

An Appraisal Theory of Empathy and Other Vicarious Emotional Experiences

by

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I can summarize my early academic career with one word: clueless. When I applied to college, I had no idea what I was doing. I chose Illinois State University because it was the only place I had visited for a full day, and the quad was beautiful. When I enrolled in Illinois State's Master's program, I was surprised to learn on my first day that I had to complete something called a "thesis". Baffled and nervous, I chose a topic of research, and began my investigation of empathy. When I was planning to apply to a doctoral program, I was fortunate to overhear a professor say that for psychology, Michigan was the place to be, and so I applied. My stroke of good luck continued when I was accepted. Since then, I think I've become a little less clueless, which I owe to my mentors, the institutions that supported my research, and the friends and colleagues that I gained at Michigan.

Let me begin with Phoebe Ellsworth, my dissertation advisor. When I began to study empathy, I read many papers on empathy, but I happily ignored whatever anyone had to say about emotions in general. Four years ago, I had the good fortune of taking Phoebe's class on emotion, which is where I learned about appraisal theory. Phoebe and I met for weeks to figure out how we could use appraisal theory to study vicarious emotions. These discussions turned into Chapter II.

We also discussed how we could begin to test the theory. We decided to begin with appraisals of agency, who or what caused an event, and to test whether changing subjects' appraisals of agency would change the vicarious emotions they felt for

someone. But it was a challenge to translate the abstract idea into a concrete study design. We spent many hours sitting together, pitching ideas, and then scrutinizing them until we were convinced they were a poor test of our hypothesis. Eventually, we came up with a mental placeholder: Someone had a prize-winning plant that they left with a friend while they went on vacation, but the plant died; either the friend watered the plant but it died anyway, or the friend failed to water the plant, but poured water on it the day before the owner returned; either way, the plant owner thought the plant died even though the friend faithfully watered the plant; but in the latter scenario, the subjects know that the true cause of this tragedy was the friend. The prize-winning plant was too ridiculous to use in an actual study, but we used it as the model for another idea: a clueless high school student applies to college but is rejected from every school; his rejections are either due to his difficult circumstances or due to the actions of his friend, but the student believes it was circumstances either way. This is the research that appears in Chapter III.

I am grateful to Phoebe for her work on appraisal theories of emotion and for teaching her class on emotion, which inspired the idea for the appraisal theory of vicarious emotions; for taking the time to have open discussions as we refined the theory and the methods to test it; for insisting that we discuss goals in Chapter II, which became a major section of the paper that made it much better; for allowing me to drive the writing and then adding her stylistic flair to make the words sound more beautiful; and for offering not only mentorship, but friendship.

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TABLE OF CONTENTS

ACKNOWLEDGEMENTS	ii
LIST OF FIGURES	ix
ABSTRACT	xi
CHAPTER	
I. On Empathy, Perceiving Emotions, and Perceiving Situations	1
References	6
II. An Appraisal Theory of Empathy and Other Vicarious Emotional Experiences	8
What is Empathy?	9
Emotion Theory and Empathy Theory are Strangers to Each Other	10
Current Theories of Empathy	12
Critical Review of Current Theