoms. In this case, the fact of having back pain is an emotional detail while the activity of swimming is classed as a non-emotional detail. Likewise, place and character names were presented organically, when they are appropriate to the unfolding of the narrative, so that each is embedded contextually.

This study replicated some of the main finding of study one. During the encoding phase, the high empathy group rated narratives of positive and neutral valence higher in self-emotionality, as compared to the low empathy group. During the recall phase, participants from the high empathy group were found to remember more emotional details. Fantasy was the strongest predictor of emotional recall, which more closely reflects the concepts that the IRI is intended to measure, since Fantasy represents the ability to engage with the emotional experience of fictional characters (for example, “After seeing a play or movie, I have felt as though I were one of the characters”). That fantasy was the strongest predictor of emotional recall would suggest that exposure to narrative and processes of narrativization may help to cultivate empathy by inviting participants to imagine mental state of characters in a given context. Over time, as these abilities become more incisive and refined, individuals can apply them to real-world scenarios and thereby empathise with others even if there are considerable cultural or temperamental disparities (Keen, 2006).

Empathic concern and personal distress were most closely associated with emotional recall, which departs somewhat from the findings of study one where empathic concern did not predict enhanced emotional recall and personal distress was the strongest predictor. Nonetheless broadly speaking and in study 2 in particular, affective empathy appeared to be driving this effect. This may tentatively be taken as evidence that visceral emotional responses cause participants to attend to details which they are then more likely to recall. We therefore propose a link between affective and cognitive empathy, whereby individuals are

more willing to engage in scene construction because they are motivated by the emotional state evoked by the narrative content.

Finally, in this study, we also found that high empathy individuals are more likely to inflate the positive affect of characters in narratives with positive valence compared to low empathy individuals. There is, then, robust evidence across two variations of the paradigm for a positivity bias, which will warrant further consideration in the general discussion.

Taken together, these findings suggest that empathy has a notable impact on the reception of social information, which may be indicative of attentional strategies that serve later instances of perspective-taking. Again, recall of these items appears to be motivated by positive self-emotionality, suggesting that sensitivity to internal states is more pronounced in empathic individuals and this effect may be biased towards positive information.

6. General Discussion

Two experiments investigated if dispositional empathy had an impact on encoding and retrieval strategies of emotional information. Specifically, we asked whether individuals demonstrating high dispositional empathy would be more likely to remember emotional details from text-based narratives. Here we will begin by discussing findings that were common to both studies.

In both studies, we observed a positive association between empathy and recall of emotional details, which, given the absence of physiological cues, would support an abstract, theory—theory-based framework of mindreading. While this does not in any sense rule out simulation as a formative mechanism for empathy, it predominantly stands as evidence that affective-hot empathy mediates attentional strategies, selecting for details that pertain to the emotional states of others, which may cultivate perspective-taking in line with narrative theories of empathy (Keen, 2006; Gallagher, 2012). It is worth considering that the IRI was administered after the encoding and retrieval phases, so priming effects from the content of the narratives to the IRI therefore cannot be discounted. Studies have reported that individuals feel more empathic after being asked to consider the emotional circumstances of another (Gaesser & Schacter, 2014) and this effect may extend to include imaginary cognition of the kind required by narrative fiction. As such, participants may have been primed to engage empathically, thereby inflating IRI scores.

Across two studies, the IRI subscales variously influenced retrieval of emotional details. The contributions made by each subscale may have depended on the propensities of the sample population. However, since the four subscales intercorrelate strongly, the effect on retrieval cannot be disassociated and should perhaps be taken as an attention and retention strategy of emotionally responsive individuals more broadly. Personal distress and empathic concern exerted the most influence on recall of emotional details, and this warrants discussion since this pairing is typically regarded as the two primary vicarious responses to another's emotional circumstance (Batson, 2009; Ze, Thoma & Suchan, 2014). Personal distress describes self-oriented feeling of anxiety and discomfort in the face of another's emotional circumstance, and has been found to associate with neuroticism (Guo, Sun & Li, 2018) as well as rumination and self-focus dysfunction (Kim & Han, 2018), marking it as the negative

element of empathic responding and likely a barrier to prosocial behaviour. Although, it is important to consider whether personal distress should be considered a category *sui generis* or if it instead is the negative variant of emotional contagion. In either case, it should only be considered a barrier to empathy if it cannot be effectively down-regulated (Lawrence *et al*., 2006). If it is effectively regulated, it may act as a powerful motivator by evoking a visceral response in the observer (Ewing *et al*., 2019). We see in this how affective and cognitive empathy may interact to realise higher-order responses such as sympathy and compassion.

On the other hand, empathic concern describes other-oriented feelings of warmth and concern. As previously noted, this suggests that the motivation behind engagement and encoding is the emotional state that the narrative content elicits. In the case of the second study, there appeared to be a shift towards more alter-centric or authentically other-directed cognition, with empathic concern associating with emotional recall where in Study 1 it did not. This may be attributed to both a change in narrative content as well as the length and style of the narratives, which allowed more time for emotional investment in the characters' situation to develop through narrative immersion. This therefore presents a more balanced argument with regards to the proposed selfishness or selflessness of empathy (De Waal, 2008), whereby some individuals may genuinely wish to help others, whilst some may seek to neutralise their own affective state, and these responses may vary according to state and trait influences.

In Study 1, High empathy individuals demonstrated enhanced emotional recall from narratives that elicited strong emotionality, that is, narratives which left them feeling either very happy or very unhappy. Further, this effect was more pronounced for positive self-emotionality. This strongly suggests a heightened sensitivity to emotional states which engages attention and mediates recall. These findings also gesture towards the idea that state-matching is vital for perspective-taking, even if it is not an essential precursor. For example, it may motivate individuals towards higher-order empathy by engaging their attention and thereby promoting scene construction.

Empathic individuals, by definition, are more sensitive to the emotional states of others, but importantly this sensitivity promotes encoding of social information, in line with well-established theories that deeper encoding occurs in conjunction with a heightened state of emotional arousal (for review, see Levine & Edelstein, 2009). This brings with it the

suggestion that the capacity for and development of empathy may be profoundly related to emotional sensitivity more generally, which is to say that those experiencing intense emotional states gradually become more empathic, possibly as their capacity for perspective-taking is refined. Intuitively, this rings true since the nature of empathy is the ability to emotionally resonate with others, but further to this it sheds light on how this resonance may deepen over time and therefore finds support for theory—theory accounts. This finding also has important clinical implications, specifically for therapies that use narrativization to cultivate understanding and concern for others.

The fact that emotional recall was enhanced for both narratives with positive valence warrants discussion. This positivity bias can be interpreted in favour of a theory—theory, since items extracted from these events and co-opted into the existing theory to support helping strategies in the future, thereby conveying an evolutionary advantage. This also lends support to an idea put forward by Batson *et al.* (1991), namely that the goal of empathy is to cultivate prosocial behaviour that increases the welfare of the person in need. As such, narratives with a positive outcome for the protagonist have more utilitarian value because they provide a template that can be used to guide future decision-making and helping behaviours. The same argument could be made for narratives with negative valence, but it is important to note here that in these narratives the positive outcomes were often the result of the character's determination and will, whereas negative outcomes were often the result of misfortune. High empathy individuals may therefore have attended less to negative narratives as they felt powerless to help. This may be identified as a limitation of the paradigm.

Across both studies, personal distress was seen to associate strongly with enhanced emotional recall from positive narratives, suggesting that this effect should conversely be understood as an aversion to narratives with negative valence, rather than an active preference for positive narratives. As previously discussed, if not effectively down-regulated, there is evidence that personal distress can lead to the observer being overwhelmed and withdrawing.

Assumptive-worldview theory (Janoff-Bulman, 1989) holds that individuals typically make positive assumptions about the world and themselves. We put forward the idea that empathic individuals, being predisposed to cooperative behaviour, favour information that supports these beliefs. According to this view, individuals exhibiting dark triad traits may deviate from the norm insofar as they believe the world to be essentially hostile and other individuals are

seen as competitors, rather than potential co-operators. In short, empathic individuals may reject negative information in order to maintain positive affect by embracing a biased worldview. Further studies would need to be conducted to see if any relationship exists between empathy and unrealistic optimism.

Studies have shown that it is easier to reconstruct elements from a scene that has been vividly imagined (Rubin, Burt & Fifield, 2003; Hassabis & Maguire, 2007; Schacter & Addis, 2007). Since cold empathy involves transposing oneself into the place of another, one would expect that this leads to a more comprehensive simulation of the described events and therefore requires a greater cognitive workload that promotes deeper encoding. Certainly, this would appear to reflect attentional influences, mediated by either traits or disposition, that cause the participant to consider the details more comprehensively and thereby motivate him or her towards episodic simulation. By contrast, individuals with less empathic traits may have a more surface or object-focused picture of the scenario since they have not mentally transported themselves into the character's shoes. Free recall presented the opportunity for participants to report details that were most salient to them, and this is perhaps why we observed that high empathy individuals reported a higher number of emotional details. This is consistent with studies that suggest that cold empathy engages a common network that supports imagination and memory (Gaesser, 2013; Hassabis & Kumaran, 2007).

Taken together, we find evidence that empathic individuals with aptitude across IRI subscales prioritise emotional information through attentional processes and encoding-retrieval strategies, which may contribute to a TT that informs later instances of higher-order empathising such as mentalisation. This bias towards emotional information, in accordance with our working model which frames ST at an early-stage bottom-up process that informs mentalizing, would appear to suggest a mediating role for memories in the formulation of a TT.

The use of purely text-based narratives may be cast as a limitation since this precludes motor mimicry of the kind described above. This may also explain why self-emotionality exerted a stronger influence on encoding and retrieval since characters and their circumstance are understood to be fictive and participants are constructing the scenario in a more personal fashion. Nonetheless, we see clear evidence of a vital role for episodic memory in the development and maintenance of empathic responses as well as evidence for the impact of

narrativization on perspective-taking abilities. Through exposure to the immersive fictional worlds and the inner worlds of the characters that inhabit them, individuals may become more adept at taking the perspectives of others, and thereby more empathic, as described by Keen (2006).

The effect of empathy mediating recall of emotional details from narratives may not be generalizable to other domains. While the present studies found tentative support for the idea that items from episodic memory may be abstracted to support a TT, this does not necessarily contribute to the discussion surrounding the proposed role of ST since visual cues were absent. That being said, studies have shown that simply hearing a description of another's actions engages mirror neuron areas that may support simulation (Tettamanti *et al*., 2005) and so even low-level simulation cannot be ruled out as a formative process. Therefore, the role of ST in the present results cannot be discounted. In our next chapter, we investigate these effects crossmodally by making use of video narratives to determine if the opportunity to simulate mental states based on physiological cues impacts upon emotional recall.

The present findings have important implications for developmental, clinical and social psychology at large. Modern person-focused therapies often cite the value of empathy for improving interpersonal relations, mitigating the potential for antisocial behaviours such as sexual abuse through therapeutic intervention, improving intergroup relations, and effecting reform in violent offenders. Evidence for the influence of narratives on empathic processes and their relationship to memory and simulation may help to develop further techniques for cultivating empathy. Finally, these findings offer a promising route to understanding how children engage with narratives through the written and oral traditions and through this learn to take the perspective of other people, even those who experience is vastly disparate from their own.

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APPENDIX 1

STUDY 1 NARRATIVES

Green = nonemotional detail

Red = emotional detail

BULLY (NEGATIVE)

Charlie (1) was nine years old (2) and lived in a small town beside the Lake District (3).

His favourite hobby was hiking (4).

He did not have many friends and was often lonely.

It was Friday morning (5) and before lunch Charlie had a test of arithmetic (6).

Every day, Charlie ate lunch in the classroom (7) when it was empty.

But today a child called Liam (8) who often bullied Charlie came walking down the corridor.

When he saw the bully, Charlie felt [participant response].

Anticipatory moment: The bully stopped in his tracks and entered the classroom

He laughed at Charlie, pushed him off his seat and stole his lunch.

LOST (NEGATIVE)

Joyce (1) was fifty-eight years old (2) and had lived her entire life in Cornwall (3).

She was a recently retired chef (4) who now spent most of her time caring for her two grandchildren.

It was Sunday morning (5) and Joyce's daughter, Jade (6), left the kids with her for day.

Joyce took them to the seaside (7) and they all had ice cream (8).

Later Joyce fell asleep and when she woke up, her grandchildren were nowhere to be seen.

She immediately felt [participant response].

Anticipatory moment: She walked up and down the beach, asking everyone she saw.

She found them a short distance away. Her grandson had fallen and bruised his knee.

That evening, Jade told her she wasn't allowed to look after the kids on her own anymore.

APARTMENT (NEGATIVE)

Anton (1) was twenty-nine years old (2) and lived in Newcastle (3)

He lived with his girlfriend, Anastasia (4) whom he had met while studying medicine.

They were both pediatricians (5) at the Great North Children's Hospital (6).

Earlier that year, Anton had proposed to her and she had agreed to marry him.

They took out a mortgage on a house together.

It was Christmas eve (7) and they were both working the late shift

They quickly ate some lasagna (8) and left the house in a rush to get to their shifts on time.

Anticipatory moment: An hour after arriving Anton received a phone call from the police.

Before answering the phone, he felt [participant response].

An officer explained that a large fire had burned down most of the apartment.

And since the oven had been left on, the insurance company refused to cover the damage.

GAMBLE (NEGATIVE)

Rianne (1) was seventy-one years old (2) and lived in Sheffield (3).

She was an emeritus university professor who had lectured in marine biology (4).

Rianne had always struggled with addiction and recently had been gambling too often.

Her friend John (5) had tried to talk to her about this but she was stubborn.

It was Monday morning (6) and Rianne went to the bookie at the end of her road (7).

She placed a huge bet on a horse with eight-to-one odds (8).

Stood waiting for the race to begin, she felt [participant response].

Anticipatory moment: Rianne's horse got off to a good start but then fell behind.

The horse came third and Rianne lost all her money.

COFFEE (NEGATIVE)

Angela (1) was twenty-four years old (2) and lived in Norwich (3).

She was studying for a Masters in climate change science (4) and wanted to help save the world's forests from climate change but worried it was already too late.

Every Wednesday (5) she went to the cafe (6) and bought a large mocha (7) before her morning seminar.

Today she struck up a conversation with the barista, Elaine (8).

Elaine said she was visiting her son in Edinburgh for Christmas.

She asked what Angela would be doing for the holiday season.

Waiting for her coffee to be ready, Angela felt [participant response].

Anticipatory moment: She sprinkled some chocolate on the coffee and put a lid on the cup.

She explained that her mother was away on business so she would be staying with a friend.

SQUASH (NEUTRAL)

Leo (1) was forty-three years old (2) and lived in Oxford (3).

He worked as a plumber (4) and ran a company together with his brother, Theodore (5).

Every Thursday after work (6), the brothers unloaded their van (7) and drove to the squash court (8).

Leo was better than his brother and usually won most of the games.

But Theodore was not very competitive and didn't get annoyed.

It was the final game and it was match point for Leo.

Anticipatory moment: Theodore moved into position and prepared to serve.

Waiting for his brother to strike the ball, Leo felt [participant response]

He played the ball down the line and Theodore was too slow to return it.

Leo won the game.

WORK TRAINING (NEUTRAL)

Angus (1) was thirty-two years old (2) and lived in Kingston-upon-Thames (3).

He had recently gotten a job as an insurance broker (4) through his friend, Alice (5).

He found the job to be quite tedious but it paid well.

Throughout the first week of November (6) he had a training course in statistical analysis (7).

Instead of the office, he went to a conference center (8) by the river.

Anticipatory moment: Settling down in his chair for the morning session, he felt [participant response].

The speaker was very engaging and by the end of the day Angus felt he had learned a lot.

GARDEN (NEUTRAL)

Cheung (1) was fifty years old (2) and had lived his whole live in Guildford (3).

But his real passion was gardening (4).

He shared a garden with his neighbour, Jill (5), and together they worked hard on it.

On April 5th (6) it was his birthday and he decided to go to the garden center (7) to buy himself a gift.

He walked around for some time until he found the collection of orchids (8) they had for sale.

Looking at the different flowers, he felt [participant response].

He eventually selected one and was excited to go home and plant it with the others.

NOVEL (NEUTRAL)

Anika (1) was nineteen years old (2).

She had recently moved to Durham (3) to begin a course in English Literature (4).

Anika liked fiction because it allowed her to experience the world through the eyes of someone else.

Every Tuesday at midday (5), Anika met with her friend Sophia (6) to discuss that week's reading.

That day, they sat on the top floor of the university library (7) and talked about Charles Dickens (8).

Waiting to read her chosen passage, Anika felt [participant response].

Anticipatory moment: She opened the book and began reading a dense paragraph.

Sophia said she found the passage to be very moving and they discussed how it related to the plot.

EXPERIMENT (NEUTRAL)

Sabrina (1) was twenty-two years old (2) and lived in Colchester (3).

Her second year of an undergraduate biochemistry degree (4) had just begun.

She was participating in her first experiment and felt a little nervous.

It was Friday afternoon (5) and Sabrina went to the EEG laboratory (6).

The study involved playing a memory game (7) against another person from her course, Jack (8).

While the experimenter secured the EEG cap to her head, Sabrina felt [participant response].

Anticipatory moment: She and Jack were given a brief and then waited for it to begin.

The experiment took about half an hour and Sabrina felt she learned a lot about memory.

MEETING (POSITIVE)

Ahmed (1) was twenty-five years old (2).

He lived in Manchester (3) where he worked as a telesalesperson (4).

Adjacent to his desk sat a lady called Rachel (5) with whom Ahmed was good friends.

They joked and laughed every day but Ahmed had never mustered the courage to ask her on a date.

The seasonal office party (6) took place on a Friday evening (7).

It was pot luck and Ahmed baked a cake (8).

He gave a piece to Rachel and she said it was delicious.

Ahmed decided this was the time to ask Rachel out and he felt [participant response].

Anticipatory moment: He waited for the room to fall silent and turned to Rachel.

He asked if she would like to have dinner with him and she said that she would love to.

SKETCH (POSITIVE)

Angela (1) was seventeen years old (2) and lived in Exeter (3).

She had always dreamt of being a sketch artist (4).

At school they was an art competition being held and Angela wanted to enter.

Unfortunately, she had recently lost her sketchbook and charcoal pencils.

She asked her friend Lisette (5) to pose on a park bench (6) for a sketch.

She entered the sketch into the competition.

The following Monday afternoon (7) they announced the results.

Sitting in the gymnasium (8) waiting for the winners to be announced, Angela felt [participant response].

Anticipatory moment: The headteacher opened an envelope and drew out a card.

He announced that Angela had won first place for her sketch and everyone applauded whilst she collected her prize.

EXAM (POSITIVE)

Jadyn (1) was seventeen years old (2) and went to school in Brighton (3).

She enjoyed her classes but had a learning difficulty which made reading a challenge (1).

Her favorite subject was geography (4). She loved learning about the planet and its environments.

It was Wednesday (5) and the big end of term exam was starting at 2pm.

Jadyn spent lunch break with her friend, Alyssa (6), and they quizzed each other on the material.

Jadyn was taking her exam in the computer lab (7) as she had an extra 45 minutes to finish (8).

Anticipatory moment: While she waited to enter, she felt [participant response].

Jadyn struggled to put her thoughts into words and thought she had done badly.

But the results came back a week later and she got an A.

CHARITY (POSITIVE)

Emilio (1) was sixty-four years old (2) and worked in Liverpool (3) as a charity event coordinator (4).

He had organised numerous fundraisers for refugees left homeless by conflict overseas.

On the first day of July (5), Emilio and his wife Haley (6) were preparing for a triathlon (7).

It was the day of the race and the athletes gathered in a local park (8).

At the end of the day, Emilio waited for the results and he felt [participant response].

Anticipatory moment: The announcer stepped onto the stage to announce the results.

The event was a huge success.

They had raised enough money to provide housing and food to hundreds of refugees.

EXERCISE (POSITIVE)

Sophia (1) was twenty-one years old (2) and lived in London (3).

She was just finishing a degree in social work (4).

She was worried about her essays as deadlines were approaching fast.

So on Thursday morning (5) she spoke to her tutor about them.

After that she went to the gym (6) to relieve her stress.

Someone she knew from her course, Amelia (7), was on the treadmill (8) next to hers.

Waiting to ask if they could study together, she felt [participant response].

Anticipatory moment: Her friend had warmed down and stepped off the treadmill.

Sophia asked her and she said she was struggling too and would love someone to study with.

APPENDIX 2

STUDY 2 NARRATIVES

FLIGHT DELAY (NEUTRAL)

By the time I reached Bangkok airport it was about ten thirty at night. My new pain medication wasn't working so I hadn't been sleeping well. I'm thirty years old now, better get used to it, I thought.

I was in Thailand because I had started a new job as charity coordinator and after two weeks of travelling from place to place and sitting in business meetings, all I wanted was to get on that plane and sleep. I had never really been away from my family before so the whole thing had been quite difficult. The woman at the desk said, "I regret to inform you that your flight has been cancelled and the next one will leave in the morning."

Naturally, I was quite frustrated to hear this, my exhaustion seemed to double in that moment. I told her my sister's engagement party was the following evening and I couldn't miss it. It was a stupid thing to say—I knew the woman at the desk was powerless. She told me that the next flight would leave tomorrow at 6am.

"Where do I sleep tonight?" I asked.

She said, "We have arranged for accommodation at the Sheraton, there will be a shuttle bus leaving from outside the terminal building."

The man who was waiting in line behind me got very angry when she broke the news to him, he raised his voice and slammed his fist down on the countertop. The lady looked frightened and I felt bad for her.

Half an hour later I arrived at the hotel. I left my bags in the room and took the elevator down to the restaurant. The airline provided complimentary dinner and breakfast. I thought I should take advantage of this and ordered myself a fillet steak with creamy mushroom sauce.

When I had finished my meal, I felt like having a drink so I moved to the bar. I sat there for about an hour, watching tv on my laptop and drinking wine. I am fascinated by insects and watch documentaries about them every chance I get. By then I wanted to sleep, but my neck was so tense I didn't think I would be able to, so I did some gentle exercises in my room. Back at home I go swimming most evenings and that helps my neck a lot, but I hadn't had the chance lately.

I was just getting into bed when my sister, Angela, called me. I answered the phone and said hello. She said she needed to talk and I asked her if she was okay. She burst into tears and proceeded to explain how she felt she had rushed into getting married and worried all the time he was not the right person for her. I did my best to calm her down and we spoke until I was too tired to keep my eyes open. I told her I would be home tomorrow, and everything would be okay.

She said okay and that she loved me. I told her she didn't need to worry, she had to make the decision that was right for her and I would support her no matter what. That's what family is for, I said.

GAMBLE (NEGATIVE)

It was Thursday and I was due to move out in less than 24 hours so I spent the night surrounded by boxes, eating takeaway pizza from a nearby restaurant. Of course, I didn't want to leave but I couldn't afford that place anymore, having been fired from my job. It was a long time coming, I guess.

At one point, teaching was my life. I moved to London to lecture in molecular biology after completing my PhD. But slowly old habits returned and I began to cope with job stress by drinking and gambling. Some of my colleagues filed complaints, saying I was becoming uncooperative and at times aggressive. My close friend Lucas tried to help, he even offered to attend group therapy with me.

It happened shortly after the Christmas Break. I was setting up for my seminar on photosynthesis, which was my area of expertise. I don't know why but I felt nervous and my hands were visibly shaking. The students started to file in and take their seats. I started lecturing anyway but a few of the students in the back wouldn't stop chatting and giggling. I just lost it and screamed at them. I don't even know what I said but the whole class went quiet and stared at me.

They fired me the next day. After that I just didn't care anymore. I stayed with my school friend for a while. Most of the time I was on the internet, betting on dog races. I was nearly thirty-four years old and I was just sitting around throwing my money away.

One morning I got a phone call saying my father had been admitted to a hospital in Brighton. They didn't know for sure but it looked like his brain cancer was back. I rented a car and drove down that afternoon. He was so happy to see me and I laughed when he told me how healthy I looked. My mum was on a business trip but had changed her flights and would be back first thing in the morning.

Unfortunately, they never saw each other again because he slipped into a coma that night. I whispered in his ear that I loved him and that I would do everything I could to make him proud. I like to think those were the last words he heard.

MAKING FRIENDS (POSITIVE)

I have always been a reclusive person. At school, while the other kids were out playing sports, I was usually hunting for mushrooms in the forest beside my house. I grew up in the Peak District so there was endless space to walk and be alone with my thoughts. I just always found people made me feel tense and because of this I wasn't very good at communicating with them.

This had a serious impact on my life growing up. I would shy away from any kind of group activity and I even pretended to be ill to escape from family gatherings. Eventually I gave up trying to integrate and just accepted that I was better off alone.

My first job was working the night shift at a dog kennel. This was perfect for me—all I had to do was keep watch over the animals and feed them in the morning. Sadly, after working there for two years, the kennel was shut down, so I signed up for benefits and moved back in with my parents. At first, I thought this would be a nightmare, living at home when I was twenty-five years old. But it turned out to be a good thing: they were so supportive and they would always sit down with me and talk through any problem I was having. My dad worked tirelessly to find me a new job and in February, he landed me a position at the local library.

This was basically my dream job and I was overjoyed. The building was right next to the garage where my dad worked, so I carpooled with him each morning. It wasn't as noisy as the kennel and everyone who worked there was very friendly.

One day, this really sweet girl called Charlotte approached me and asked if I was interested in learning circus skills. This surprised me a lot because no one ever asked me to do anything like that. Normally I wouldn't dream of it but I was feeling a lot more confident and I got the feeling she was a bit like me. So I agreed and the next day we went together. Even though I was bad at it, she was patient and encouraged the whole time. I even stayed afterwards to have brownies with the group and then walked Charlotte home. I thought for the first time in my life I might have friends of my own and I felt so happy.

MENTAL HEALTH FACILITY (NEGATIVE)

It was April and I had been working nightshifts at a care home for individuals with learning difficulties in a facility just outside of Ipswich.

Most of the residents at the facility slept soundly until at least dawn, so usually it wasn't hard work. I would sit with a colleague who had recently emigrated from Nigeria to start a PhD exploring corruption in the Congo.

That night, which was a Wednesday, one of the residents, Rachel, was very unsettled. We spoke a lot and I knew her better than any other resident. After being told that she would be transferred to another facility later that week, she had started crying and banging her head against the wall.

She told me, "All my friends are here and I don't want to leave them, I will be scared and lonely."

I told her it would be difficult at first but she would make new friends and that she needed to be there to get the best treatment.

Rachel was now fifteen and had been an orphan most of her life. She had suffered massive head trauma after being given illegal drugs by a foster parent and falling down a flight of stairs. This had led to brain damage.

After a long chat, she said she was feeling much better. She gave a huge yawn and said that she wanted to sleep.

The next day, however, she was unsettled again. The nurse had administered a sedative, but she continued to punch and kicks her bedroom walls until she was bleeding and had to be restrained.

I knew that sometimes music had a calming effect on her so I took her to the sensory room and we listened to The Beatles, which was her favourite band. A while later she said she wanted to take a shower so I gave her the key to the bathrooms and went to the staff cafeteria to eat a bagel. At that time Victor was looking after Rachel, which meant he had to stand outside the bathroom and knock on the door every few minutes to check she was okay.

When I returned to the ward, Victor was knocking on the bathroom door but there was no answer. The head nurse returned and without saying anything he approached the door and, in a loud voice, said, “I am coming in, Rachel”. As soon as he was inside he called for help.

Rachel was slumped over the side of the bathtub with a length of cord wrapped tightly around her neck. She had tried to kill herself. Her face was nearly blue and her eyes were bloodshot. Victor ran for the ligature knife and cut the cord. She began gasping for breath as soon as the cord was cut. It was a close call, but she would survive.

SKETCH ARTIST (POSITIVE)

Leaving Portsmouth and moving to Chicago to study History of Art was a huge step for me. My dad left when I was just nine years old and I haven't spoken to him since. Naturally my mum and I became very close and I was afraid to leave her alone. Of course, there was some culture shock and homesickness as first but since then it's proved to be the most valuable experience of my life. I've made so many friends and learnt so much.

A girl named Ellie, who lives in the room next to time, has quickly become my best friend. She was the one who encouraged me to enter the campus sketch competition. We decided to a get a gin and tonic in the bar after class and she pointed the poster out to me. It said the prize was $2000. Normally I wouldn't dream of doing something like that, I'm basically quite a secretive person and I feel so vulnerable when people look at my work. The deadline was at the beginning of November and it was already the middle of October so I immediately set to work on my most ambitious piece to date. My work is always surreal: I combine different animals to make the most grotesque monsters I can imagine.

I found so much determination inside myself I didn't know I had and it gave me a profound sense of purpose. Every day after class I was either seeking out inspiration or adding to the piece. I thought for the first time I really knew what I wanted from life. Finally, the submission deadline came around. Ellie and I went to the school office and I handed in my work. I was so nervous I could barely sign my name. Waiting for the results to come in was stressful to say the least. Then one day I got a letter through the university and it told me I had won first place and there would be an awards ceremony that weekend. It was one of the happiest moments of my life.

SMALL TOWN (NEUTRAL)

It was towards the end of January and I woke up to find it had snowed heavily overnight. The pine trees outside my bedroom window were almost completely white and there wasn't a single footprint on the sidewalk. This was the town I had grown up in, just outside of Chicago.

I could hear my dog, Fever, getting restless in the next room. Fever was a rescue dog who had nearly starved to death when his owner was killed in a car accident. One of my best friends, Alison, worked in at an animal rehabilitation centre and knew I was looking for a dog. She said he had tried to bite one of her colleagues, so they would have to put him down if no one adopted him. I went down to meet him and knew right away he was the right dog for me.

It had been a tough year. In March I lost nearly £8000 to an insurance scam. Even though I had always wanted to write comic books, I somehow ended up being a travel writer. So I had to go out of town a lot and during once such trip, in Morocco, I discovered on social media that my girlfriend was cheating on me with someone I had known since preschool. At first, I thought I was just being paranoid so I didn't confront her, then one night I saw her car parked outside his house. I know a lot of people might have lost their head over stuff like that, but I'm pretty even-tempered and very rarely get angry. So, she moved out and the dog moved in.

It was such a beautiful day I decided to take Fever for a long walk. We went past my old high school and for some reason I remembered the time my friend had slipped on the ice and broken his wrist. I went to get the nurse and when I came back I saw that the bone was sticking out of the skin and I vomited right there beside him. After circling the lake, we cut through town to get home and bumped into Alison. We sat down to drink a hot chocolate together. Alison was the twenty-eight, the same age as me, but she looked a lot younger. We always used to joke that she'd be getting ID'd until she had grey hair. It was like that having grown up in a small town, memories everywhere I looked. In some ways it was comforting, in other ways it was haunting. For the first time in my life I realised that I had feelings for Alison that were more than just friendly and that I should perhaps ask her to dinner.

Chapter 3

The impact of empathy on the encoding and retrieval of social information presented in flat and congruent emotional tones: A video narrative study

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Abstract

To determine the role, if any, played by motor mimicry in empathy-mediated encoding and retrieval strategy, a video narrative paradigm was developed. This was an attempt to shed light on the relative contribution of simulation to empathic processes. Professional actors read 6 monologues, whose outcome was either positive, neutral or negative. In one condition, the actors presented congruent emotional reactions to the material (i.e. smiling when something pleasant happened, varied tone of voice, animated and expressive body language) while in the other condition they presented severely inhibited emotional reactions (i.e. no facial expression, neutral tone of voice, restricted body language). We expected that, if simulation plays a formative role in empathic processes, empathic participants would remember less emotional details from the flat condition, whereas if theory—theory more accurately reflects internal processes, we expected to see enhanced recall of emotional details in both conditions.

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1. Introduction

As detailed in the previous chapter, two studies were conducted using a novel text-based paradigm. These were intended to investigate the role played by empathy in the encoding and retrieval of information with emotional content. In both studies, we found that high empathy individuals remember more emotional details than low empathy individuals across valences, and that they displayed a preference for details from narratives with positive valence. These findings were taken as evidence that reactionary emotional states mediate the encoding of details with affective content, which means these items are available to facilitate perspective-taking, in line with propositions from the theory—theory (Gopnik & Wellman, 1992) and narrative theory of empathy (Keen, 2006; Gallagher, 2012). This lends weight to the notion that empathy is a constructive process that relies on stored knowledge more than directly accessible perceptual information.

Still, the role played by affective empathy processes, specifically motor mimicry, requires elaboration. Unlike complex behaviours such as sympathy, motor mimicry is a comparatively simple physiological response and therefore lends itself to a more precise definition. It can be described as the tendency to imitate facial, vocal or postural expressions of individuals with whom we are interacting (Cuff *et al*., 2016). With regards to its conceptual veracity, mimicry can be distinguished from emotional contagion insofar as the latter is a sharing of subjective emotional states while the former is a matching of nonverbal displays (Hess & Fischer, 2014). One can be observed while the other is strictly internal. While some argue that these concepts are not dissociable (de Gelder, 2009; Spengler, Brass, Kühn & Shütz-Bosbach, 2010), simulation theory presents the case that this unconscious mirroring provides a template for understanding (Gallese, 2007). If this is the case, emotional contagion must be contingent upon motor mimicry, and therefore should not be conflated with it.

The role played by motor mimicry in empathy is heavily debated. Recent neuroimaging studies have implicated mirror neurons in this process (for review, see Blakemore & Decety, 2001), but such interpretations are heavily contested. In particular, there is debate as to whether mirror neurons facilitate action understanding or are a mere by-product of it (Lamm, C., & Majdandžić, 2015). So, with regards to the relationship between motor mimicry and higher-order processes, there are three distinct possibilities: (i) higher-order processes *depend upon* motor mimicry, (ii) motor mimicry is a supplement to action and emotion understanding, or, (iii) less likely, motor mimicry is epiphenomenal or occurs in parallel and serves an unrelated purpose. We have noted that it is hard to make the case that motor

mimicry is essential for cold and higher-order empathy processes to occur since we know anecdotally that individuals can infer the emotions of fictional characters in a book or vicariously with people they have never physically encountered. Further to this, it has been demonstrated that motor mimicry can be consciously suppressed in healthy individuals (Spengler, Cramon & Brass, 2010; Spengler, von Cramon & Brass, 2010), suggesting that it is not fundamental to empathy in the way that hard simulation theories suppose. Still, this does not preclude mimicry as a formative, enhancing or motivating factor in the empathic experience.

Lesion studies have demonstrated that patients with inhibited motor mimicry following brain injury do not necessarily demonstrate impaired emotion recognition (De Sousa *et al*., 2011). However, studies of patients with Parkinson's Disease have shown that impaired motor mimicry can lead to emotion recognition dysfunction (Prenger & MacDonald, 2018). In both cases, however, the intensity and locality of brain damage sustained may massively impact its effect on empathy and so it hard to draw firm conclusions. Furthermore, in otherwise healthy individuals, brain regions may compensate where there is a lack of information fed forward from motor mimicry. In any case, these examples do not specifically clarify the role of motor mimicry as a foundation to higher empathic processes.

More recent research has challenged the classical view that motor mimicry is merely an automatic and reflexive process, suggesting that top-down processes modulate motor mimicry according to motivation (Murato *et al*., 2016) and relationship to the target (Bourgeois & Hess, 2008; for review, see Seibt *et al*., 2015), indicating that motor mimicry can be recruited to assist cold empathy processes but is not crucial to emotion understanding.

Lastly, the specificity of motor mimicry can illuminate its epistemic function. It would, after all, be inaccurate to suppose that motor mimicry supports emotion recognition if the mimicry were not isomorphic to the expression of the target. There is limited research in this area but evidence suggests that motor mimicry enacts the general valence of an emotion, as being either positive or negative (Larsen, Norris & Cacioppo, 2003). This is to say that, for example, rather than mimicking the expression of anger itself, the group of muscles that more generally express negative emotions tend to show greater activity. According to a review by Hess & Fischer (2013), comparatively few studies find evidence for motor mimicry being emotion-specific (Wigenbach *et al*., 2020). There are difficulties with taxonomising emotions categorically that must be overcome, but this is fundamental to understanding the role of motor mimicry in empathic processes. If it is not emotion-specific, as the research tends to suggest, it may be more useful to regard it as a mechanism that supplies heuristic information

on roughly how an interlocuter is feeling and motivating top-down influences to analyse if it is warranted by contextual factors. In any case, it is clear that top-down influence cannot be discounted in any form from the process of emotion understanding.

This study presented the same narratives as in chapter two but in a different medium to assess the role of motor mimicry in empathic processing. The stories were read by actors in one of two emotional tones. In the congruent condition, facial expressions and tone of voice were consistent with the material. For example, smiling and affecting a lilting and bouncy tone of voice during moments of joy. In the flat condition, all facial expressions were downregulated, and tone of voice was kept neutral. The reduction of visual and auditory cues that signal emotional states was intended to inhibit the participants' ability to mirror the actor. This is a reversal of the effect observed in a seminal study by Oberman, Winkielman & Ramachandran (2007) in which facial expressions were inhibited by asking participants to bite down on a pen while imitating a model. They found that the recognition of positive affect was most impaired, although this effect pertained across valence. Following on from the results described in Chapter 2, we therefore expected that if motor mimicry provides the neurological foundations for perspective-taking, this would be reflected in the capacity for emotional recall.

This adapted paradigm is intended to shed light on the respective roles played by ST and TT. If motor mimicry is crucial to primitive emotion recognition and understanding, one would expect empathy, and by extension emotional recall, to be inhibited in the flat condition. However, if a theory—theory is sufficient to achieve higher-order empathy, one would expect that individuals would empathise with the characters based purely on the content, since they can infer how this would feel to them without needing perceptual cues. Accordingly, we would not expect that recall for congruent and flat narratives will differ by empathy because, even if they engage in mimicry more actively (Sonnby–Borgström, 2003), they may be more adept at making inferences based on cognitive empathy, and so are able to assess the mental state of the actors in this way.

However, we do expect that overall individuals will report less intense emotionality when the target appears indifferent or unphased and will remember more emotional details from congruent than flat narratives.

This study also pilots a novel empathy measure, the Emotional Resonance Index (ERI), which was intended to give indices of hot-affective and cold-cognitive responsivity. We

expect that cold empathy will correlate strongly with the perspective-taking and fantasy subscale, since these rely on mentalizing abilities. On the other hand, we expect that hot empathy will correlate strongly with empathic concern and personal distress, which are more closely related to heightened states of emotional arousal.

2. Method

To investigate how the presence or absence of physiological information impacts encoding and retrieval strategies across high and low empathy groups, the novel text-based paradigm described in Chapter 2 was adapted into video monologues read by actors (Appendix 3). As in the previous chapter, there were three valences, depicting either a positive, negative or neutral outcome for the protagonist with 10 emotional and 10 nonemotional details in each narrative. In addition, half of the narratives were present in the flat emotional tone condition, where the actors maintained neutral facial expressions and tone of voice throughout, and half were presented in the congruent emotional tone condition, where facial expressions and tone of voice were apposite to the content.

2.1 Participants

Participants (n=62, 45 female) were undergraduate students at University of East Anglia. All were aged between 18 and 44 ($\bar{x}$=21.1). All were recruited on SONA and were granted course credit for participation.

Undergraduate actors were recruited from the Theatre department at the University of East Anglia. Three women and three men were recruited, and each read a single narrative in both flat and congruent emotional tones. Participants saw a different actor perform each narrative to avoid any kind of familiarity bias. Halfway through data collection, the narrative presentation order and emotional tone of each narrative was reversed.

2.2 Materials

The study received ethics approval from the Research Ethics Committee of the School of Psychology at the University of East Anglia. The study was written in Qualtrics by the author and was run through the website, presented to participants on a desktop computer in an isolated cubicle on the UEA campus. Three questionnaires were administered. These were the Short Dark Triad-III (Paulhus, 2002), the Interpersonal Reactivity Index (Davis, 1983) and the ERI, a novel empathy measure.

2.2.1 Short Dark Triad (SDT-III)

The Short Dark Triad is a revised and shortened version of the Dark Triad questionnaire developed by Paulhus (2002) which provides a measure of three socially aversive traits, all of which include some form of empathy deficit: narcissism, Machiavellianism and psychopathy. There are 9 questions for each category, totalling 27 items. Responses are given on 5-item Likert scales that ranged from Strongly Disagree through Neither Agree nor Disagree to Strongly Agree.

2.2.2 Interpersonal Reactivity Index (IRI)

The Interpersonal reactivity index is 28-item questionnaire that provides an overall measure of dispositional empathy. Participants responded to statements on 5-item Likert scales that ranged from Strongly Disagree through Neither Agree nor Disagree to Strongly Agree. There are four subscales: personal distress, empathic concern, fantasy and perspective-taking. Personal distress denotes feelings of discomfort that are not directed towards an external agent. Empathic concern describes 'other-oriented' feelings of sympathy and concern. Fantasy assesses the ability to transpose oneself into the feelings and action of fictitious characters. Perspective-taking assesses one's capacity to spontaneously adopt the viewpoint of another person.

2.2.3 Emotional Resonance Index (ERI)

A novel 16-item empathy measure was developed and piloted in this study (Appendix 4). Finding previous measures rely heavily on explicit self-report statements, this measure focused on behaviours, convictions and temperaments that have been demonstrated to associate with emotional and cognitive empathy. For example, anxiety and neuroticism have been found to associate with personal distress (Alterman *et al*., 2003; Kim & Han, 2018) and certain questions exploit this relationship ("When placed in a compromising position, I can't help but fantasise about all the possible outcomes and this is a source of anxiety for me"). The ERI decomposes into two subscales, intended to measure hot-emotional and cold-cognitive empathy.

Hot-emotional empathy measures the propensity to experience vicarious emotions in response to another's situation. This is considered to be the bodily-visceral facet of empathic

responding, therefore individuals were queried about their emotional response to gore, harm to animals, affect sharing in tense or awkward social exchanges, or the likelihood of them experiencing emotional contagion. For example, “Even if I had the medical expertise, the thought of cutting into someone with a scalpel would still be horrifying to me”.
Cold or cognitive empathy measures the capacity for projection or perspective-taking and cognitive appraisal of another’s circumstances. These statements were geared towards analytic and meta-analytic understanding of social reality, which require theorizing and abstracting rather than direct processing of available perceptual information. Individuals were therefore asked to respond to statements that concern their convictions and determine their assessment of another’s circumstance, how this influences their decision making and behaviour, as well as the thoughts processes preceding and subsequent to complex social interactions. For example, “I don’t expect other people to help with my problems, so other people shouldn’t expect me to help with theirs”.

2.3 Procedure

Participants were presented with 6 video monologues, which had either a positive (n=2), negative (n=2) or neutral (n=2) outcome for the protagonist. These were followed by three Likert scales: one to assess their emotional response to the narrative (1=very negative to 7=very positive), one to indicate how they thought the character felt (same rating scale) and one to give a measure of self-relevance (1=not relevant at all to 7=very relevant).

After a trail-making distractor task, participants completed a recall phase. They were presented with a title for each narrative and then asked to free recall as many details as possible. Finally, they had to recall their own emotional responses to the narrative and indicate this on a Likert scale (“do you remember how this made you feel?” and “do you remember how you thought the character felt?”).

Finally participants completed the Short Dark Triad, the Interpersonal Reactivity Index and the Emotional Resonance Index as described above.

3 **Results**

As before, we recognise the arbitrary nature of a median split and therefore compare our findings with studies that also make use of the IRI. We also conduct correlations as a

supplementary measure, and offer Bonferroni corrections where these relate to the hypotheses. We calculated an average of 3.63 across IRI subscales, which is similar to the findings of Cliffordson (2001) ($\bar{x}$=4.53) but departs somewhat from the findings of Gilet *et al*. (2013) ($\bar{x}$=3.92).

3.1 Encoding Phase

3.1.1 Emotionality Ratings

We first considered whether self-emotionality (how emotional the participants found the narratives to be) and other-emotionality (how emotional they thought the character felt) interacted with narrative valence (positive, negative, neutral) and emotional tone (congruent, flat). At encoding, the mean response for self-emotionality was 3.56 (SD=1.25), on a 7-point Likert scale where 4 denotes neutral affect. The mean response for other-emotionality was 3.64 (SD=1.61).

A repeated measures ANOVA with emotionality type (self-, other-emotionality), emotional tone (congruent, flat) and valence, revealed a main effect of emotional tone ($F(1,61)=85.81$, $p<.01$, $\eta_p^2=.59$) and of valence ($F(2,60)=193.59$, $p<.01$, $\eta_p^2=.76$) but not of emotionality type ($F(2,60)=1.13$, $p=.29$, $\eta_p^2=.02$). There were significant interactions between emotionality type and emotional tone ($F(1,61)=5.09$, $p=.03$, $\eta_p^2=.08$), emotionality type and valence ($F(2,60)=22.29$, $p<.001$, $\eta_p^2=.27$), emotional tone and valence ($F(2,60)=32.54$, $p<.001$, $\eta_p^2=.35$).

3.1.1.1 Self-Emotionality Ratings

Overall, for narratives with negative valence, the mean response to self-emotionality was 2.53 (SD=.77). For narratives with neutral valence, it was 3.81 (SD=.55). For narratives with positive valence, it was 4.42 (SD=.81). For descriptive statistics, see Figure 5. These differed in the expected directions: positive-neutral ($t(62)=5.52$, $p<.001$), negative-neutral ($t(62)=10.39$, $p<.001$), negative-positive ($t(62)=13.04$, $p<.001$).

	Overall			***Congruent***			***Flat***		
	Positive	*Negative*	*Neutral*	*Positive*	*Negative*	*Neutral*	*Positive*	*Negative*	*Neutral*
Overall	4.42 (.81)	2.53 (.77)	3.81 (.55)	4.90 (.99)	2.45 (.92)	4.13 (.74)	3.90 (.94)	2.48 (.97)	3.47 (.78)
High Empathy	4.39 (.77)	2.32 (.82)	3.73 (.53)	4.87 (1.12)	2.26 (.89)	4.23 (.67)	4.00 (.93)	2.32 (.91)	3.29 (.91)
Low Empathy	4.45 (.86)	2.74 (.67)	3.89 (.56)	4.94 (.85)	2.65 (.98)	4.03 (.80)	3.81 (.95)	2.65 (1.02)	3.65 (.76)

Figure 5. Descriptive statistics for self-emotionality ratings by valence, emotional tone and empathy group, where 1=Very Unhappy and 7=Very Happy. Standard deviation reported in brackets.

When presented in the congruent emotional tone, self-emotionality in response to narratives with negative valence was 2.45 (SD=.92). For narratives with positive valence, it was 4.90 (SD=.99). For narratives with neutral valence, it was 4.13 (SD=.74). These differences were demonstrated to be significant: positive-neutral ($t(62)=5.17$, $p<.001$), negative-neutral ($t(62)=--10.55$, $p<.001$), negative-positive ($t(62)=12.34$, $p<.001$).
When presented in flat emotional tone, self-emotionality in response to narratives with negative valence was 2.48 (SD=.97). For narratives with positive valence, it was 3.90 (SD=.94). For narratives with neutral valence, it was 3.47 (SD=.78). These differences were demonstrated to be significant: positive-neutral ($t(62)=2.80$, $p=.01$), negative-neutral ($t(62)=-6.34$, $p<.001$), negative-positive ($t(62)=9.05$, $p<.001$).

The differences in self-emotionality ratings by emotional tone were demonstrated to be significant in the cases of positive congruent-flat ($t(62)=6.48$, $p<.001$) and neutral congruent-flat ($t(62)=4.87$, $p<.001$) but not negative congruent-flat ($t(62)=-.21$, $p=.84$).

Participants therefore consistently rated positive narratives in the congruent condition more positively than in the flat condition and neutral narratives in the congruent condition more positively than in the flat condition, but there was no significant difference between negative congruent and flat.

3.1.1.2 Other-Emotionality Ratings

Overall, for narratives with negative valence, the mean response to other-emotionality was 2.31 (SD=.75). For narratives with neutral valence, it was 3.67 (SD=.66). For narratives with positive valence, it was 4.89 (SD=1.03). For descriptive statistics, see Figure 6. These differed in the expected directions: positive-neutral ($t(62)=8.90$, $p<.001$), negative-neutral ($t(62)=11.19$, $p<.001$), negative-positive ($t(62)=15.13$, $p<.001$).

	Overall			***Congruent***			***Flat***		
	Positive	*Negative*	*Neutral*	*Positive*	*Negative*	*Neutral*	*Positive*	*Negative*	*Neutral*
Overall	4.88	2.31	3.67	5.73	2.06	4.24	4.10	2.52	3.03
	(1.03)	(.75)	(.66)	(1.01)	(.96)	(1.00)	(1.41)	(1.04)	(.94)
High	4.82	2.16	3.61	5.65	1.81	4.26	4.32	2.58	2.97
Empathy	(1.09)	(.75)	(.64)	(1.14)	(.79)	(.93)	(1.51)	(1.06)	(.98)
Low	4.95	2.45	3.73	5.81	2.32	4.23	3.87	2.45	3.10
Empathy	(.97)	(.73)	(.69)	(.87)	(1.04)	(1.09)	(1.28)	(1.03)	(.91)

Figure 6. Descriptive statistics for other-emotionality ratings by valence, emotional tone and empathy group, where 1=Very Unhappy and 7=Very Happy. Standard deviation reported in brackets.

When presented in congruent emotional tone, other-emotionality in response to narratives with negative valence was 2.06 (SD=.96). For narratives with positive valence 5.73

(SD=1.01). For narratives with neutral valence, it was 4.24 (SD=1.00). These differences were demonstrated to be significant: positive-neutral ($t(62)=9.24$, $p<.001$), negative-neutral ($t(62)=-12.07$, $p<.001$), negative-positive ($t(62)=19.61$, $p<.001$).

When presented in flat emotional tone, other-emotionality in response to narratives with negative valence was 2.51 (SD=1.04). For narratives with positive valence 4.09 (SD=1.41). For narratives with neutral valence, it was 3.03 (SD=.94). These differences were demonstrated to be significant: positive-neutral ($t(62)=4.80$, $p<.001$), negative-neutral ($t(62)=-2.88$, $p=.01$), negative-positive ($t(62)=8.02$, $p<.001$).

The differences in other-emotionality ratings by emotional tone were demonstrated to be significant: positive congruent-flat ($t(62)=8.28$, $p<.001$) and neutral congruent-flat ($t(62)=6.96$, $p<.001$) and negative congruent-flat ($t(62)=-2.66$, $p=.01$). Participants therefore consistently rated positive and neutral narratives in the congruent condition more positively than in the flat condition and negative narratives in the congruent condition more negatively than in the flat condition.

3.1.1.3 Comparison of Self- and Other-Emotionality Ratings

Overall, the differences between self-emotionality ratings and other-emotionality ratings were demonstrated to be significant in the response to narratives with positive valence ($t(62)=-5.01$, $p<.001$) and narratives with negative valence ($t(62)=2.34$, $p=.02$), but not narratives with neutral valence ($t(62)=1.93$, $p=.06$). Participants therefore consistently gave higher other-emotionality than self-emotionality ratings in response to positive narratives and significantly lower other-emotionality than self-emotionality ratings in response to negative narratives.

In the congruent condition, the differences between self-emotionality ratings and other-emotionality ratings were demonstrated to be significant in the response to narratives with positive valence ($t(62)=-7.38$, $p<.001$) and narratives with negative valence ($t(62)=2.75$, $p=.01$), but not narratives with neutral valence ($t(62)=-.98$, $p=.33$). Likewise, participants in the congruent condition therefore gave higher other-emotionality than self-emotionality ratings in response to positive narratives and significantly lower other-emotionality than self-emotionality ratings in response to negative narratives.

In the flat condition, the differences between self-emotionality ratings and other-emotionality ratings were demonstrated to be significant in the response to narratives with neutral valence ($t(62)=3.74$, $p<.001$), but not narratives with positive valence ($t(62)=-1.47$, $p=.15$) or

narratives with negative valence (t(62)=-.24, *p*=.81). Participants in the flat condition therefore gave significantly lower other-emotionality than self-emotionality ratings in response to neutral narratives.

3.1.2 Relationship between Emotionality & Empathy

Participants were divided over the IRI median line (M=100) into high (N=31) and low (N=31) empathy groups. Overall the average IRI score was 97.94 (SD=13.15). The average score in the low empathy group was 87.74 (SD=9.56). In the high empathy group the average score was 108.13 (SD=6.75). This was demonstrated to be significant: (t(62)=-9.70, *p*<.001). Figures 7 and 8 show emotionality ratings by empathy group and emotional tone.

There was a significant interaction between emotionality type, emotional tone and empathy group (F(2,60)=3.87, *p*=.05, η_p^2=.06) but not between emotional tone, valence and empathy group (F(2,60)=2.34, *p*=.10, η_p^2=.04) or emotionality type, emotional tone, valence and empathy group (F(2,60)=.12, *p*=.88, η_p^2<.01). However, it was not possible to analyse valence apart from emotional tone since emotionality ratings only have meaning relative to valence and an average would homogenise towards the (neutral) midpoint. Therefore to investigate the impact of emotional tone, post hoc analysis including the valence factor was conducted. To follow-up on the interaction between emotionality type, emotional tone and empathy group, we then considered effects of emotional tone and empathy group separately for self and other emotionality.

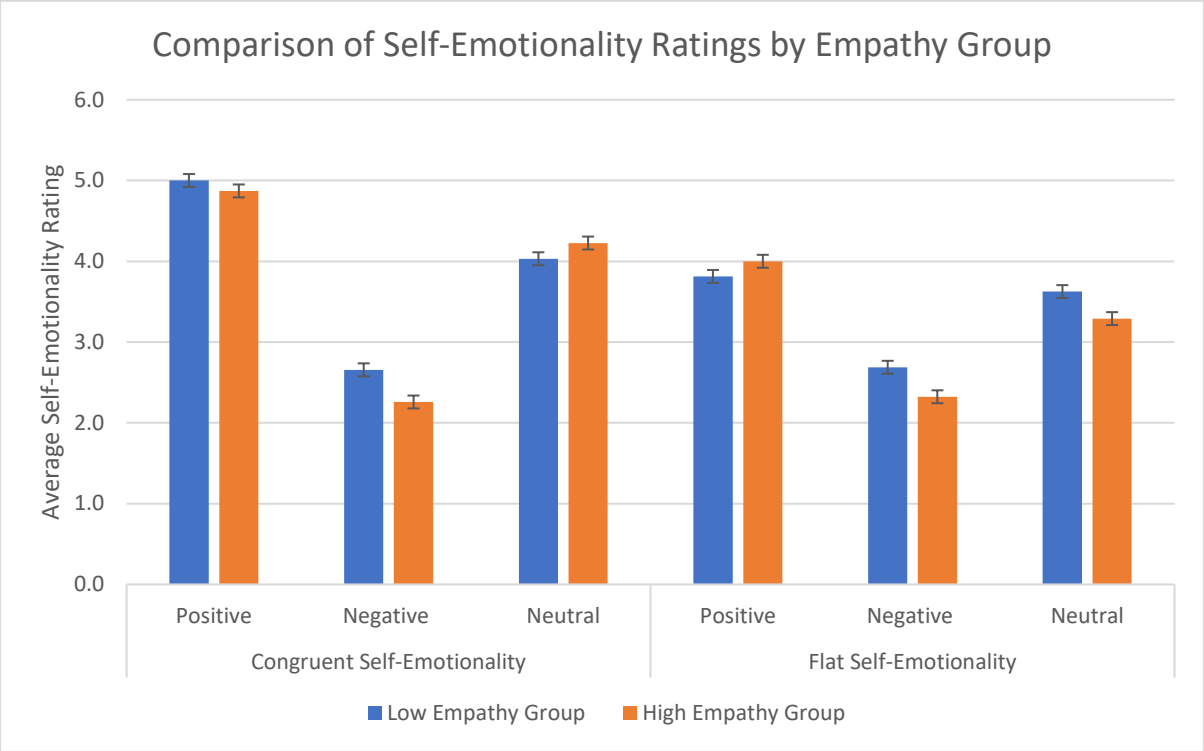

Figure 7. Bar graph representing differences in self-emotionality ratings by empathy group (with standard error bars)

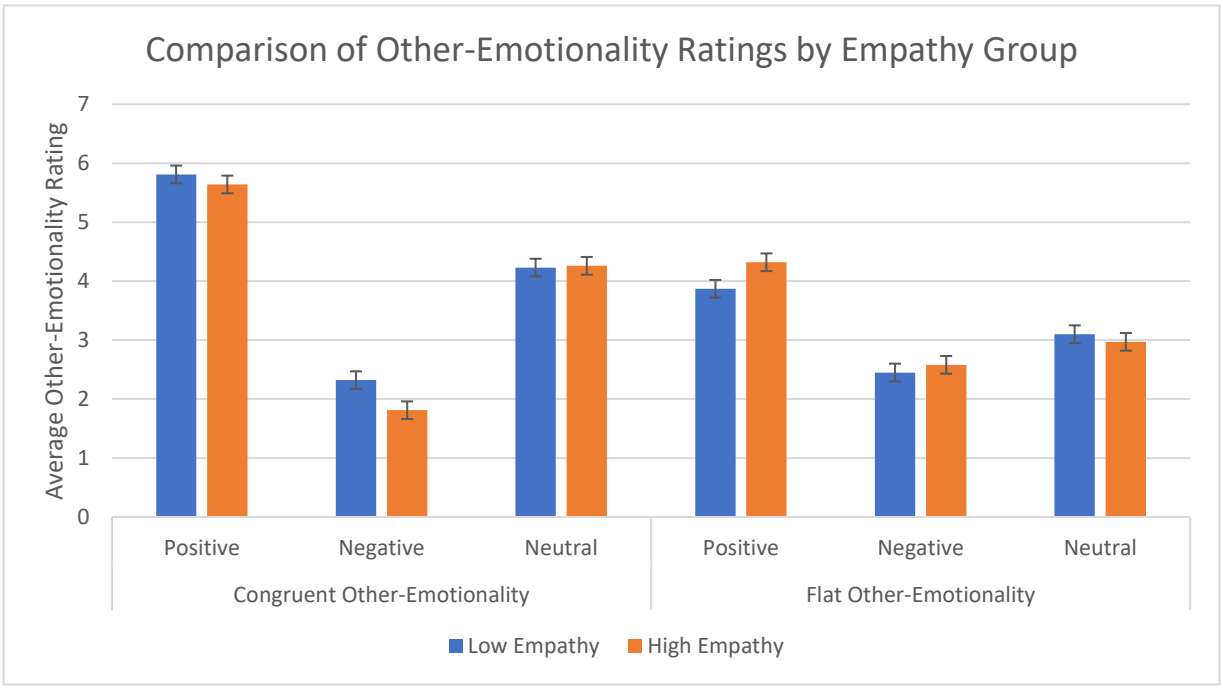

Figure 8. Bar graph representing differences in other-emotionality ratings by empathy group, (with standard error bars)

3.1.2.1 Self-emotionality Ratings

In the high empathy group, a 2x3 repeated measures ANOVA with emotional tone and self-emotionality ratings across the three levels of valence revealed a main effect of emotional tone ($F(1,61)=32.09$, $p<.001$, $\eta_p^2=.52$) and of valence ($F(2,60)=73.46$, $p<.001$, $\eta_p^2=.71$). There was a significant interaction between emotional tone and valence ($F(2,60)=7.11$, $p<.01$, $\eta_p^2=.19$).

Within the congruent condition, the mean self-emotionality rating for narratives with positive valence was 4.87 (SD=1.12). For narratives with negative valence, it was 2.26 (SD=.89). For narratives with neutral valence, it was 4.23 (SD=.67). These differences were each demonstrated to be significant: positive-negative ($t(62)=9.06$, $p<.01$), positive-neutral ($t(62)=2.65$, $p=.01$), negative-neutral ($t(62)=-9.87$, $p<.01$).

Within the flat condition, the mean self-emotionality rating for narratives with positive valence was 4.00 (SD=.93). For narratives with negative valence, it was 2.32 (SD=.91). For narratives with neutral valence, it was 3.29 (SD=.78). These differences were each demonstrated to be significant: positive-negative ($t(62)=8.22$, $p<.01$), positive-neutral ($t(62)=3.11$, $p<.01$), negative-neutral ($t(62)=-4.22$, $p<.01$).

The differences in self-emotionality ratings between the congruent and flat conditions were also demonstrated to be significant in the cases of narratives with positive valence ($t(62)=3.86$, $p<.001$) and narratives with neutral valence ($t(62)=4.76$, $p<.01$), but not narratives with negative valence ($t(62)=-.37$, $p=.71$). So high-empathy participants consistently reported higher self-emotionality in response to congruent positive and neutral narratives as compared to the flat condition.

In the low empathy group, a 2x3 repeated measures ANOVA with emotional tone and self-emotionality ratings in the response to the three levels of valence revealed a main effect of emotional tone ($F(1,61)=17.85$, $p<.01$, $\eta_p^2=.37$), and of valence ($F(2,60)=60.76$, $p<.01$, $\eta_p^2=.74$). There was an interaction between emotional tone and valence ($F(2,42)=6.59$, $p<.01$, $\eta_p^2=.18$).

Within the congruent condition, the mean self-emotionality rating for narratives with positive valence was 4.94 (SD=.85). For narratives with negative valence, it was 2.65 (SD=.98). For narratives with neutral valence, it was 4.03 (SD=.80). These differences were each

demonstrated to be significant: positive-negative (t(62)=8.33, p<.01), positive-neutral (t(62)=5.14, p<.001), negative-neutral (t(62)=-5.79, p<.001).
Within the flat condition, the mean self-emotionality rating for narratives with positive valence was 3.81 (SD=.95). For narratives with negative valence, it was 2.65 (SD=1.02). For narratives with neutral valence, it was 3.65 (SD=.75). These differences were each demonstrated to be significant in the cases of positive-negative (t(62)=5.00, p<.01) and negative neutral (t(62)=-4.71, p<.001), but not positive-neutral (t(62)=.80, p=.43).
The differences in self-emotionality ratings between the congruent and flat conditions were demonstrated to be significant in the cases of narratives with positive valence (t(62)=5.35, p<.001) and narratives with neutral valence (t(62)=2.18, p=.04), but not narratives with negative valence (t(62)=.00, p=1.00).

3.1.2.2 Other-emotionality Ratings

In the high empathy group, a 2x3 repeated measures ANOVA with emotional tone and other-emotionality ratings across the three levels of valence revealed a main effect of emotional tone (F(1,61)=16.71, p<.01, η_p^2=.36) and of valence (F(2,60)=93.30, p<.001, η_p^2=.76). There was a significant interaction between emotional tone and valence (F(2,60)=21.33, p<.01, η_p^2=.42).
Within the congruent condition, the mean other-emotionality rating for narratives with positive valence was 5.64 (SD=1.14). For narratives with negative valence, it was 1.81 (SD=.79). For narratives with neutral valence, it was 4.26 (SD=.93). These differences were each demonstrated to be significant: positive-negative (t(62)=14.38, p<.01), positive-neutral (t(62)=5.90, p<.01), negative-neutral (t(62)=-10.21, p<.01).
Within the flat condition, the mean other-emotionality rating for narratives with positive valence was 4.32 (SD=1.51). For narratives with negative valence, it was 2.58 (SD=1.06). For narratives with neutral valence, it was 2.97 (SD=.98). These differences were each demonstrated to be significant in the cases of positive-negative (t(62)=6.45, p<.01) and positive-neutral (t(62)=3.79, p<.01), but not negative-neutral (t(62)=-1.48, p=.15).
The differences in other-emotionality ratings between the congruent and flat conditions were demonstrated to be significant for narratives with positive valence (t(62)=4.14, p<.01), narratives with neutral valence (t(62)=5.15, p<.01), and narratives with negative valence (t(62)=-.3.97, p<.01). High-empathy participants therefore consistently reported higher other-

emotionality in response to congruent positive and neutral narratives and lower other-emotionality in response to congruent negative narratives as compared with the flat condition.

In the low empathy group, a 2x3 repeated measures ANOVA with emotional tone and other-emotionality ratings in the response to the three levels of valence revealed a main effect of emotional tone ($F(1,61)=48.90$, $p<.001$, $\eta_p^2=.62$), and of valence ($F(2,60)=84.42$, $p<.001$, $\eta_p^2=.74$). There was an interaction between emotional tone and valence ($F(2,42)=17.63$, $p<.001$, $\eta_p^2=.37$).

Within the congruent condition, the mean other-emotionality rating for narratives with positive valence was 5.81 (SD=.88). For narratives with negative valence, it was 2.32 (SD=1.05). For narratives with neutral valence, it was 4.23 (SD=1.09). These differences were each demonstrated to be significant: positive-negative ($t(62)=13.31$, $p<.001$), positive-neutral ($t(62)=7.14$, $p<.001$), negative-neutral ($t(62)=-7.22$, $p<.001$).

Within the flat condition, the mean other-emotionality rating for narratives with positive valence was 3.87 (SD=1.28). For narratives with negative valence, it was 2.45 (SD=1.03). For narratives with neutral valence, it was 3.10 (SD=.91). These differences were each demonstrated to be significant in the cases of positive-negative ($t(62)=4.92$, $p<.001$) and positive-neutral ($t(62)=3.01$, $p=.01$), but not negative-neutral ($t(62)=-2.60$, $p=.01$).

The differences in other-emotionality ratings between the congruent and flat conditions were demonstrated to be significant in the cases of narratives with positive valence ($t(62)=8.72$, $p<.001$) and narratives with neutral valence ($t(62)=4.62$, $p<.001$), but not narratives with negative valence ($t(62)=-.48$, $p=.64$).

3.1.2.3 Differences in Emotionality by Empathy Group

Comparison of the high and low empathy groups revealed significant differences in other-emotionality ratings in response to narratives with negative valence presented in congruent emotional tone: ($t(62)=2.19$, $p=.03$). For self-emotionality ratings in response to narratives with negative valence, there was also a significant difference between empathy groups: ($t(62)=2.20$, $p=.03$). High empathy individuals therefore reported feeling worse (self-emotionality ratings) and expected the character to feel worse (other-emotionality ratings) compared to low empathy individuals in response to narratives with negative valence.

3.1.3 Self-relevance

A repeated measures ANOVA with mean self-relevance ratings, revealed a main effect of valence: ($F(2,60)=22.23$, $p<.001$, $\eta_p^2=.27$). There was no significant interaction with empathy group: $F(2,60)=2.14$, $p=.12$, $\eta_p^2=.07$).

On average, participants found the self-relevance of narratives to be 2.55 (SD=1.56), where 1=Not Relevant at All and 7=Very Relevant. Of the three valences, they found the content of narratives with positive valence to be the most self-relevant ($\overline{x}=3.65$, SD=1.27), followed by narratives with neutral valence ($\overline{x}=2.53$, SD=1.12) and finally narratives with negative valence ($\overline{x}=2.47$, SD=1.39). Positive-neutral ($t(62)=5.48$, $p<.001$) and negative-positive ($t(62)=5.78$, $p<.001$) were demonstrated to differ significantly, while negative-neutral did not: ($t(62)=.32$, $p=.75$).

3.2 Retrieval

3.2.1 Comparison of Emotionality Ratings at Encoding and Retrieval

When asked to recall how narratives with negative valence made them feel, the mean response was 2.40 (SD=.76) and the mean response to how they believed the character felt was 2.76 (SD=.79). For narratives with neutral valence, the mean response to how the narratives made participants feel was 3.73 (SD=.66) and the mean response to how they believed the character felt was 3.53 (SD=.53). For narratives with positive valence, the mean response for how the narratives made participants feel was 4.22 (SD=.55) and the mean response for how they believed the character felt was 4.70 (SD=1.13).

A repeated measures ANOVA was run with task (encoding, retrieval), emotionality type (self, other), emotional tone (flat, congruent) and valence (negative, neutral, positive). This revealed main effects of emotional tone ($F(1,61)=116.32$, $p<.01$, $\eta_p^2=.66$) and valence ($F(2,60)=350.49$, $p<.01$, $\eta_p^2=.86$) but not emotionality type ($F(1,61)=2.08$, $p=.16$, $\eta_p^2=.03$) or task ($F(1,61)=.73$, $p=.40$, $\eta_p^2=.01$).

Further to this, there were significant interactions between emotionality type and emotional tone ($F(1,61)=10.05$, $p<.01$, $\eta_p^2=.15$), emotionality type and valence ($F(1,61)=61.68$, $p<.01$, $\eta_p^2=.51$), emotional tone and valence ($F(2,60)=65.82$, $p<.01$, $\eta_p^2=.53$) and emotionality type, emotional tone and valence ($F(2,60)=18.08$, $p<.01$, $\eta_p^2=.24$).

Finally, with regards to differences between high and low empathy groups, there were significant interactions between task, emotionality type, emotional tone and empathy group ($F(1,61)=22.16$, $p<.01$, $\eta_p^2=.27$), task, emotional tone, valence and empathy group ($F(2,60)=6.41$, $p<.01$, $\eta_p^2=.10$) and task, emotionality type, emotional tone, valence and empathy group ($F(2,60)=4.82$, $p=.01$, $\eta_p^2=.08$).

In the high empathy group, within the flat emotional tone condition, the mean self-emotionality rating for narratives with negative valence was 2.32 (SD=.91) at encoding and 2.90 (SD=.98) at retrieval. For narratives with neutral valence it was 3.29 (SD=.78) at encoding and 3.71 (SD=.86) at retrieval. For narratives with positive valence was 4.00 (SD=.93) at encoding and 3.68 (SD=1.05) at retrieval. These differences were demonstrated to be significant in the case of narratives with negative valence ($t(62)=-2.52$, $p=.02$) and narratives with neutral valence ($t(62)=-2.21$, $p=.04$) but not narratives with positive valence ($t(62)=1.26$, $p=.22$). So high empathy participants inflated self-emotionality at retrieval, when compared to encoding, for narratives with negative and neutral valence.
Within the congruent condition, no significant differences were found for self-emotionality ratings at the time of encoding and retrieval for narratives with neutral ($t(62)=1.87$, $p=.07$), positive ($t(62)=1.58$, $p=.13$), or negative ($t(62)=-.37$, $p=.71$) valence.

In the low empathy group, within the flat emotional tone condition, the mean self-emotionality rating for narratives with positive valence was 3.81 (SD=.95) at encoding and 3.94 (SD=1.09) at retrieval. For narratives with negative valence it was 2.65 (SD=1.02) at encoding and 2.39 (SD=.99) at retrieval. For narratives with neutral valence it was 3.65 (SD=.75) at encoding and 3.06 (SD=.68) at retrieval. These differences were demonstrated to be significant in the case of narratives with neutral valence ($t(62)=2.82$, $p=.01$) but not narratives with negative valence ($t(62)=1.02$, $p=.32$) or narratives with positive valence ($t(62)=-.61$, $p=.55$). So low empathy participants reported lower self-emotionality ratings at retrieval than at encoding for neutral narratives.
Within the congruent condition, no significant differences were found for self-emotionality ratings at the time of encoding and retrieval for narratives with neutral ($t(62)=-1.32$, $p=.20$), positive ($t(62)=.25$, $p=.80$), or negative ($t(62)=.41$, $p=.68$) valence.

At retrieval, within the flat emotional tone condition, self-emotionality ratings in response to narratives with neutral valence were significantly greater in the high (x=3.71, SD=.86) than

in the low empathy group (x=3.06 , SD=.68), (t(62)=-3.27, *p*<.01). In response to narratives with negative valence, they were also significantly greater in the high (x=2.90, SD=.98) than in the low empathy group (x=2.39, SD=.99), (t(62)=-2.07, *p*=.04).

However, in the congruent emotional tone condition, mean self-emotionality responses were significantly lower for the high (x=3.94, SD=.77) than the low empathy group (x=4.27, SD=.52) in response to narratives with neutral valence, (t(62)=1.96, *p*=.05).

Therefore, in the flat emotional tone condition, high empathy individuals tended to inflate positive affect in response to neutral and negative narratives, reporting that they felt better than low empathy individuals. Conversely, in the congruent emotional tone condition, high empathy individuals reported feeling worse than low empathy individuals in response to neutral narratives.

3.2.2 Empathy, Detail Type and Valence Recall

In total, there were 60 nonemotional and 60 emotional details for recall. The mean total number of details recalled was 35.26 (SD=12.81). Participants remembered significantly more emotional details ($\bar{x}$=20.65, SD=6.65) than nonemotional details ($\bar{x}$=14.61, SD=7.27), (t(61)=-8.67, *p*<.001). Participants remembered more emotional details from narratives with negative valence ($\bar{x}$=7.94, SD=2.74), followed by narratives with neutral valence ($\bar{x}$=7.66, SD=3.08) and finally narratives with positive valence ($\bar{x}$=5.05, SD=2.24). Participants remembered more details from negative than positive narratives (t(61)=-8.52, *p*<.001) and more details from neutral than positive narratives (t(61)=-7.60, *p*<.001), while there was no significant difference between recall of details from neutral and negative narratives (t(61)=-.79, *p*=.43).

Figure 9 shows item recall across the congruent and flat emotional tone conditions. Figure 10 represents overall emotional and nonemotional recall by empathy group.

Participants remembered more nonemotional details from narratives with positive valence than any other ($\bar{x}$=6.48, SD=3.54), followed by narratives with neutral valence ($\bar{x}$=4.29, SD=2.85) and finally narratives with negative valence ($\bar{x}$=3.84, SD=2.36). Participants remembered more details from positive than neutral narratives (t(61)=5.55, *p*<.001) and more details from positive than negative narratives (t(61)=7.08, *p*<.001), while there was no significant difference between emotional recall from neutral and negative narratives (t(61)=1.31, *p*=.20).

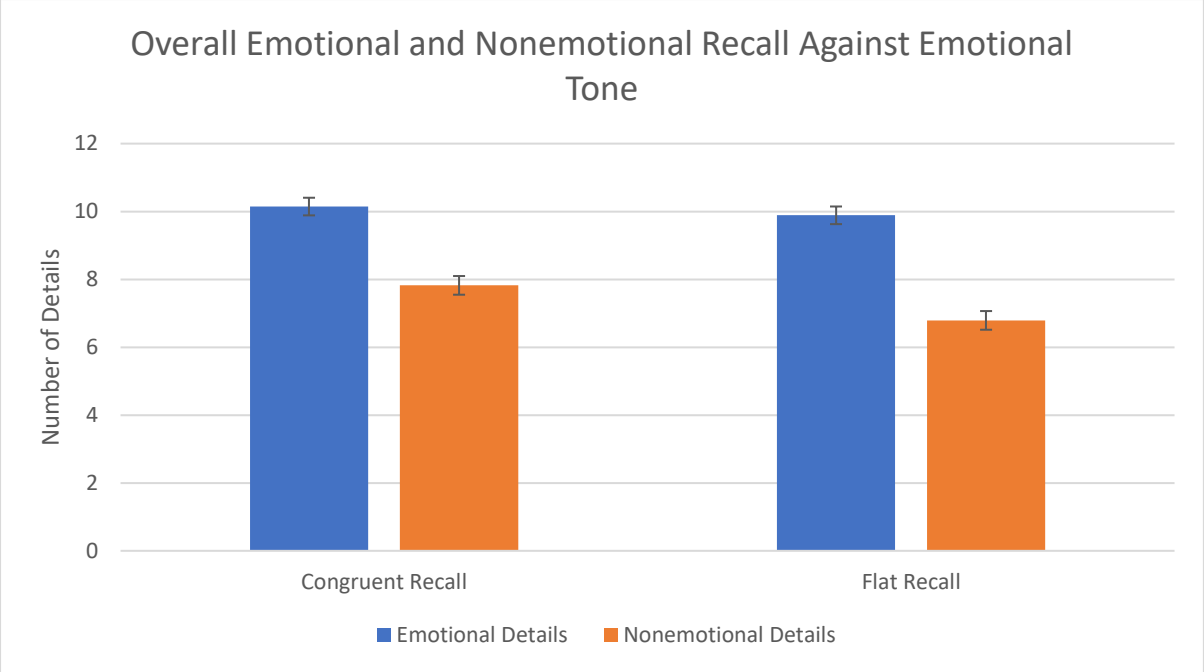

Figure 9. Bar graph representing overall emotional and nonemotional recall by emotional tone, with standard error bars

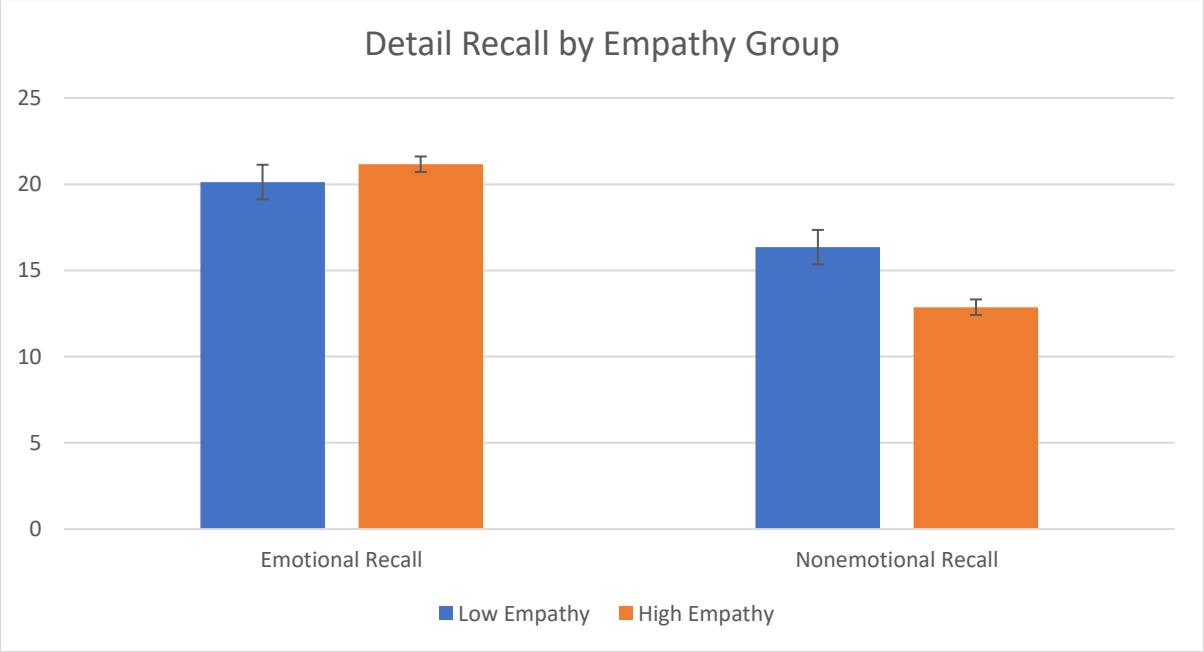

Figure 10. Bar graph representing overall emotional and nonemotional recall across high and low empathy groups, with standard error bars

A 2x3 Repeated Measures ANOVA with detail type (emotional, non-emotional detail recall) and the valence factor revealed a main effect of detail type ($F(1,61)=89.30$, $p<.01$, $\eta_p^2=.60$)

but not of valence (F(1,43)=.27, p=.76, η_p^2=.01). There was an interaction between valence and detail type: (F(1,43)=93.37, p<.01, η_p^2=.61).

There was a significant interaction between detail type and empathy group (F(1,61)=12.51, p<.01, η_p^2=.17), but not between valence and empathy group (F(1,43)=.05, p=.95, η_p^2<.01) or between empathy, detail type and valence (F(1,43)=.68, p=.51, η_p^2=.01).

Emotional recall for the high empathy group ($\overline{x}$ =21.16, SD=7.27) was not significantly higher than the low empathy group ($\overline{x}$=20.13, SD=6.04), (t(61)=-.61, p=.55). However, nonemotional recall for the high empathy group ($\overline{x}$=12.87, SD=6.42) was significantly lower than the low empathy group ($\overline{x}$=16.35, SD=6.08), (t(61)=3.48, p=.05). Total recall for the high empathy group ($\overline{x}$=34.03, SD=12.71) did not differ significantly from the low empathy group ($\overline{x}$=36.48, SD=13.00), (t(61)=.75, p=.46).

3.2.3 The Influence of Empathy on Recall by Emotional Tone

A 2x2x3 repeated measures ANOVA with emotional tone (congruent, flat), detail type and valence, revealed a main effect of emotional tone (F(1,61)=7.36, p<.01, η_p^2=.11) and of detail type (F(1,61)=89.30, p<.001, η_p^2=.60), but not of valence (F(1,61)=.27, p=.76, η_p^2=.01).

There was no significant interaction between emotional tone and empathy group (F(1,61)=1.22, p=.27, η_p^2=.02), emotional tone, detail type and empathy group (F(1,61)=.02, p=.90, η_p^2<.01) or between emotional tone, valence and empathy group (F(1,61)=.75, p=.46, η_p^2=.01). Figure 11 shows item recall from the flat and congruent emotional tone conditions by empathy group.

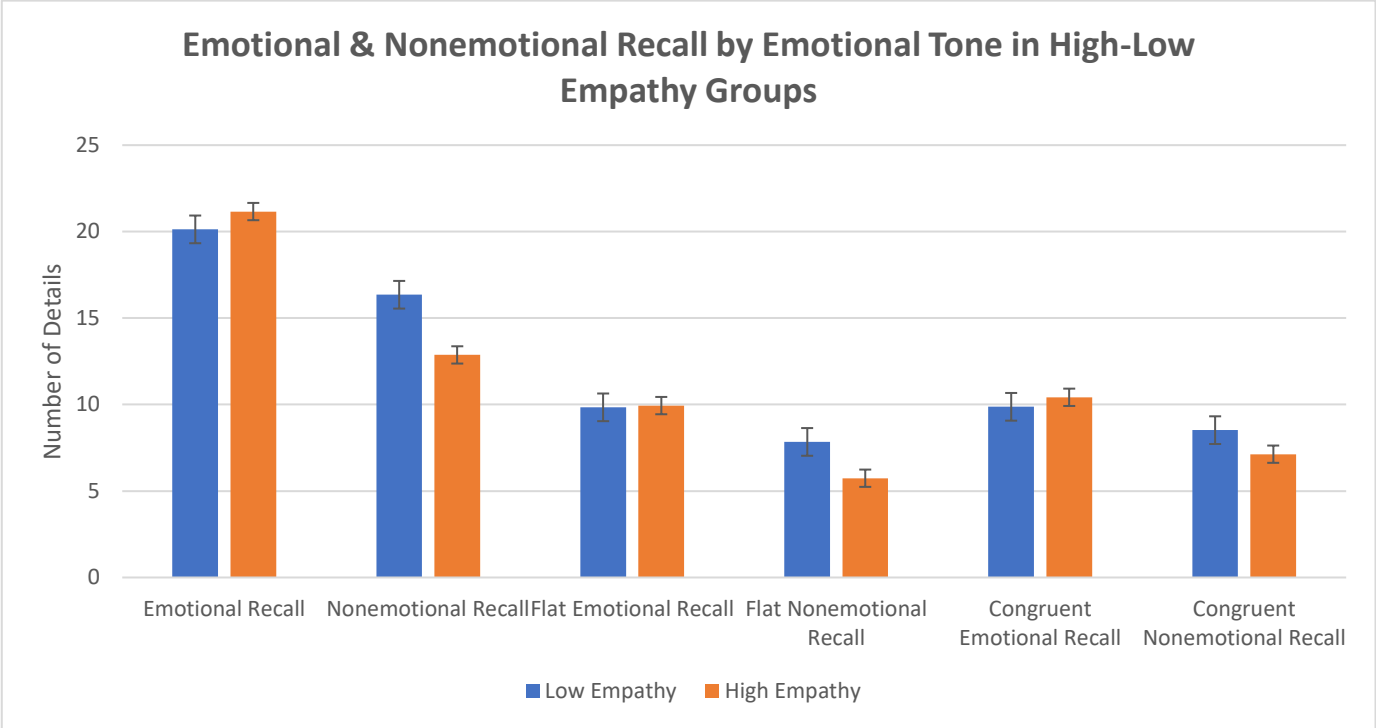

Figure 11 . Bar graph representing overall emotional and nonemotional for details from narrative presented in congruent and flat emotional tones across high and low empathy groups, with standard error bars

Overall, participants remembered more emotional details from narratives presented in congruent emotional tone ($\bar{x}$=10.15, SD=3.75) than from narratives presented in flat emotional tone ($\bar{x}$=9.89, SD=3.34), but this was not demonstrated to be significant: (t(61)=.74, *p*=.47).

Participants remembered significantly more nonemotional details from narratives presented in congruent emotional tone ($\bar{x}$=7.82 (SD=3.99) than from narratives presented in flat emotional tone ($\bar{x}$=6.79, SD=4.05), (t(61)=2.37, *p*=.02).

3.2.4 The Influence of Empathy on Emotionality Recall

As in the previous two studies, emotional recall was scored if a narrative elicited either very positive (6 or more on the Likert scale) or very negative (2 or less on the Likert scale) emotionality. Hereafter this factor is referred to as emotionality recall.

Following this, a repeated measures ANOVA with emotionality type (self-, other-) and emotionality recall, revealed a main effect of emotionality recall (F(1,61)=52.31, *p*<.001,

η_p^2=.47) and emotionality type (F(1,61)=10.92, p<.01, η_p^2=.15). There was no significant interactions between emotionality type and emotionality recall (F(1,61)=2.17, p=.12, η_p^2=.04), nor any significant interactions between emotionality type and empathy group (F(1,61)=2.14, p=.15, η_p^2=.03), emotionality recall and empathy group (F(1,61)=.73, p=.46, η_p^2=.01) or emotionality type, emotionality recall and empathy group (F(1,61)=1.34, p=.26, η_p^2=.02).

Next, we considered the impact of emotional tone on emotionality recall. An ANOVA with emotional tone and emotionality recall was conducted. This revealed that the main effect of emotional tone was not significant (F(1,61)=1.27, p=.27, η_p^2=.02). Likewise, there was no interaction between emotional tone, emotionality recall and empathy group (F(1,61)=1.80, p=.18, η_p^2=.03).

3.2.5 The Influence of IRI Subscales on Recall by Detail Type, Emotional Tone, Valence & Emotionality

The IRI has four subscales. These are Fantasy, Personal distress, Empathic concern and Perspective-Taking. A series of bivariate correlations with the IRI subscales revealed that only fantasy (r(62)=.32, p=.01) correlated significantly with overall recall of emotional details. Following a Bonferroni correction, the p-value was recalculated to 0.013 and this finding remained significant.

A series of exploratory bivariate Spearman correlations revealed that Fantasy (r(62)=.39, p=.002) and empathic concern (r(62)=.27, p=.04) predicted recall of emotional details from narratives with negative valence.
Fantasy also predicted recall of emotional details from narratives presented in congruent emotional tone: r(62)=.29, p=.03.

Additionally, Fantasy also demonstrated a positive correlation with emotional recall from narratives with evoked strong self-emotionality (r(62)=.30, p=.02), narratives in congruent emotional tone where strong other-emotionality was reported (r(62)=.33, p=.008) and narratives in congruent emotional tone where strong self-emotionality was reported (r(62)=.39, p=.002). Similarly, Empathic Concern exhibited a positive correlation with emotional recall from narratives that evoked strong self-emotionality (r(43)=.27, p=.034) and

narratives in congruent emotional tone where strong self-emotionality was reported ($r(62)=.33$, $p=.008$). Table 7 gives a breakdown of the IRI subscale scores by high and low empathy group.

	Mean (SD)	*Low Empathy Group*	*High Empathy Group*
IRI Score	97.94 (13.15)	87.74 (9.56)	108.13 (6.75)
Fantasy	24.85 (5.55)	21.45 (5.27)	28.26 (3.32)
Personal Distress	19.73 (5.20)	17.68 (4.92)	21.77 (4.70)
Perspective Taking	25.74 (4.30)	23.74 (4.15)	27.74 (3.47)
Empathic Concern	27.61 (4.35)	24.87 (3.90)	30.35 (2.79)

Table 7. Means of IRI and subscales

3.2.6 The Influence of Dark Triad on Recall by Detail Type and Valence

The Dark Triad has three subscales. These are Machiavellianism, Narcissism and Psychopathy. A series of exploratory bivariate correlations revealed that none of these subscales significantly correlated with overall emotional or nonemotional recall. However, overall Dark Triad score did demonstrate a significant negative correlation with recall of emotional details from narratives with neutral valence ($r(62)=-.27$, $p=.03$) and this was largely attributable to Psychopathy predicting diminished emotional recall from narratives with neutral valence ($r(62)=.25$, $p=.05$).

Overall Dark Triad score ($r(62)=-.29$, $p=.02$), narcissism ($r(62)=-.31$, $p=.01$) and psychopathy ($r(62)=-.26$, $p=.04$) all demonstrated significant negative correlations with recall of emotional details from narratives with neutral valence presented in congruent emotional tone.

Overall Dark Triad score also demonstrated a significant negative correlation with emotional recall from narratives that evoked strong positive or negative self-emotionality ($r(62)=.-$, $p=.01$) and narratives presented in flat emotional tone that evoked strong positive or negative emotionality ($r(62)=-.31$, $p=.02$). This was largely attributable to Machiavellianism for narratives that evoked strong positive or negative self-emotionality ($r(62)=-.27$, $p=.04$) and narratives presented in flat emotional tone that evoked strong positive or negative

emotionality ($r(62)=-.25$, $p=.05$). Table 8 gives a break down of Dark Triad subscale scores by high and low empathy group.

	Overall (SD)	*Low Empathy*	*High Empathy*
Dark Triad Score	66.60 (14.10)	70.13 (12.56)	63.06 (14.85)
Machiavellianism	27.74 (7.13)	29.29 (6.67)	26.32 (7.37)
Narcissism	22.74 (6.06)	24.00 (4.80)	21.48 (6.96)
Psychopathy	16.05 (4.70)	16.84 (4.80)	15.26 (4.54)

Table 8. Means of Dark Triad and subscales

3.2.7 Influence of ERI on Recall by Detail Type and Valence

The ERI is composed of two subscales, hot and cold empathy. Intercorrelations with the IRI and its subscales are represented in Table 9.

	IRI	*Fantasy*	*Empathic Concern*	*Perspective Taking*	*Personal Distress*
ERI	.66**	.49**	.62**	.38**	.31*
Hot	.53**	.36**	.53**	.22	.33**
Cold	.60**	.48**	.52**	.47**	.16

Table 9. Intercorrelations between ERI, IRI and subscales

To assess the impact of ERI scores on emotionality and recall, a further ERI median split was performed. A 2x3 repeated measures ANOVA with recall by detail type and valence demonstrated a main effect of detail type ($F(1,61)=84.22$, $p<.001$, $\eta_p^2=.58$) but not of valence ($F(1,61)=.28$, $p=.76$, $\eta_p^2=.01$). There was an interaction between detail type and ERI group ($F(1,61)=8.38$, $p<.01$, $\eta_p^2=.12$), but not between valence and ERI group ($F(1,61)=.77$, $p=.47$, $\eta_p^2=.01$) or detail type, valence and ERI group ($F(1,61)=1.28$, $p=.26$, $\eta_p^2=.02$).

However, a series of post hoc independent samples t-tests revealed that overall neither emotional recall (t(61)=-1.43, *p*=.16) nor nonemotional recall (t(61)=.77, *p*=.45) differed significantly by ERI group. Figure 10 gives a breakdown of ERI subscale scores by high and low empathy group.

	Overall	*Low Empathy*	*High Empathy*
ERI	69.95 (9.69)	64.48 (9.21)	75.42 (6.66)
Hot	33.34 (6.84)	30.16 (7.34)	36.52 (4.53)
Cold	36.61 (4.59)	34.32 (3.81)	38.90 (4.17)

Figure 10. Descriptive statistics of ERI and subscale scores by low and high empathy group

4 Discussion

The purpose of this study was twofold. Firstly, by asking actors to downregulate emotional displays while reading monologues, we sought to evaluate the contribution made by motor mimicry to the empathic process. Specifically, if the enhanced emotional recall observed in chapter two persisted when physiological cues were lacking. Secondly, to assess any differences incurred by adapting the narratives from text narratives to video monologues.

This study found that, in most cases, participants inflated self- and other-emotionality in response to congruent narratives as compared to flat narratives (e.g. they felt better and believed the character felt better in response to narratives with positive valence). Participants were also more likely to report a disparity between self- and other-emotionality in response to congruent narratives with negative and positive valence (e.g. believing the character felt worse or better than they did). In the flat emotional tone condition, participants only reported higher other- than self-emotionality in response to neutral narratives, where there was already less expression of strong emotionality due to the content.

Taken together, this is evidence that the paradigm functioned as intended, with congruent narratives eliciting stronger emotionality in response to the perceived emotional state of the characters, suggesting that motor mimicry plays a role in emotion matching. Contrary to our hypotheses, at retrieval, participants did not remember more emotional details from congruent than flat narratives, and high empathy individuals remembered less nonemotional details.

As we will see in what follows, however, there is limited evidence that this process is modulated by dispositional empathy as measure by the IRI (Davis, 1980). Observing emotional displays in others appears to predominantly elicit stronger emotionality in the observer regardless of their empathic abilities, since emotional reactions were stronger in response to congruent than flat narratives across participants. In limited cases at encoding, there was evidence that high empathy individuals experienced heightened emotionality and such individuals were significantly more likely to inflate self- and other-emotionality in response to congruent narratives with negative valence, suggesting they were more sensitive to characters' suffering. This suggests that cold empathy does not influence hot empathy processes, contrary to the findings of Sonnby–Borgström (2002). Importantly, our study

relies on self-report of subjective emotional states, and indeed what one feels and what one mimics may be two very different things. However, a mismatch would also gesture towards the idea that mimicry is not essential for emotional contagion or at least that emotional contagion can also be elicited by top-down influences.

Nonetheless, this finds support for the idea that this mechanism is automatic and is engaged throughout social interaction in lieu of some neurological deficit, which tends to be the view in the literature (Rymarczyk, 2019; Varcin *et al*., 2019). To advance these findings, this paradigm would need to be administered to individuals with affective empathy that is impaired following traumatic brain injury, to determine if such a deficit would be reflected in emotionality scores at encoding.

At retrieval, we observed that high empathy individuals remembered feeling better than they reported at encoding in response to flat narratives with neutral and negative valence. Low empathy individuals remembered feeling worse than they did at encoding in response to congruent narratives with neutral valence. This may offer some insight into why enhanced emotional recall was not observed in this experiment. The contrasting emotional tones appear to have dampened emotional responsivity at the time of encoding, possibly resulting in less willingness to engage with and vividly imagine the scenarios, and thereby inhibiting retrieval. This retrospective inflation of self-emotionality is insufficient to enhance recall, thus supporting the idea that reactionary emotional states are required to support an encoding strategy that favours emotional details.

Further to this, the inflation of self-emotionality at retrieval suggests that participants report stronger positive emotionality than they did not at encoding *following effortful reflection*, suggesting that such individuals do rely on perceptual cues to inform judgments but that a theory—theory may retroactively compensate when these are lacking, and importantly that these attributions demonstrate a bias towards positivity. In short, when the emotional state of characters was ambiguous and needed to be cognitively inferred, high empathy individuals tended to ascribe a more positive self-attribution. This gestures toward the idea that hot empathy processes play a low-level role in guiding attention and informing higher-order processes.

More broadly, however, if it were the case that motor mimicry motivates the observer towards emotional engagement, we would expect enhanced emotional recall from narratives presented in the congruent as compared to the flat condition, but this was not the case. Instead we observed greater emotional than nonemotional recall across participants and diminished nonemotional recall in high empathy individuals. This suggests less engagement overall in high empathy individuals and the overall enhanced emotional recall suggests that inferences about mental states proceed even in the absence of perceptual cues. Although, as noted above, there was evidence that high empathy individuals are more likely to inflate positive emotionality at retrieval.

High empathy individuals tended to report feeling worse in response to congruent narratives with negative valence, as compared to low empathy individuals. This is taken as further evidence of a positivity bias of the kind described in previous chapters. We conjectured that this heightened emotional response to negative stimuli may have presented as an aversion, leading to a preference for information that evokes positive affect. However, in this instance personal distress was not found to predict emotional recall of any kind, suggesting that this aversion is not necessarily driven by strong emotional states but may be attributable to positive affect prompting emotional recall more generally. This effect warrants further discussion, however, and relevant findings will be discussed in Chapter 5.

It is important to note that the change from text to a video-based medium allows less time for rehearsal and places less demand on cognitive resources, which may have promoted more superficial engagement with the content. In the previous studies, participants needed to make efforts to imagine the scenario in the way that one might when reading a novel, which, as noted by Keen (2006) and Gallagher (2012), likely cultivates a richer empathic experience. On this occasion the information was simply given, which assigns a more passive role to the participants, and therefore does not necessitate the same level of cognitive investment. Furthermore, the possibility of considering information in greater details at one's own pace is severely impacted, which likely leaves less room for consolidation. In line with research by Gaesser and others (2014; 2019; 2020), vividly imagining significantly enhanced emotional engagement and willingness to help a character in need compared with a control condition. We therefore identify a crucial role for this constructive process in the formation of higher-order empathy, consistent with research which identifies a common neural substrate for simulation and episodic memory (Schacter & Addis, 2007; Schacter *et al.*, 2012; Addis,

2018). As such, this shift to video monologues, coupled with the manipulation of emotional tone, may have restricted constructive engagement and thereby neutralised the expected memory effect.

Several other points from Keen's theory of narrative empathy (2006) should also be addressed. She notes that empathy is readily enhanced by use of the first-person, and can be mitigated by an array of factors including complex plots, an excess of narrators, and relatability dependent on genre, setting and time period (p.215-6). With regards to the present study, then, the move from text to video-based narratives may correspond to a shift in emphasis from the first- to the third-person. Rather than constructing a scenario, which calls for a degree of self-projection through effortful construction, the conditions of this experiment are more akin to a real-world social interaction, and again this may lead to more superficial engagement with the material and thereby inhibit emotional recall.

As Keen (2006) also notes, some individuals feel more empathy for real interlocuters and far less for fictional characters. We therefore return to problems with categorisation. To date, no studies have considered these types of empathy nor developed a empathy measure that attempts to tease them apart. While Davis' (1980) categories have been shown to demonstrate external validity, it becomes clear that an overarching empathy score is of little value when there is such variation within the construct. This leads us to consider the subscales to understand the various influence of different empathic processes. In this case, only fantasy associated with enhanced emotional recall. This faculty pertains to an individual's ability and willingness to engage with fictitious characters, and describes a cognitive rather than affective process of interrelation. While this does fit with our model by suggesting that such processes can still cultivate empathy in the absence of motor mimicry, it is considerably harder to understand why perspective-taking did not play a greater role. We propose that due to the format, the monologues were interpreted as dramatic performances rather than as social interactions. It would therefore be beneficial to conduct a study wherein emotional recall following active dialogue with an actor is measured.

While this is not in line with our hypotheses, it nonetheless sheds light on how empathic individuals enact perspective-taking and what contextual factors prompt engagement and deeper encoding. It seems that, noting the indifference of characters in the flat condition, high empathy individuals were primed to engage less overall, and so did not deploy affective and mental resources towards imagining scenarios, as reflected by their diminished recall of nonemotional details overall. It is important to note that this may have resulted from a level of emotional confusion. Not knowing how to interpret the characters' emotional states, they

opted instead to withdraw. Naturally this casts doubt on the ethological validity of the paradigm.

In sum, we find this to be evidence that motor mimicry plays a role in engaging attention and investing cognitive resources towards the goal of mental inference, rather than being a necessary prerequisite to higher-order processes. We therefore propose that motor mimicry serves a motivational rather an epistemic role in line with studies that demonstrate motor mimicry is not emotional specific (Larsen, Norris & Cacioppo, 2003).

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APPENDIX 3

LINKS TO VIDEO MONOLOGUES

SMALL TOWN: https://youtu.be/yHXbnTauH9U

GAMBLE: https://youtu.be/U9fGz4ymaf8

FLIGHT DELAY: https://www.youtube.com/watch?v=ciSuwZFPMq0

SKETCH ARTIST: https://youtu.be/C8D07DxhJts

MAKING FRIENDS: https://youtu.be/n-GGYWtEzrQ

MENTAL HEALTH FACILITY: https://youtu.be/qBAiOm41RTE

APPENDIX 4

EMOTIONAL RESONANCE INDEX (ERI)

Hot Empathy Subscale

1. A sad song can bring me to tears.
2. I get goosebumps when I witness something particularly beautiful.
3. If the person I am talking to is awkward, I feel awkward too.
4. I get irritated quickly when people complain to me. (R)
5. I find it very difficult to stop myself from tearing up when I see other people crying.
6. Even if I had the medical expertise, the thought of cutting into someone with a scalpel would still be horrifying to me.
7. I like watching gory horror films. (R)

Cold Empathy Subscale

8. I don't expect other people to help with my problems, so other people shouldn't expect me to help with theirs. (R)
9. If someone in a group is making other people uncomfortable, I can always tell and I try to mediate the situation.
10. When placed in a compromising position, I can’t help but fantasise about all the possible outcomes and this is a source of anxiety for me.
11. When people behave in a way that is hurtful to others, I always try to understand the reasons why.
12. When I am unkind to people I care about, I feel very guilty.
13. It's a dog-eat-dog world and so individual progress is always at the expense of others. (R)
14. I think harming an animal is always morally wrong, even if it is eaten.

Chapter 4

The Influence of Big 5 Personality Traits and Empathy on Theory of Mind-based Inferences

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Abstract

The Big 5 organises personality traits into five spectra—openness, conscientiousness, extraversion, agreeableness and neuroticism—which have been widely adopted in the field of psychology. However, associations between these traits, empathy and Theory of Mind (ToM) remain largely unaddressed. Empathy pertains to awareness and responsivity to the emotional states of other, while ToM more generally describes the ability to infer the mental states of others. This study made use of a novel text-based paradigm in which participants (N=87) were asked to read narratives (N=8) and select a response (out of three possibilities) that they believed to be the most plausible. These responses had previously been rated as either negative, neutral or positive in emotional tone by way of a pilot study. This was intended to investigate how empathy and Big 5 traits mediate interpretation of social events; specifically, if individuals in the high empathy, openness, conscientiousness, extraversion, agreeableness or neuroticism groups typically choose the dominant response or responses of a particular valence compared to low trait groups. Following from the results of studies 1, 2 and 3, we expected to find a bias towards positive responses in high empathy individuals. We also expected that high empathy and agreeableness would predict a preference for the most popular response. While Big 5 traits did not appear to impact overall response patterns, they did associate with responses in specific cases. Extraversion, Agreeableness and Neuroticism were found to predict differences in IRI scores. Hot empathy was found to predict a preference for positive responses. The disproportionate preferability of one response over others in several of the narratives was identified as a limitation of the paradigm.

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1. Introduction

1.1 The Big 5 Model of Personality

Since the groundwork of inquiry into personality began with the work of Galton (1884) and was advanced by thinkers such as Allport (1936) and Cattell (1940), numerous empirical trait theories have been put forwards, but perhaps none has gained as much traction as the Big 5 (Curtis, 2015). In the revised NEO (Neuroticism, Extraversion, Openness to experience) version, (Costa & McCrae, 1985) traits are organised into five spectra, said to be the most fundamental—Openness to Experience (inventive/curious vs consistent/cautious), Conscientiousness (efficient/organised vs extravagant careless), Extraversion (outgoing energetic vs solitary/reserved), Agreeableness (friendly/compassionate vs challenging callous), and Neuroticism (sensitive/nervous vs resilient/confident). Broadly speaking, Openness represents a willingness to explore new ideas and experiences, appreciation of art, beauty, imagination and emotion, and heightened sensitivity to one's own emotional states. Conscientiousness represents organisation, focus, and self-discipline. Extraversion is the capacity to assert oneself, surgency in the face of external circumstance, confidence, and action-oriented behaviour. Agreeableness is associated with a desire to please and get along with others, behaving considerately, kindly and generously, and willingness to compromise. Finally, neuroticism is characterised by emotional instability, a propensity to experience heightened negative affect and a low tolerance for stress. Given that all of these incorporate a social dimension, we expect to find associations between these measures and constructs described by the IRI empathy subscales.

The big 5 traits have been variously found to predict a wide range of behavioural outcomes including academic (Vedel, 2014) and job performance (Barrick & Mount, 1991; Hurtz & Donovan, 2000), depression, anxiety and substance abuse (Allen *et al*., 2018), cognitive ability in older adults (Curtis, Windsor & Soubelet, 2015), and leadership potential (Judge & Bono, 2000). As a result, it has quickly become the most prevalent personality measure in the field of psychology (Carmel & Glick, 1996; Nettle & Liddle, 2008).

Within the domain of social psychology, researchers have predicted Big 5 personality profiles from social media activity (Azucar, Marengo & Settanni, 2018) and found links between these traits and romantic relationship satisfaction (Maluoff *et al*., 2010), emotional

intelligence (Petrides & Furnham, 2000), and empathy (Barrio *et al.*, 2004; Claxton-Oldfield & Banzen, 2010).

The seemingly robust link between neuroticism and personal distress, a subcategory in our working model of empathy, has garnered the most attention (Alterman *et al*., 2003; Kim & Han, 2018). However, researchers have also found that Agreeableness correlates with empathic concern and perspective taking, Openness to experience with perspective taking and diminished personal distress, and Conscientiousness with perspective taking (Song & Shi, 2017). A study of Spanish adolescents by Barrio, Aluja & García (2004) using Byrant's Empathy Index for Children and Adolescents (Byrant, 1982) found that overall empathy score was linked to Friendliness, which broadly maps onto the construct of Agreeableness. Contrary to the hypotheses of this study, empathy did not predict emotional stability; or diminished Neuroticism in accord with the Costa & McCrae model (1985). Finally, a study of Portuguese medical students by Costa *et al*. (2014) also found an association between Agreeableness and empathy, as measured by the Jefferson Scale of Physician Empathy.

While previous studies helped to elaborate the relationship between empathy and the Big 5 traits, it remains to be seen what influence these factors exert on ToM-based inferences.

1.2 The Relationship Between Empathy and Theory of Mind

As is typically the case in empathy theory, taking the initial step requires that we make abundantly clear exactly which processes are being discussed. Firstly, there is broad consensus that affective-hot empathy is both conceptually and neurologically distinct from cognitive-cold empathy (Raz *et al.*, 2014); this is to say, there are distinct neurological pathways for understanding others affectively (Fan *et al.*, 2011; Lamm *et al.*, 2011) and cognitively (Frith & Frith, 2005; Oliver *et al*., 2015). Empathy necessarily includes inferences about the contents of other minds and the terms cognitive perspective-taking and ToM are often used interchangeably (Blair, 2005; Decety *et al.*, 2012). This ability is understood to rely on a common neural network including the temporoparietal junction, temporal lobes, medial prefrontal cortex and posterior cingulate cortex (for meta-analysis, see Bzdok *et al*., 2012 and Schurz *et al.*, 2014). These analyses indicate that the main difference between hot empathy and cold empathy is that the latter yields explicit or propositional knowledge of others that is acquired through inference and appraisal, while the former describes embodied emotional states that are elicited by observing the behaviour of others.

For example, observing facial expressions associated with pain activates a common neural network that also processes firsthand pain, leading to a visceral response in the observer (Lamm, Decety & Singer, 2011).

Equally, from a semantic standpoint, as our working model makes clear, there is no difference between ToM and cognitive perspective-taking. If inferences lead to an emotional response, we define this as a higher-order empathic response such as sympathy, or being in feeling with the other.

In line with Buckner & Caroll (2007), we theorise that both empathy and ToM rely on a common neural substrate that also supports episodic recall and future thinking. As such, we expect to find differences in ToM-based inferences according to empathic abilities. Westra (2018) argues that individuals interpret and predict the behaviour of others based on character evaluation, that is, how their personality structure is likely to impact their evaluations and decision making. We therefore propose that the traits of the individual herself also influence how such judgements are made. For example, we expect that neuroticism will predict a tendency to choose answers that are negative in valence.

1.3 The Present Study

The link between Big 5 traits and ToM is more poorly understood. Investigating ToM presents difficulties to empirical science since any attribution of intent is entirely subjective and can seldom be verified by the agent with any degree of precision. Researchers have adapted the 'Reading the Mind in the Eyes' paradigm to investigate the neural substrate of ToM (Adams et al., 2010) or to otherwise identify deficits in mentalising abilities (Baron-Cohen *et al*., 2001), but these paradigms do not give an indication of how individual differences effect interpretation. There is no reliable scale that gives a measure of ToM and its constituent processes and can be used to predict interindividual differences in personality traits. To address this gap in the literature, a novel ToM task was developed which presented participants with narratives and asked them to rank order responses in descending order of plausibility. These responses were organised by emotional valence (negative, neutral, positive).

1.3.1 Hypotheses

Previously we found a bias towards positive social information in high empathy individuals, we therefore expect that (i) overall IRI score and agreeableness will predict a preference for positive responses and, that (ii) neuroticism, being associated with higher levels of anxiety, will predict a preference for negative responses.

In line with the aforementioned findings from Song & Shi (2017) and Barrio, Aluja & García (2004), we also expect that (iv) agreeableness will correlate most strongly with empathy more generally. Of the Emotional Resonance Index (ERI) subscales, which were introduced in the previous chapter, we expect that (v) cold and hot empathy will associate with agreeableness. Of the IRI subscales, in line with the literature, we expect that (vi) empathic concern will correlate most strongly with agreeableness and (vii) personal distress with neuroticism and negatively with extraversion, since this trait is characterised by assertiveness and self-confidence. Further, we expect (viii) openness will correlate with perspective taking since this faculty requires that individuals are willing to consider novel information and attempt to project themselves into potentially unfamiliar scenarios, especially in the case of outgroup or cross-cultural mentalising, which conversely may be frightening to those exhibiting high neuroticism.

Given that there is typically homogeneity between individuals regarding how to interpret behaviours such as facial expressions (Susskind & Anderson, 2008), we also expected that (ix) some responses would be considerably more popular than others and would be associated with little interindividual variability. We would thus expect less robust associations with personality traits and empathy scores for these responses.

2. Method

To investigate how empathy mediates the interpretation of social scenarios, a novel text-based paradigm was developed. Each narrative was associated with three possible judgements regarding the character's mental state. Participants read each narrative and ordered responses in descending order of plausibility. Each response had been rated beforehand by another group of participants on a Likert scale of emotional valence from very negative to very positive (see sections on pilot study below).

2.1 Participants

Pilot study (rating of emotional valence):

Participants (n=77, 61 female) were undergraduate students at the University of East Anglia. All were aged between 18 and 28 ($\overline{x}$=21.2) and were recruited using the SONA system. They were granted course credit for participation.

Main study:

In the main study, participants (n=87, 67 female) were different undergraduate students at University of East Anglia. All were aged between 18 and 26 ($\overline{x}$=20.15) and were recruited on SONA. They were granted course credit for participation.

2.2 Materials

The study received ethics approval from the Research Ethics Committee of the School of Psychology at the University of East Anglia. The study was written in Qualtrics by the author and was run through the website. Initially, participants completed the experiment at a desktop computer in an isolated cubicle on the UEA campus. Following the outbreak of the Covid-19 pandemic, participants completed the experiment online (N=60). Three questionnaires were also administered. These were the Big 5 inventory, the Interpersonal Reactivity Index (Davis, 1983), and the ERI, a novel empathy measure.

2.2.1 Big 5 Inventory

The Big 5 Inventory is a 44-item questionnaire that assesses traits according to five subscales, which are organised as spectra. These are: openness, which runs from curious-inventive to consistent-cautious; Conscientiousness, from efficient-organised to easygoing-careless. Extraversion, from outgoing-energetic to solitary-reserved; Agreeableness, from friendly-

compassionate to challenging-detached; and neuroticism, from sensitive-nervous to secure-confident. Participants respond to statements (e.g. “I see myself as someone who is talkative” and “I see myself as someone is helpful and unselfish with others”) on a Likert scale where 1=Strongly Disagree and 7=Strongly Agree.

2.2.2 IRI

The Interpersonal Reactivity Index is 28-item questionnaire that provides an overall measure of dispositional empathy. Participants responded to statements on 5-item Likert scales that ranged from Strongly Disagree through Neither Agree nor Disagree to Strongly Agree. There are four subscales: personal distress, empathic concern, fantasy and perspective-taking. Personal distress denotes feelings of discomfort that are not directed towards an external agent. Empathic concern describes ‘other-oriented’ feelings of sympathy and concern. Fantasy assesses the ability to transpose oneself into the feelings and action of fictitious characters. Perspective-taking assesses one’s capacity to spontaneously adopt the viewpoint of another person.

2.2.3 Emotional Resonance Index (ERI)

A novel 16-item empathy measure, piloted in a Chapter 3, was also used in this study. The ERI is intended to implicitly measure empathy along two subscales, hot-emotional and cold-cognitive empathy.

Hot-emotional empathy measures the propensity to experience vicarious emotions in response to another’s situation. This is considered to be the bodily-visceral facet of empathic responding, therefore individuals were queried about their emotional response to gore, harm to animals, affect sharing in tense or awkward social exchanges, or the likelihood of them experiencing emotional contagion. For example, “Even if I had the medical expertise, the thought of cutting into someone with a scalpel would still be horrifying to me”.

Cold or cognitive empathy measures the capacity for projection or perspective-taking and cognitive appraisal of another’s circumstances. These statements were geared towards analytic and meta-analytic understanding of social reality, which require theorizing and abstracting rather than direct processing of available perceptual information. Individuals were therefore asked to respond to statements that concern their convictions and determine their assessment of another’s circumstance, how this influences their decision making and behaviour, as well as the thoughts processes preceding and subsequent to complex social

interactions. For example, “I don’t expect other people to help with my problems, so other people shouldn’t expect me to help with theirs”.

2.3 Procedure

Pilot Study

To determine valence of responses (negative, neutral, positive), a pilot study was conducted. Participants read nine narratives and were asked to rate three possible explanations for the character’s behaviour (Appendix 5). For example, (1) “Anna is worried George still has feelings for her and doesn’t want to hurt him”, (2) “Craig lives far away so Anna is hoping she can still see George romantically” or (3) “Anna feels this could compromise the friendship”. Participants did not see the title of the narrative as it was expected that this would influence their interpretation.

They were given the instruction to “Rate each response on a Likert scale from 1, very negative, to 7, very positive.” The order of narrative presentation was randomised for each participant. The narratives depicted characters in a range of romantic, platonic and professional scenarios. For example, a character who has recently broken up with their partner, a character whose grandmother is preparing to undergo life-saving surgery, and a character who is trying to strengthen the connection of an existing friendship.

Main study

Participants read eight narratives, which were selected as possible responses significantly differed in emotional valence according to the results of the pilot study. The order of presentation was randomised. After reading each, they received the instruction to “Place these responses in ranked order from most to least appropriate.” Finally, they completed the Big 5 Inventory, the IRI and the ERI, as described above.

3. Results

3.1 Pilot study: Preliminary Valence Ratings

To ensure the responses to the narratives were perceived to differ significantly in valence, a pilot study was conducted. Participants read through each narrative and were then asked to rate each response on a scale from 1, Very Negative, to 7, Very Positive. In the following section, the title is given, followed by a description of each response and the corresponding descriptive statistics. The intended valence is supplied in parentheses after the response statement. Participants ratings were grouped and 1-3 responses were considered as negative and 4-6 responses as positive. Finally, t-tests were performed to assess difference in participants ratings between the 3 possible outcomes of each narrative.

3.2 Valence Differentiation

In all narratives, there were significant differences between the rating of positive and negative responses. For *Office Dating, Business Lunch, Breakup Sex* and *Bad Flirt,* there were significant differences in valence rating between all responses in the expected direction.

Office Dating

Emma is trying to provoke Kamal and make him feel inferior (Negative).
Emma expect Kamal and Frank will think she's joking (Neutral).
Emma doesn't want to lie to her friends but wants to assess their reaction before proceeding (Positive).

Ratings for the positive response were significantly higher than for the neutral response, ($t(77)=-6.41$, $p<.01$). Ratings to the negative response were significantly lower than for the positive response, ($t(77)=14.28$, $p<.01$) and ratings to the negative response were also significantly lower than for the neutral response, ($t(77)=10.67$, $p<.01$).

Business Lunch

Maria wants to shame Steve for ordering such an expensive meal (Negative).
Maria rushed and did not think clearly (Neutral).

Maria picked up on Steve's comment about sacrifice and wanted to make a good impression (Positive).

Ratings to the positive response were significantly higher than for the neutral response, ($t(76)=6.12$, $p<.01$). Ratings to the negative response were significantly lower than to the positive response, ($t(76)=12.09$, $p<.01$) and ratings to the negative response were also significantly lower than to the neutral response, ($t(76)=-9.07$, $p<.01$).

Breakup Sex

Alistair wants to sabotage her relationship with Pedro (Negative).

Alistair didn't plan to sleep with Felicity, it just happened organically (Neutral).

Alistair still cares about Felicity and wants to fix the relationship (Positive).

Ratings to the positive response were significantly higher than for the neutral response, $t(76)=2.74$, $p<.01$. Ratings to the negative responses were significantly lower than to the positive response, $t(76)=2.74$, $p<.01$, and ratings to the negative response were significantly lower than to the neutral response, $t(76)=3.93$, $p<.01$.

Bad Flirt

Mark was propositioning Rachel without much thought for her feelings (Negative).

When Rachel said her friends are out of town, Mark thought she was propositioning him (Neutral).

Mark really likes Rachel and thinks she likes him too (Positive).

Ratings to the positive response were significantly higher than to the neutral response, $t(76)=-3.09$, $p<.01$. Ratings to the negative response were significantly lower than to the positive response, $t(76)=-5.42$, $p<.01$, and ratings to the negative response were also significantly lower than to the neutral response, $t(76)=3.93$, $p<.01$.

However, for a number of narratives, the neutral responses did not significantly differ from the positive or negative responses.

In the cases of *Market Stall*, *Charity Work* and *Library Lecture*, the ratings for the negative response did not differ significantly from ratings to the neutral response, although they were rated in the expected direction.

Market Stall

Heather is concerned that Janet knows her initials (Negative).
Heather is embarrassed about receiving presents from people she doesn't know very well (Neutral).
Heather can see Janet doesn't have much money and feels the gift is too much (Positive).
Ratings were significantly higher for the positive response than the neutral response, $t(77)=2.43$, $p=.02$. Ratings for the negative response were significantly lower than for the positive response, ($t(77)=-3.51$, $p<.01$). However, ratings for the negative response were not significantly lower than the neutral response, ($t(77)=-1.82$, $p=.07$).

Charity Work

Brittany self-sabotages, ensuring she is too hungover and tired to go to work (Negative).
Brittany feels her manager is demanding too much but is afraid to refuse (Neutral).
Brittany didn't want to neglect her friend and accidentally overslept (Positive).

Ratings to the positive response were significantly higher for the neutral response, ($t(77)=-6.32$, $p<.01$). Ratings to the negative response were significantly lower than to the positive response, ($t(77)=-7.95$, $p<.01$). However, ratings to the negative response were not significantly lower than to the neutral response, ($t(77)=-1.65$, $p=.10$).

Library Lecture

Erica is just worried she will lose one of her only friends (Negative).
Erica feels her remark has made an impact on the presentation (Neutral).
Erica acknowledges that Sasha is anxious too and she was too harsh with her (Positive).
Ratings to the positive response were significantly higher than for the neutral response, $t(76)=5.99$, $p<.01$. Ratings to the negative response were significantly lower than for the positive response, $t(76)=7.38$, $p<.01$. However, ratings to the negative response were not significantly lower than for the neutral response, $t(76)=-.15$, $p=.89$.

In the cases of *New Boyfriend* and *Secret Move*, ratings to the positive response did not differ significantly from ratings for the neutral response, although they were rated in the expected direction.

New Boyfriend

Craig lives far away so Anna is hoping she can still see George romantically (Negative).
Anna thinks this will compromise the friendship (Neutral).
Anna is worried George still has feelings for her and doesn't want to hurt him (Positive).
Ratings were significantly lower for the negative than the positive response, ($t(77)=5.68$, $p<.01$). Ratings were also significantly lower for the negative than the neutral response, ($t(77)=-5.14$, $p<.01$). However, ratings of the positive response were not significantly higher than the neutral response, ($t(77)=-1.82$, $p=.07$.

Secret Move

Aisha is hoping that if Julie feels guilty, she will tell the truth (Negative).

Aisha wants to show Julie how much she'll be missing (Neutral).
Aisha worries that the friendship is falling apart and this is her attempt to fix it (Positive).
Ratings to the negative response were significantly lower than for the positive response, $t(77)=-5.24$, $p<.01$. Ratings to the negative response were also significantly lower than for the neutral response, $t(77)=-5.44$, $p<.01$. However, ratings to the positive response were not significantly higher than to the neutral response, $t(77)=-.64$, $p=.52$.

Of the 9 narratives, only *New Boyfriend* was omitted given that the mean difference between ratings of the positive and neutral response was marginal.

Table 11 shows the mean valence ratings for each scenario.

	Intended Valence		
	Negative	***Neutral***	***Positive***
Market Stall	*3.36 (1.39)*	*3.69 (1.43)*	*4.34 (1.72)*
New Boyfriend	*3.08 (1.77)*	*4.38 (1.41)*	*4.76 (1.42)*
Office Dating	*2.08 (1.14)*	*3.96 (1.28)*	*5.14 (1.17)*
Charity Work	*2.79 (1.34)*	*3.18 (1.46)*	*4.65 (1.56)*
Business Lunch	*2.41 (1.06)*	*3.75 (1.06)*	*4.94 (1.21)*
Library Lecture	*3.88 (1.42)*	*3.92 (1.65)*	*5.34 (1.21)*
Breakup Sex	*2.85 (1.71)*	*4.00 (1.41)*	*4.54 (1.51)*
Bad Flirt	*3.08 (1.64)*	*4.04 (1.56)*	*4.54 (1.51)*
Secret Move	*3.43 (1.45)*	*4.57 (1.45)*	*4.71 (1.47)*

Table 11. Descriptive statistics of mean valence ratings for each response, with standard deviation in parentheses.

3.3 Main Study

For the main study, we investigated valence preference and typicality of responses in participants, before looking at response patterns to individual narratives.

3.4 Influence of Empathy on Valence Preference

3.4.1 *Empathy & Overall Response Pattern*

To calculate valence preference scores for each participant, we considered the number of times participants chose negative, neutral or positive responses and a percentage of positive, negative and neutral choice preference was then calculated. As demonstrated in preliminary study, all responses were rated in the expected direction, so none were amended.

To determine if empathy associated with a preference for one valence over others, bivariate Spearman correlations were run between valence preference and ERI, and between valence preference and IRI.

Overall ERI scores were found to associate with a preference for positive responses ($r_s(86)=.30$, $p=.005$) and a reduction in neutral response choice ($r_s(86)=-.29$, $p=.006$). This effect was attributed to Hot Empathy which was found to predict a preference for positive responses (r_s $(86)=.33$, $p=.002$) and a reduction in neutral response choice (r_s $(86)=-.28$, $p=.009$).

Overall, the IRI nor its subscales predicted differences in valence preference. Complete regression analyses are reported in Table 12.

		Valence Preference		
		Negative	*Neutral*	*Positive*
	Overall	0.07	-0.18	0.13
	Fantasy	0.06	-0.03	0.01
IRI	*Empathic Concern*	0.01	-0.2	0.12
	Perspective Taking	0.03	0.01	-0.08
	Personal Distress	0.06	-0.1	0.12
	Overall	0.01	-0.29**	0.3**
ERI	*Hot Empathy*	-0.01	-0.28**	0.33**
	Cold Empathy	0.06	-0.19	0.13

Table 12. Spearman correlations of IRI and ERI (with subscales) against valence preference

3.4.2 Response Frequency

However, certain responses to the narratives were selected more frequently than others. Positive response selection outweighed negative and neutral for *Market Stall*, *Office Dating* and *Business Lunch*. While negative responses outweighed positive and neutral responses for *Library Lecture and Breakup Sex*. Frequency of first choice responses are shown in Figure 14.

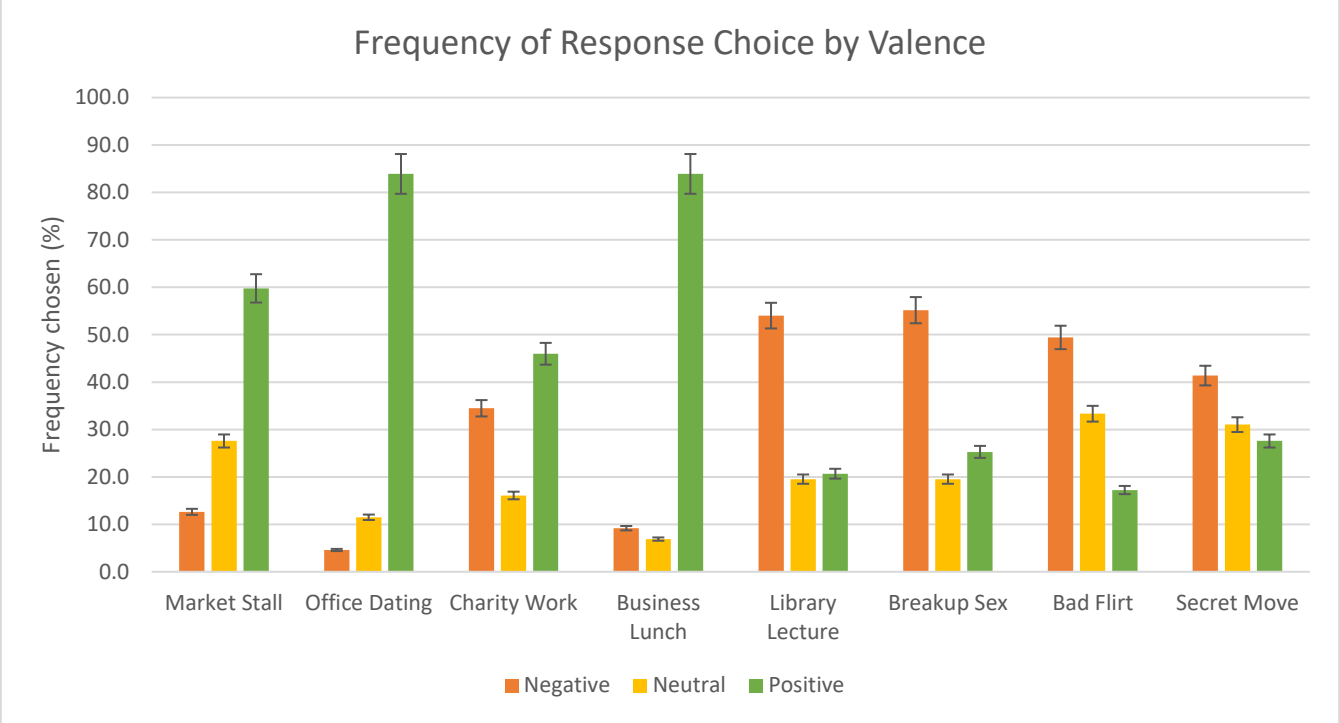

Figure 14. Frequency of first choice responses by valence, with standard error bars.

3.4.3 Empathy & Individual Response Patterns

Given that the content and themes of the narratives differed notably, we considered if response patterns differed for each narrative separately. An IRI median split was performed, as in previous chapters, separating participants into high (N=43, 16 males) and low (N=43, 4 males) groups.

For *Library Lecture*, the response pattern differed by IRI group (high, low): X^2 (2, N=*86*)=13.00, p<.01. A post hoc independent samples t-test revealed that high empathy individuals were significantly more likely to choose the positive response than low empathy

individuals, $t(84)=3.31$, $p<.01$. Whereas low empathy individuals were significantly more likely to choose the neutral response than high empathy individuals, $t(84)=-2.06$, $p=.04$.

For *Breakup Sex*, the response pattern differed by IRI group (high, low): X^2 (2, $N=86$)=7.18, $p=.03$. Post hoc analysis revealed that high empathy individuals were more likely to choose the positive response than low empathy individuals, $t(84)=-2.76$, $p<.01$.

There were no other significant differences in response choice by IRI group.

Similarly, an ERI median split was performed, separating participants into high (N=43, 2 males) and low (N=43, 18 males) groups. The same analysis was then conducted.

For *Office Dating*, the response pattern differed by empathy (ERI) group (high, low): X^2 (2, $N=86$)=6.49, $p=.04$. High empathy individuals were significantly more likely to choose the positive response than low empathy individuals, $t(84)=2.62$, $p=.01$.

For *Library Lecture*, the response pattern differed by empathy (ERI) group (high, low): X^2 (2, $N=86$)=6.93, $p=.03$. High empathy individuals were significantly more likely to choose the positive response than low empathy individuals, $t(84)=2.63$, $p=.01$.

There were no other significant differences in response choice by ERI group.

3.4.4 The Influence of Empathy on Typicality Score

As seen above, certain responses were notably more popular than others. We therefore wanted to investigate if high empathy was associated with an increased or decreased preference for typical responses.

To calculate a typicality score, we considered the most common response for each narrative, and each participant was assigned a score of 1 for that narrative if they picked the typical response and 0 if not. A percentage of typical responses out of total response was then calculated.

Overall ERI scores demonstrated a significant positive correlation with typicality scores ($r_s(86)=.26$, $p=.017$). Of the subscales, hot empathy was found to predict typical response choice (r_s (86)=.30, $p=.005$).

Overall, neither the IRI nor its subscales predicted differences in the selection of typical responses. Due to the heterogeneity in narrative ratings, we performed an analysis of individual narratives, similar to our analyses of valence responses above. We performed an IRI median split and again looked at individual narratives.

Independent samples t-tests revealed that in the case of *Library Lecture*, high empathy individuals ($\bar{x}$=.12, SD=.32, where a score closer to 1.0 represents more typical choices) were less likely to choose the typical response (negative) than low empathy individuals ($\bar{x}$=.40, SD=.49), $t(84)=3.09$, $p<.01$.

For *Breakup Sex*, high empathy individuals ($\bar{x}$=.70, SD=.46) were more likely to choose the typical response (negative) than low empathy individuals ($\bar{x}$=.42, SD=.50), $t(84)=-2.68$, $p<.01$.

The same analysis was performed with an ERI median split. This revealed that, for *Office Dating*, high empathy individuals ($\bar{x}$=.93, SD=.26) were more likely to choose the typical response (positive) than low empathy individuals ($\bar{x}$=.74, SD=.44), $t(84)=-1.30$, $p=.02$.

For *Library Lecture*, high empathy individuals ($\bar{x}$=.16, SD=.37) were less likely to choose the typical response (negative) than low empathy individuals ($\bar{x}$=.35, SD=.48), $t(84)=2.00$, $p=.05$.

3.4.5 Influence of Big 5 Personality Traits on Individual Response Selection

A series of bivariate Spearman correlations did not significantly predict typicality score or an overall valence preference. The strongest correlation observed was between conscientiousness and a preference for neutral responses, $r_s(86)=.19$, $p=.07$. Complete regression analyses are reported in Table 13.

		Valence Preference			***Typicality Score***
		Negative	*Neutral*	*Positive*	*Overall*
Big 5 Traits	*Extraversion*	-0.2	0.13	-0.03	0.01
	Agreeableness	-0.01	-0.05	-0.02	0.13
	Conscientiousness	-0.04	-0.2	0.21	0.14
	Neuroticism	0.09	-0.14	0.11	0.13
	Openness	-0.1	0.09	-0.07	-0.01

Table 13. Spearman correlation of Big 5 Traits against Valence Preference and Typicality

To investigate the relation between response choices and Big 5 personality traits, it was problematic to average across narratives given the considerable thematic differences, we therefore decided to narrow our focus and look at response patterns to individuals narratives. A median split was performed for each personality trait, separated into high and low groups.

For *Secret Move*, the response pattern differed by extraversion group (high, N=43, 12 males; low, N=43, 8 males): X^2 (2, *N=86*)=9.54, *p*<.01. Low extraversion individuals were significantly more likely to choose the negative response than high extraversion individuals, *t*(84)=-3.02, *p*<.01. High extraversion individuals were significantly more likely to choose the neutral response than low extraversion individuals, *t*(84)=2.20, *p*=.03.

For *Charity Work*, the response pattern differed by agreeableness group (high, N=43, 7 males; low, N=43, 13 males): X^2 (2, *N=86*)=6.67, *p*=.03. High agreeableness individuals were significantly more likely to choose the negative response than low agreeableness individuals, *t*(84)=2.46, *p*=.02. Low agreeableness individuals were significantly more likely to choose the positive response than high agreeableness individuals, *t*(84)=-2.81, *p*<.01.

For *Office Dating*, the response pattern differed by openness group (high, N=43, 11 males; low, N=43, 9 males): X^2 (2, *N=86*)=7.29, *p*=.04. Low openness individuals were significantly more likely to choose the neutral response than high openness individuals, *t*(84)=-2.21, *p*=.03.

3.4.6 Correlations between Big 5 Personality Traits and the IRI

Our hypotheses about the relationship between personality traits and empathy as measured by the IRI were that neuroticism would associate with personal distress, agreeableness with empathic concern, and conscientiousness with perspective taking (see also introduction).

We found that extraversion demonstrated a positive correlation with empathic concern (r_s=.33, *p*=.002, *N*=87) and a negative correlation with personal distress (r_s=-.29, *p*=.006, *N*=87).

Agreeableness demonstrated a strong positive correlation with overall IRI score (r_s=.33, *p*=.002, *N*=87) and empathic concern (r_s=.44, *p*=.000, *N*=87).

Conscientiousness was associated with empathic concern (r_s=.35, p=.001, N=87).

Neuroticism demonstrated a negative correlation with perspective taking (r_s=-.29, p=.007, N=87) and a strong positive correlation with personal distress (r_s=.56, p=.000, N=87).

Finally, openness demonstrated a negative correlation with personal distress (r_s=-.23, p=.034, N=87).

Intercorrelations between IRI and Big 5 personality traits are reported in Table 14.

	IRI	***Fantasy***	***Empathic Concern***	***Perspective Taking***	***Personal Distress***
Extraversion	-0.03	-0.07	0.29**	0.12	-0.34**
Agreeableness	0.29**	-0.08	0.43**	0.28	-0.04
Conscientiousness	0.16	0.04	0.32	0.09	-0.13
Neuroticism	0.06	0.02	-0.09	-0.25*	0.53**
Openness	0.17	0.19	0.16	0.18	-0.23*

* correlation is significant at the 0.05 level (2-tailed)

** correlation is significant at the 0.01 level (2-tailed)

Table 14. Intercorrelations between IRI and Big 5 Personality Measure

3.4.7 Correlations between Big 5 Personality Traits and the ERI

Of the ERI subscales, we expected that agreeableness would associate with overall empathy score, neuroticism with hot empathy and conscientiousness with cold empathy.

Overall ERI score demonstrated positive correlations with conscientiousness (r_s=.23, p=.035, N=87) and neuroticism (r_s=.36, p=.001, N=87).

The hot empathy subscale correlated with agreeableness (r_s=.22, p=.038, N=87) and conscientiousness (r_s=.30, p=.004, N=87), while the cold empathy subscale correlated with neuroticism (r_s=.44, p=.000, N=87).

These intercorrelations are reported in Table 15.

	ERI	***Hot***	***Cold***
Extraversion	-0.1	-0.16	-0.03
Agreeableness	0.16	0.22*	0.04
Conscientiousness	0.23*	0.30**	0.08
Neuroticism	0.36**	0.19	0.44**
Openness	-0.06	-0.11	0.04

* correlation is significant at the 0.05 level (2-tailed)

** correlation is significant at the 0.01 level (2-tailed)

Table 15. Intercorrelations between ERI and Big 5 Personality Measure

3.4.8 Correlations between the ERI and IRI

In line with our previous study (Chapter 3), we expected that hot empathy would correlate with personal distress and empathic concern while cold empathy would correlate with fantasy and perspective taking.

Overall IRI score correlated with overall ERI score (r_s=.47, p=.000, N=87), hot empathy (r_s=.42, p=.000, N=87) and cold empathy (r_s=.39, p=.000, N=87).

Overall ERI score correlated with Fantasy (r_s=.33, p=.002, N=87), empathic concern (r_s=.52, p=.000, N=87) and personal distress (r_s=.29, p=.007, N=87).

The hot empathy subscale correlated with fantasy (r_s=.31, p=.003, N=87), empathic concern (r_s=.47, p=.000, N=87) and personal distress (r_s=.26, p=.017, N=87).

The cold empathy subscale correlated with fantasy (r_s=.27, p=.011, N=87) and empathic concern (r_s=.42, p=.000, N=87).

These correlations are reported in Table 16.

	ERI	***Hot***	***Cold***
IRI	0.47**	0.42**	0.39**
Fantasy	0.33**	0.31**	0.27*
Empathic Concern	0.52**	0.47**	0.42**
Perspective Taking	-0.05	-0.12	0.04
Personal Distress	0.29**	0.26*	0.21

* correlation is significant at the 0.05 level (2-tailed)

** correlation is significant at the 0.01 level (2-tailed)

Table 16. Intercorrelations between ERI and IRI

4. Discussion

In this study, we introduced a novel narrative paradigm. Participants were asked to select a response to explain the motivation behind the characters' actions. Emotional valence, of each response had previously been rated in a pilot study. Participants then completed a battery of empathy and personality measures. We considered if these traits and abilities influenced ToM style, specifically if they associated with a preference for responses of a particular valence, or a preference for the most typical responses. First we looked at the overall response patterns before narrowing in and looking at individual narrative. Broadly speaking, we found that high empathy individuals were more likely to select positive responses and less likely to select neutral or atypical responses. Hot empathy was observed to be driving this selection preference. Big 5 traits associated with response preference in select cases, which will be discussed in turn.

Based on the idea that we expect individuals will feel and respond to circumstances as we would, we expected to find some uniformity of interpretation such that certain responses would be appear more viable than others (Hypothesis ix), which turned out to be the case. It is not surprising that high empathy individuals often favoured these typical responses, the majority of which were positive. Empathy, after all, is associated with prosocial intent and a desire for others to do well (Bloom, 2017), and in the present research has been contrasted with antisocial traits such as those described by the Dark Triad.

These findings indicate that high empathy individuals are more inclined to believe that characters are motivated by positive intent. Importantly, this effect was driven by the embodied, or hot, rather than the cognitive, or cold, aspect of empathy. This is in line with previous research which suggests that such emotional resonance is what motivates prosocial behaviour. Psychopathic individuals, for example, are found to exhibit affective but not cognitive empathy deficits (Jonason & Krause, 2013; Lishner *et al.*, 2015). In short, a willingness to help others requires both a cognitive appraisal of their situation and a corresponding emotional reaction to it. So, for example, in the case of the narrative *Breakup Sex*, high empathy individuals may have consistently chosen the positive response because they sympathise with the character and therefore *are inclined to believe* they are not acting out of malice. It seems natural that if you have compassionate feelings towards others, you are more likely to appraise them in a favourable light. This is a promising avenue for future

research and a replication study which also administered measures of antisocial traits such as the Dark Triad would be beneficial.

While the ERI did associate with an overarching trend for positive responses, the IRI did not, contrary to our primary hypothesis. Instead, we observed that the positivity bias was only observed in response to particular narratives, implying such interpretations are context-dependent and may be heavily influenced by certain factors. This follows from research which suggests that empathic responses are more pronounced depending on the relationship between the observer and target (Tarrant, Dazeley & Cottom, 2009), perceived fairness (Singer *et al*., 2006) and environmental determinants (Kuypers, 2018). We observed that high and low empathy individuals were more divided on narratives depicting romantic or sexual complications (*Office Dating*, *Library Lecture, Breakup Sex)* than narratives dealing with professional or platonic relations. These findings demonstrate that such circumstance may elicit a stronger empathic ToM engagement, hinting at an evolutionary motivation for such behaviour. In addition, this may be because such depictions are more relatable or self-relevant, or because it is easier to sympathise with characters in these circumstances. Lastly, empathic individuals may simply be less invested in narratives that depict professional or other types of encounter, such as in the case of *Business Lunch* or *Charity Work* where the emotionally involvement of characters' is perceived to be diminished.

Crucially, in the case of *Library Lecture*, high empathy individuals (as measured both with the IRI and ERI) typically selected the positive response even though it ran contrary to the typical response choice, which was overwhelmingly negative. In this particular context, then, the observed positivity bias persisted even in opposition to the general consensus and may therefore indicate a broader dispositional tendency to distort the intentions of others in a positive light. This may be contrasted with the theory of depressive realism (Alloy & Abramson, 1979; for review, see Moore & Fresco, 2012), which takes the position that depressed individuals make more accurate real-world predictions because their perception is shaped less by what Beck (1979) called 'the illusion of control'. Although the content here is of a decidedly subjective nature, we venture to say that empathic individuals may distort social information because they are inclined to believe people are motivated by kindness, what might be termed the 'illusion of goodness'. There are important implications here for evolutionary psychology, since falsely attributing positive intent to others may place one in danger, and it may therefore be valuable to consider if such biases extent to outgroup or

members of culturally distinct groups. Conversely, researchers have identified the evolutionary benefits of Dark Triad traits in terms of facilitating successful mating strategies (Jonason & Webster, 2009) and furnishing competitive advantages (Stellwagen & Kerig, 2013; Vaughan & Madigan, 2020).

In our previous studies, we also observed a bias towards positive information, suggesting this is due either to an attention strategy that facilitates helping behaviours or an aversion to negative stimuli due to an excess of Personal Distress, which is typically regarded as a hindrance to prosocial responding (Grynberg & López-Pérez, 2018). We propose therefore that this positivity bias is reinforced due to the well-feeling it elicits, and so over time high empathy individuals become increasingly likely to attribute positive intent to others. Keen (2006) has highlighted the role of narrative and narrativisation in this process, providing a means to project oneself into the place of others and understand the world through their eyes. She suggests that reading fiction can cultivate a willingness and capacity to engage emotionally with others, but this is not to say that such empathic responding is balanced or accurate.

The Big 5 traits appeared to exert a lesser impact on response selection. However, limitations of this new paradigm, which are outlined below, must also be taken into account. To understand why individuals exhibiting high agreeableness might have demonstrated a preference for negative responses in particular cases, it is necessary to consider the content of these narratives. In *Charity Work*, the character agrees to take on another day of work and then subsequently stays out late drinking with a friend and fails to show up. Since a commitment was made, this may be perceived as a violation of a social contract, and consistent with this interpretation, the negative response may appear to have the most explanatory power. On the other hand, individuals exhibiting low extraversion were more likely to choose the positive response, by which the character stayed out late to appease her friend and then accidentally overslept. For individuals that are less outgoing and who are less assertive about their own desires and thoughts, this may be a relatable circumstance. Additionally, they may be more inclined to believe extraverted people would behave in this way.

In *Breakup Sex*, agreeableness was associated with a belief that the character intended to sabotage his ex-girlfriend's new relationship by seducing her. As this trait is linked to

friendliness and feelings of warmth and compassion, the character's reluctance to move on may be regarded as selfish so his actions take on a callous tone. Conversely, individuals exhibiting low extraversion—that is, who are more withdrawn and less socially involved—were more likely to choose the neutral response, suggesting he was motivated by lingering romantic feelings. So these differing response patterns appear to reflect different appraisals of romantic engagement based on what is perceived to be right and justifiable. Again, those that are generally more compassionate find this behaviour to be pernicious or spiteful and those that are more inwardly focused are inclined towards sympathy. These limited findings therefore suggest that personality traits influence how we attribute meaning to the behaviour of others. However, this nascent paradigm requires additional work to ensure that the response choice is more balanced.

Taken together, these findings indicate that empathy exerts a stronger influence on ToM style than certain personality traits. This is not surprising given that empathy is both an exclusively social phenomenon and overlaps conceptually and neurological with ToM abilities. We would therefore expect that a sensitivity to the emotional states of others will impact the interpretation of behaviour more than, say, conscientiousness, which pertains to how we conduct ourselves in relation to tasks and responsibilities.

Strong correlations were found between empathy and certain personality traits. Extraversion was associated with heightened empathic concern. Extraversion and openness predicted diminished personal distress. Agreeableness correlated with overall empathy score (as measured by the IRI) and empathic concern. Neuroticism predicted a tendency towards personal distress and diminished perspective taking. Correlations between IRI subscales and Big 5 personality traits follow a very similar trend to those in the study by Song & Shi (2017). Most importantly, we found that neuroticism correlated strongly with personal distress and agreeableness with empathic concern. This is not surprisingly given that personal distress describes experiences of intense negative affect when observing others and must be downregulated to allow for prosocial behaviour (Kim & Han, 2018), while neuroticism is characterised by an inability to effectively manage and regulate one's emotional responses . Similarly, agreeableness describes proclivities towards friendliness and compassion for others and empathic concern is most closely related to compassion, being described as feelings of warmth and tenderness for others.

There were significant correlations between the novel ERI and established IRI subscales. Hot empathy was associated with empathic concern and personal distress, both of which are intended to measure embodied emotional responses, but also with fantasy, which requires explicit appraisal of character's circumstance and therefore is more closely related to cognitive empathy. Cold empathy associated with fantasy, empathic concern and, to a lesser extent, personal distress. While we have argued that empathic concern and personal distress both evoke emotional states that motivate the observer towards cognitive appraisal, we nonetheless intended more dissociation between these categories. Furthermore, cold empathy did not associate with perspective-taking as expected. These findings suggest that the scale is overly sensitive to the embodied aspects of empathy, particularly personal distress, at the expense of measuring the cognitive facet in a balanced way. By extension, it may also be biased towards the more negative and inhibitory side of empathy, therefore giving a more reliable measure of visceral emotional responsivity and not relaying an accurate portrayal of an individual's capacity for episodic simulation. These issues will need to be addressed in the next version.

Still, the ERI predicted broader outcomes in this experiment than the IRI. Most notably, high ERI scores were associated with a preference for positive responses. This was unsurprising and fits with our hypothesis that personal distress presents a barrier to cold empathy and thus leads to a bias for positive information that does not elicit negative affect. This therefore stands as further evidence that the scale is too sensitive to personal distress and neurotic tendencies. Were it more balanced, we would expect this effect to fall below significance.

This paradigm would undoubtedly benefit if a greater disparity between response valence was reported and these responses were considered more equally viable. The lack of differentiation was useful for identifying which factors predict violations from the typical response pattern, but were a hindrance to the analysis of valence preference. Nonetheless the paradigm demonstrated promise and, if refined, could provide a useful tool for recognising what factors contribute to differences in ToM style and addressing the avenues for research identified in the preceding.

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APPENDIX 5

STUDY 4 VIGNETTES

NEW BOYFRIEND

George has been friends with Anna since the first day of university. They had a brief and intense relationship, but this ended because George decided they would be better as friends. Anna agreed, although she was quite upset about it. This seemingly did not harm their friendship because they still spent nearly every day together. George talked about dating other people, but Anna noticed he never acted on it. When Anna went home for the holidays, she met another boy, Craig. They decided to start a long-distance relationship. When Anna returned to university, she did not tell George about Craig.

Why?

> *Craig lives far away so Anna is hoping she can still see George romantically* (Negative).
> *Anna thinks this will compromise the friendship* (Neutral).
> *Anna is worried George still has feelings for her and doesn't want to hurt him* (Positive).

OFFICE FRANK

Emma, Kamal and Takeshi all work in the same office and once or twice a week meet in the local pub after work to have a few beers. Emma has been dating a colleague named Frank. She has told Takeshi but not Kamal because she knows that he doesn't like Frank. Partway through the evening they get to talking about relationships and Kamal, who is good at reading people, notices that Emma is being sheepish. He asks her if she has been dating anyone. She responds by saying, "I've just been daydreaming about Frank is all, what a man!"

Why does she say this?

Emma is trying to provoke Kamal and make him feel inferior (Negative).
Emma expect Kamal and Frank will think she's joking (Neutral).
Emma doesn't want to lie to her friends but wants to assess their reaction before proceeding (Positive).

CHARITY WORK

Brittany has been working for a charity in Thailand for almost a year. She loves being immersed in a foreign culture and learning the language but finds herself getting homesick whenever she isn't distracted. She is torn because she needs this experience to further her career but also must admit to herself that she might not be able to cope with being so far from home.

Her manager asks if she would be willing to visit a neighbouring village and teach the children basic English language skills later that week. She agrees but the night before she is due to teach her friend from home is visiting. They go to the local bar and get drunk and the next morning Brittany sleeps late, missing her class.

Why did she go out the night before?

Brittany self-sabotages, ensuring she is too hungover and tired to go to work (Negative).
Brittany feels her manager is demanding too much but is afraid to refuse (Neutral).
Brittany didn't want to neglect her friend and accidentally overslept (Positive).

BUSINESS LUNCH

John and Maria are from Company X while Valentina and Steve are from Company Y. They are all at a business lunch. They are discussing a future merger of the two businesses. Company Y has been more successful than Company X in recent years.

Before discussing business, they agree to split the bill evenly. John has a starter and a cheap main. Maria has a cheap main. Valentina has a starter and an expensive main. Steve has a starter, an expensive main and dessert. During the meal, Steve makes an offhand comment about how partnerships are often about sacrifice, everyone nods agreement. The meeting goes well. They ask the waiter for the bill. Maria takes out her wallet and pays for everyone before anyone else has a chance. John shoots her a disapproving look.

Why does Maria pay?

> *Maria wants to shame Steve for ordering such an expensive meal* (Negative).
> *Maria rushed and did not think clearly* (Neutral).
> *Maria picked up on Steve's comment about sacrifice and wanted to make a good impression* (Positive).

LIBRARY LECTURE

Erica has worked at the local library for the past two years. She has always been somewhat anxious around people and tends to keep to herself. Once a week, however, she meets an old friend from school, Sasha, and they have lunch. Erica finds Sasha quite annoying because she talks about herself nonstop and never listens. One day, Erica gets agitated and she snaps at Sasha: It wouldn't hurt for you to shut up and let other people talk sometimes. Sasha mumbles that she is sorry and walks away. The next day Sasha comes to the library to lecture some students. When Sasha begins, Erica notices that she is shaking and cannot stand still, but nonetheless she speaks clearly and with an air of confidence. Erica decides to apologise.

Why?

> *Erica is just worried she will lose one of her only friends* (Negative).

Erica feels her remark has made an impact on the presentation (Neutral).
Erica acknowledges that Sasha is anxious too and she was too harsh with her (Positive).

BREAKUP SEX

Alistair lives in a house with two other people. One is his girlfriend, Felicity, and the other is a friend from university, Pedro. They had been living together for three years. Pedro and Alistair had once been very close but more recently they had been arguing about trivial matters and finding it tense being in close proximity to one another. Alistair was unsure as to the reason behind these difficulties.

Alistair broke up with Felicity. She moved out of the house but still spends time there as she was friends with all the occupants. Alistair noticed that Pedro and Felicity were getting closer and spending more time together. When Pedro went away for the Christmas holidays, Alistair met up with Felicity and they slept together.

Why does Alistair sleep with Felicity?

Alistair wants to sabotage her relationship with Pedro (Negative).
Alistair didn't plan to sleep with Felicity, it just happened organically (Neutral).
Alistair still cares about Felicity and wants to fix the relationship (Positive).

BAD FLIRT

Rachel works at an insurance company. She is popular amongst her colleagues and known to be an entertaining presence. At office parties she always gets a bit drunk and gives a speech that makes everyone laugh. One day she is chatting with a new employee called Mark in the staff room. They are about the same age and, from their limited interactions, Rachel thinks they get along well. They talk about the shortcomings of management and what they will do over the weekend. Rachel says she is likely to be bored because most of her friends are out of

town. Mark leans in close and says, “Why don’t you come over to my place? I’m sure I could find some ways of keeping you busy,” and laughs. She glares at him and promptly leaves the room.

Why did Mark proposition Rachel in this way?

> *Mark was propositioning Rachel without much thought for her feelings* (Negative).
> *When Rachel said her friends are out of town, Mark thought she was propositioning him* (Neutral).
> *Mark really likes Rachel and thinks she likes him too* (Positive).

SECRET MOVE

Aisha and Julie have been close friends since childhood. They rented an apartment in London and started an online business together, which provided language learning webinars to students across the world. One day, Julie left her computer on with the browser open and Aisha sees that she has applied to start a course in computer science at Aberdeen. Julie has never mentioned this to Aisha, so she finds the news very upsetting. Over the next few days, Aisha goes out of her way to spoil Julie. She cooks her a fancy meal and makes fresh lemonade. She cleans the apartment and does all the laundry.

Why does Aisha go out of her way to do these things for Julie?

> *Aisha is hoping that if Julie feels guilty, she will tell the truth* (Negative).
> *Aisha wants to show Julie how much she’ll be missing* (Neutral).
> *Aisha worries that the friendship is falling apart and this is her attempt to fix it* (Positive).

Chapter 5

Synthesis of Findings & Discussion

Table of Contents

1. Research Goals & Rationale

"The universe is made of stories, not of atoms"
—Muriel Rukeyser (1968)

The primary goal of this research was to improve our understanding of how empathy is supported by other cognitive faculties, specifically episodic memory. A working model was put forward in Chapter 1 that attempted to describe the array of processes considered fundamental to empathy and to demonstrate how they emerge from an interaction of cognitive faculties, such as Theory of Mind, to achieve social goals. Empathy was assigned a broad definition and we adopted a functional approach that emphasized domain-specific processes, discussing the potential contributions of both simulation and a theory—theory. Through this, we established the putative connection between perspective taking and episodic memory.

Research indicates that episodic memory, in addition to allowing the reconstruction of past events, also provides a platform for prospective or imaginative cognition (Irish *et al.*, 2012; Abraham & Bubic, 2015; Schacter, Benoit & Szpunar, 2017). Since higher-order forms of empathy such as perspective taking require one to represent the thoughts and feelings of others, to imagine oneself in their place, it follows that these abilities also depend on this common neural substrate, and research has tended to support this view (Gaesser, 2013; Ciaramelli, Bernardi, & Moscovitch, 2013). We expected that, if higher empathy does rely on faculties of imagination, this would be reflected in the encoding and retrieval strategies of high empathy individuals. We proposed that high empathy individuals would be more emotionally responsive than low empathy individuals and this would cause them to attend to information pertaining to the emotional states of characters, leading to enhanced recall of such details. We further argued that this encoding and retrieval strategy would ensure such information can be deployed to the needs of perspective-taking.

There is considerable debate in the literature as to whether such empathic abilities require low- or high-level simulation or an abstract theory—theory of other kinds. However, as researchers have pointed out, such clear-cut conceptual frameworks are not necessarily useful or valid, and it is likely that both have some role to play depending on contextual factors and the associated cognitive demands (Mitchell, 2005). We considered that this is not an either-or

situation, and both simulation and higher-level theorising are employed at different stages of the empathic process. Finally, we questioned whether these processes are stacked, meaning higher-order empathic processes rely on bottom-up processes such a neural state-matching, or are dynamic and deployed in accordance with situational demands.

2. Summary of Studies and Main Findings

To investigate these research questions, four studies were conducted. The first two developed and adapted a novel text-based paradigm in order to identify any differences in the encoding-retrieval strategies of low and high empathy individuals. Study 3 adapted this paradigm into video monologues and introduced a novel empathy measure, the Emotional Resonance Index (ERI). Study 4 introduced a second paradigm that presented participants with written scenarios to investigate how empathy may relate to theory of mind based inferences.

2.1 Study 1

Study 1 utilised 15 narratives that depicted individuals in a variety of social interactions. There were three valences, which described either a negative, neutral or positive outcome for the character. Each narrative contained 3 emotional and 8 nonemotional details for recall.

We found that, at encoding, high empathy individuals were more emotionally impacted by the content of narratives, specifically those with neutral and positive valence. At retrieval, they consistently remembered more emotional details and less nonemotional details than low empathy individuals, especially from narratives with positive valence.

2.2 Study 2

Finding the narratives to be too brief and the disparity between emotional and nonemotional details to be a limitation, Study 2 refined this paradigm. In this case, 6 longer narratives, 2 of each valence, were presented. Nonemotional details were organically embedded in the development of the scenario, rather than being simply given.

Once again, we found that high empathy individuals were more emotionally impacted at encoding, specifically in response to narratives with neutral and negative valence. They also remembered significantly more emotional details at retrieval. We also found further evidence of a bias towards the retention of positive information, possibly regulated by the participants' own emotional state.

2.3 Study 3

Study 3 adapted the paradigm from Study 2 into video monologues. These were read by semi-professional actors in either a flat or congruent emotional tone. This was intended to investigate the role played by physiological cues and motor mimicry in the encoding and retrieval strategy outlined above.

Here we observed that high empathy participants no longer remembered more emotional details but instead remembered less non-emotional details. All participants demonstrated a stronger emotional reaction to narratives presented in congruent emotional tone, but high empathy individuals reported experiencing stronger emotionality than low empathy individuals.

As part of this study, a novel empathy measure was also piloted, the Emotional Resonance Index (ERI). Rather than relying on explicit self-report, statements were intended to measure empathy implicitly by asking individuals about their convictions, their perceptions of fairness and cooperation, and how they would feel in certain situations. The ERI decomposes into two subscales, hot and cold empathy. In line with our working model, these are taken to be the broadest categorisations of empathic processes. As expected, hot empathy correlated with personal distress, fantasy, and empathic concern. Cold empathy was found to associate with perspective taking, fantasy and empathic concern.

2.4 Study 4

Study 4 was exploratory and was designed to identify how types of empathy and the Big 5 personality traits influence Theory of Mind-based inferences. To do this, a second text-based paradigm was developed. Participants read short vignettes and were asked to rank order response from most to least viable. These responses were intended to be either negative, neutral or positive in valence (as determined by another sample of participants in a pilot study).

Overall, we found that hot empathy predicted a preference for typical responses and responses of positive emotional valence. For certain vignettes, response choices varied with empathy scores and personality traits . In line with previous research (Song & Shi, 2017), agreeableness correlated with overall empathy score and personal distress with neuroticism.

As in Study 3, Hot empathy correlated with personal distress, fantasy, and empathic concern. Cold empathy was found to associate with fantasy and empathic concern but not perspective-taking.

3. Theoretical Implications of the Present Studies

3.1 Cognitive-Behavioural Model of Empathy

Our starting point was a working model of empathy that we put forward, drawing on theory that considers the relative contributions of simulation and theory—theory to empathic processes (Decety & Jackson, 2004; Gallagher, 2012; Decety, 2015), and de Waal's phylogenetic 'Russian Doll' theory (2007). This model positioned empathy as a supervenient category that includes discrete but interdependent processes, which can be broadly divided in hot-affective and cold-cognitive (Blair, 2005; Shamay-Tsoory, 2010; Barnett & Mann, 2013). We argued that state-matching at the neural level can explain hot empathy processes, which were identified as automatic, bottom-up and predominantly physiological, including motor mimicry, emotional contagion and personal distress. We then argued that it was necessary to invoke a theory—theory, possibly in conjunction with the use of narrativisation, to explain cold empathy processes, which were identified as effortful conscious appraisals of another's mental state based on the available perceptual information. These include perspective-taking, mental projection and complex emotional responses such as sympathy and *schadenfreude*.

3.2 Understanding the Relationship between Empathy & Emotional Recall

We observed that high empathy individuals are both more emotionally impacted and demonstrated heightened retention of emotional details *from written narratives*. Episodic memory is thought to also provide a platform for simulatory or prospective cognition by allowing for the novel recombination of memory objects (Addis *et al*., 2007; Schacter *et al*., 2008), so we argued for a putative relationship between this faculty and cold empathy processes. Our studies provided further evidence that resonating with another's emotional circumstance led to deeper encoding and retention of details concerning their emotional state. We considered that this attention-retention strategy may be the mechanism which supports the development of a theory—theory over time. In the following section, we will discuss these findings alongside the aforementioned theories of empathy.

Our results indicated that the observed recall of emotional details was driven initially by faculties of attention. It appeared that emotional details were more salient to high empathy individuals because they elicited a stronger emotional response while first exposed to the narratives. However, this appeared to be the case in particular when narratives elicited positive affect, suggesting that the personal distress felt in response to narratives with negative valence may present a barrier to cold empathy.

The adaptation of our narrative paradigm in Study 3 can shed further light on the observed memory effect. In this study, we no longer observed the seemingly robust finding (observed in our first two studies) that high empathy individuals remembered more emotional details. Instead high empathy individuals remembered significantly less non-emotional details. This, we propose, suggests that high empathy individuals are more capable and willing to engage in scene construction when reading a narrative. This vivid imagining, in line with research by Vollberg, Gaesser & Cikara (2019), leads to enhanced empathic engagement and deeper encoding. This is revealing because in this experiment, the same demands as in our first studies were not made of individuals. They did not need to effortfully construct a written narrative, instead they listened as it was related to them by another person. We believe this may have led to lesser engagement with the content overall. This calls into question how empathic abilities are engaged in different situations. As a result, we argued that engagement with narrative fiction may play a crucial role in the cultivation of empathic abilities, allowing individuals to hone their narrativisation skills and providing them with the tools to readily construct another's circumstances in real-world situations. A number of theorists have recognised the importance of narrative structure in the empathic process (Kenn, 2006; Moore & Hallenbeck, 2010; Gallagher, 2012) arguing that it is only through these stories that we can break through the opaqueness of other minds to gain explicit understanding. Without this kind of narrativisation, humans are reduced to the present and what immediately impresses itself upon the senses.

There is compelling evidence that both reading fiction (Mar, Oatley & Peterson, 2009) and encouraging individuals to vividly imagine a scenario (Gaesser, 2013) can enhance empathy and a willingness to engage in prosocial behaviour. There is also evidence that this is a reciprocal process, with a recent study finding that teaching empathy to schoolchildren increases their creative output, at least in terms of Design & Technology (Demetriou & Nicholl, 2021). In line with these studies, our findings suggest that high empathy individuals are more adept at empathically responding to texts and therefore that over time this aptitude

may enhance empathy. Whether this is an innate capacity or something that is learnt through frequent engagement with narrative fiction remains a contentious issue but there is mounting evidence of the plasticity of empathy throughout adulthood (Goldstein & Winner, 2012; Bal & Veltcamp, 2013). Demetriou & Nicholl's (2021) additional finding that affective and cognitive empathy scores in pupils in the control group steadily decreased over time suggests that more than simply enhancing empathy, regular practice is required to maintain empathy. We propose that this is a product of effortful cognition, which is to say that individuals engage more with the emotional state of characters when the medium encourages scene construction. When the scene is dictated to them and they are instead a passive recipient of information, as in Study 3, this effect is eliminated and instead we observe diminished recall of non-emotional details, suggesting less engagement overall. What seems clear is that empathy depends upon this kind of episodic simulation to access the mental state of another, gesturing towards high-level simulationist accounts (Zahavi, 2008) or what Goldman (2006) termed "'simulation-plus-projection' and finding support for the notion of a theory—theory.

It is also important to consider the cognitive demands made by written narratives. While reading, the individual is permitted to imagine and rehearse the content at their own pace. It is a constructive process that, crucially, invites the reader to project themselves into the place of the character, who is recognised as fictional. As a result, readers may be more likely to imagine how such circumstances would make them feel (Batson, 2009). In short, it is a more personal experience. We propose that this is less likely when listening to an interlocuter, which necessarily distances the listener from the material and assigns them a more passive role. Another study (Brunyé *et al*., 2009) investigated how pronouns modulate perspective taking during narrative comprehension, finding that the use of *I* encouraged readers to embody the character while *s/he* elicited a figurative distance between reader and character. Further research may therefore consider adapting these narratives into the first-person to see if this enhances emotional engagement and recall.

Video monologues, on the other hand, are related by an actor to whom the participant has no relationship. As suggested by the literature on empathy for ingroup as compared to outgroup members, this may have reduced willingness to empathise (Stürmer, *et al.*, 2006; Tarrant, Dazeley & Cottom, 2009; Gutsell & Inzlicht, 2010). In this case, putting a face to the narratives may have actually blunted participants' emotional engagement. We further suggested that the flat emotional tone may have amplified this effect, because participants'

would then detect that the character themselves are not emotionally involved and so would be less inclined to take their perspective even in the congruent condition.

We remind the reader here that low-level simulation describes the use of neural representations as a template for understanding the behaviour of others, which Gallese's 'shared manifold hypothesis' (2001) argues is supported by mirror neuron populations. Study 3 presented narratives in congruent and flat emotional tones to determine the role played by motor mimicry, and by extension low-level simulation, in this process. High empathy individuals were more likely to inflate self- and other-emotionality in response to congruent narratives but nonetheless did not recall more emotional details compared with narratives presented in the flat emotional tone. Still, this difference at encoding nonetheless indicates that high empathy individuals are more emotionally responsive when the actor's behaviour is appropriate to the narrative content, therefore suggesting that the reason we did not observe enhanced emotional recall was the change in medium rather than the introduction of the emotional tones conditions. That we did not find enhanced recall from congruent (as compared to flat) narratives across participants or by empathy group lends tentative support to the idea that simulation is not a prerequisite to behaviour understanding and possibly that it is epiphenomenal or even vestigial. However, theorising beyond this is speculative and the paradigm would need to be adapted for neuroimaging techniques to determine if motor resonance or state-matching occurs at the neural level.

High empathy individuals also tended to report heightened self-emotionality in the flat condition, but in the opposing direction, remembering that they felt more positive in response to narratives with neutral and negative valence than low empathy individuals. Crucially, this effect arose at the retrieval stage, suggesting that at the time they were first exposed to the narratives they did not rate actors as feeling better but remembered them being more positive *after effortful reflection*. We found this to be evidence that, when perceptual cues are lacking, high empathy individuals will compensate with TT-based mentalising processes that mitigate the experience of negative affect, thereby presenting further evidence for a positivity bias.

Any further analysis would be speculative. This evidence is insufficient to determine if individuals are more emotionally impacted by the congruent condition because they are able to simulate the other. As we saw, in Studies 1 and 2, due to the very nature of empathic responding, high empathy individuals are generally more emotionally affected by the narrative content. Therefore this study would need to be adapted to the use of fMRI to

understand if brain regions associated with mirror neuron responses are engaged. Comparison with the EmpaToM paradigm (Kanske *et al.*, 2015) may help to distinguish which mentalising abilities are associated with the inference of emotional versus nonemotional states. It would further be useful to conduct a study using the same paradigm with three conditions. One where participants read silently, a second where they read aloud and a third where they listen to the narratives, to see if empathy is modality-dependent and investigate how this affects emotional recall.

With such a vast array of advanced cognitive faculties involved in the empathic process, it seems more useful to speak instead about processes *being empathic* than to describe any kind of unitary concept. For example, the imagination can be deployed empathically but plainly is not domain-specific. We know from lived experience that analysing another's situation and imagining how it must feel to be them, creating a narrative of how they have arrived at this place in time and what might happen next, represents the substance of empathy. Certainly state-matching is a crucial aspect. I cannot conceive of helping someone that evoked no emotional state in me or indeed what would motivate me to help, but in fact many of these most complex faculties of mind—the imagination, episodic memory, reasoning—the aspects that distinguish us from other animals, can be engaged empathically.

3.3 The Contribution of Subordinate Empathic Processes

3.3.1 Personal Distress

A number of our findings implicate personal distress in the sequence of empathic responding. We found that this construct in particular associated with a preference for positive information. That is, individuals scoring high on this scale were more likely to retain information from narratives with positive valence and narratives that left them feeling happy. We argued in favour of the idea that, if not effectively downregulated, this emotional response leads to an aversion to negative affect and thereby inhibits prosocial behaviour.

These findings draw us towards the ongoing discussion that reaches back to Piaget (1975) on the ego- or altercentricity of empathy. In short, is the goal of empathy to help the target or to neutralise one's own emotional state?

At the centre of this debate is personal distress. There is strong evidence that, when observing another's suffering, personal distress must be downregulated to allow for prosocial behaviour

(Singer & Klimecki, 2014). So there is reason to believe that personal distress is a barrier to prosocial behaviour and represents the more egocentric aspects of empathy, such as withdrawal and self-consoling. This point is bolstered by Barrio, Aluja & García's study (2004), which found that empathy did not predict emotional stability, or diminished neuroticism in accord with Costa & McCrae's model (1985). Further, borderline personality disorder has been associated with enhanced affective empathy compared to controls (Harari *et al.,* 2010*;* for review, see Dinsdale & Crespi, 2013), but the inability to effectively downregulate leads to becoming overwhelmed and withdrawing. So there is compelling evidence that prosocial behaviour depends upon a delicate interaction between these subordinate processes and that affective empathy is not only dissociable from cognitive empathy, but can present as a barrier to it. The fact that, for example, psychopathic individuals often have preserved perspective-taking but impaired emotional contagion (Lishner *et al.*, 2015; Pfabigan *et al.*, 2015) and autistic individuals demonstrate the opposite pattern (Gleishgerrcht *et al*., 2013; Mazza *et al*., 2014) further suggests that these processes are neurologically dissociable.

3.3.2 Fantasy, Empathic Concern & Perspective-Taking

We found that fantasy and empathic concern were also associated with enhanced emotional recall. From this, we drew a number of conclusions. Firstly, that there was strong evidence of hot empathy driving deeper encoding of emotional information and, secondly, that the IRI subscales demonstrated good construct validity.

Fantasy was the only subscale that consistently associated with overall emotional recall across the three memory studies (chapters 2 to 4). This subscale is taken as a measure of an individual's willingness and capacity to engage with fictional characters, and so reflects cold-cognitive empathy processes. In light of the aforementioned theory on narrative empathy, this is regarded as being a key factor in the cultivation and refinement of perspective-taking and higher-order empathy processes. Nomura & Akai's study (2012) indicates that empathy for fictional characters overlaps considerably with empathy for real people, suggesting these measure the same construct . They therefore argued that this subscale be reconsidered. We agree the construct should be reconsidered but rather on the grounds that this distinction is not meaningful with regards to higher-order empathy, since the cognitive processes are the same for real people *in absentia* as for imagined ones. In short, if a person is not physically

present, any empathy we feel is necessarily based on abstract theorising. Davis (1980) intended the IRI scale as a measure of *tendency* to engage in the emotional lives of fictional characters and so in terms of reconsideration, it may be more accurate to say it is a more general measure of the capacity to empathise imaginatively, by making judgments based on narrativisation of the kind described earlier.

Empathic concern was associated with enhanced emotional recall in the first two studies but not the third. This subscale is described as feelings of warmth and tenderness towards others, and so it is perhaps not surprising that this association was diminished in study 3 since the congruent emotional tone condition was counteracted by the flat condition. We proposed that such embodied emotional states are motivational; that is, they engage the observer's faculties of attention so that they then dedicate cognitive resources to the needs of cold empathy. When this kind of state-matching is inhibited, fantasy appears to become the primary predictor of emotional recall. In accordance with the literature addressed earlier, these findings suggest that empathic concern is a more other-oriented aspect of hot empathy and therefore may be more likely to promote prosocial behaviour.

It is worth considering that perspective-taking was the only subscale that did not predict overall emotional recall. At first glance, this seems to depart from expectation since a general capacity to assume another's perspective would seem vital here. However, Davis (1980) was very specific in his categorisation. Where each item on the fantasy subscale pertains directly to engagement with narrative, perspective-taking gives a measure of more meta-analytic tendencies. For example, "I try to look at everybody's side of a disagreement before I make a decision". This subscale attempts to capture how the awareness and consideration of other's feelings and beliefs guide our own behaviour in real-world situations. When we engage with narratives, we are called upon to construct the scenarios and so become arbiters of this fictional space, the limits are to an extent defined by us, whereas the real world places constraints on this process. We argue, then, in line with Gallagher (2012), that a theory—theory of other minds and the process of narrativisation are required for higher-order empathy, and that these concepts are deeply enmeshed but nonetheless distinct. The former describes the deployment of an abstract framework that is largely acontextual, while the latter follows the rules of narrative structure but is developed uniquely in each case.

4. Positivity Bias

We found that high empathy participants were more likely to recall emotional details from positive narratives. We observed an inflation effect at encoding. In studies 2 and 3, high-empathy individuals reported feeling more negative in response to negative narratives and reporting that the character felt worse than low empathy individuals. Conversely, in study 1 and 2, high-empathy individuals tended to inflate positive self- and other-emotionality in response to positive narratives, respectively. At retrieval, high-empathy individuals displayed a preference for positive emotional information.

Typically, these heightened emotional states predicted enhanced recall, but not so in this case. We therefore propose that negative affect generated by these narratives led to an aversion, resulting in a predominance of positive information. This is supported by the finding that personal distress and empathic concern were the strongest predictors of emotional recall from positive narratives, suggesting that hot empathy mediates this encoding-retrieval strategy. Strong negative affect led seemingly to an aversion, while strong positive affect enhanced emotional recall, giving some indication of this bias may develop. Coupled with the finding that heightened self-emotionality predicted emotional recall, rather than observed other-emotionality, this lends weight to the idea that empathy is egocentric in the sense that the negative feelings of others do not appear to be the primary concern.

There is to date very little research on the idea that empathy associates with a positivity bias. We tentatively put forward a study by Storbeck & Clore (2005), using the Deese-Roediger-McDermott paradigm (Roediger & McDermott, 1995), who found that individuals experiencing positive mood are more likely to generate false memories. We also make reference to assumptive-worldview theory to argue for a broader positivity bias in the general population. We found consistent evidence that high empathy individuals attend to and recall information that is perceived to be positive (Studies 1, 2 and 3) and are more likely to believe a character was acting prosocially (Study 4) than low empathy individuals. We argue that if an individual invests mental energy in empathising with another, they regard them as deserving and so neglect evidence that compromises this belief in accordance with the theory of confirmation bias (Nickerson, 1998). Indeed, we observed this in Study 4, where hot empathy in particular associated with a belief that the character had positive intentions at heart.

Depressive realism was explored as a counterpoint to this positivity bias. Interestingly, a study by Moore & Fresco (2012) found that participants generally exhibited a bias for

positive information, but nondysphoric/nondepressed individuals to a great extent. There is therefore tentative evidence that links emotional states to differences in the interpretation of information.

Being more sensitive to emotional states, it follows that high empathy individuals may display a preference for positive information simply because it generates pleasant experiences. What is particularly interesting about this is that such distortions present an obvious barrier to prosocial behaviour since they may lead individuals to withdraw from situations that generate negative affect, as suggested in the literature on personal distress. We experience this anecdotally when, for example, we shuffle past a homeless person, muttering excuses and avoiding eye contact, because it makes us uncomfortable. We are often far more willing to celebrate a friend or co-workers successes than to extend a helping hand to those in difficult circumstances, especially when we have no relationship to them.

5. Validity of the Emotional Resonance Index (ERI)

There was some indication that the ERI is more sensitive to hot empathy, since cold empathy failed to correlate significantly with perspective-taking. We would expect this concept to map onto cold empathy above others. However, hot empathy was consistently associated with personal distress and empathic concern, which are taken to be the two aspects of the IRI that correspond to embodied emotional states, such as feelings of warmth and tenderness towards the suffering of others.

Further studies need to be undertaken to ensure construct validity. Hot empathy was also found to associate strongly with neuroticism. We expect this in case of personal distress which has a well understood relationship to neuroticism. However, we would not expect empathic concern to associate with neuroticism since this construct represents the other-focused and emotional restrained element of hot empathy, and promotes prosocial behaviour. As such, we would expect this construct to associate with agreeableness and possibly diminished neuroticism.

Finally, there was some evidence of overlap between the hot and cold subscale. Cold empathy associated with empathic concern and hot empathy with fantasy. However, as noted above, there is evidence that these processes are interdependent and therefore such an overlap should not cause concern. After all, without the corresponding affective component these are

only instances of ToM, and as discussed, psychopathic individuals roundly do not demonstrate inhibited perspective-taking, so any measure of empathy must account for this affective component to ensure its accuracy. A study by Fabi, Weber & Leuthold (2019) found that observing others in psychological distress aroused empathic concern while physical pain aroused personal distress, suggesting that empathic concern relies more on top-down feedback while personal distress depends more on state-matching. We therefore conclude that the scale should be adjusted to include statements that specifically target cognitive empathy processes.

As a comparative measure, the IRI benefits from a long history and subsequent meta-analysis (Brigandi *et al*., 2018). It has been demonstrated to have good internal validity (De Corte *et al*., 2007) across cultures (Siu & Shek, 2005; Yang & Kang, 2020). Still, there are reasons to doubt the reliability of explicit, self-report measures more generally and concerns over construct validity cannot be discounted entirely. As mentioned, researchers have queried the fantasy subscale in particular (Nomura & Akai, 2012). Following revision, it would therefore be beneficial to compare the ERI results of a larger sample population against a variety of empathy measures. Crucially, it must be weighed against questionnaires that separately give a measure of cognitive and affective empathy such as the Questionnaire of Cognitive and Affective Empathy (Reniers *et al*., 2011), to elaborate on this apparent oversensitivity to personal distress.

6. Implications & Future Research

The subjective nature of what is considered emotional is a potential hurdle for narrative paradigms. To further develop our paradigm, then, future research may undertake preliminary studies that ask participants to rate details as being either emotional or nonemotional, to confirm the intended valence. Further, details can become emotionally loaded depending on context. Consider that in *Flight Delay* that act of swimming assumed an emotional dimension when it was mentioned that the character engages in this activity to alleviate neck pain. Such a preliminary study may also reveal differences in how high- and low-empathy individuals perceive this information.

Being so fundamental to human experience, the potential benefits of understanding and cultivating empathy are vast. These findings can help to refine therapeutic interventions that exploit this link between creative imagination and empathy. Such therapies might hope to improve intergroup relations and reduce bias (Dovidio *et al*., 2010); reform violent offenders (Day, Casey & Gerace, 2010); reduce incidences of bullying in schoolchildren (Van Ryzin & Roseth, 2019); and improve relationship satisfaction through mutual understanding and open communication (Scuka, 2013).

There is also scope for cultivating empathy in professional fields. Medical students were shown to demonstrate heightened empathy when their course also included literature (Shapiro, J., Morrison, E. H., & Boker, J. R. (2004). Considering the findings of Gaesser & Schacter (2014), we propose that therapies make use of narrative to encourage this kind of vivid imagining and by this promote prosocial behaviour. The use of virtual reality technology could help to cultivate perspective-taking where cognitive abilities are limited. It would also be revealing to replicate study 2 with the introduction of a novel imagine 'helping condition', to see if encouraging episodic simulation led to heightened emotional recall.

As noted, our studies tended to assign the participant a passive role. However, in real-world scenarios empathy is more dynamic and interpersonal. In fact, as Husserl hinted, it may be the only bridge between ourselves and other minds. As such, future studies may wish to see how empathy is deployed in dialogue. Participants could engage in conversation with an actor and be tasked with recalling details about the actor's mental state, to see if this memory effect is only elicited by the demands of narrative fiction as Study 3 suggests.

The recent study by Demetriou & Nicholl (2021) shows that empathy can also be used to cultivate creativity and may provide a valuable tool for enriching lived experience more

generally. They also imply that empathy is plastic throughout adulthood and therefore must be maintained through practice. Findings such as these demonstrate the importance of narrative paradigms in both investigating empathy and developing therapeutic interventions. Simply by encouraging participants to attend to emotional details may enhance empathy via this salience effect.

In a world that is increasingly disconnected and polarised, the importance of empathy and the higher-order constructs such as compassion cannot be overlooked. Many of our societal problems seem to have their origins in radical individualism, which places the needs of the self above others and has markedly dehumanising effects. Empathy presents the opportunity to take remedial action, giving people the chance to see what makes us similar rather than focus on superficial differences.

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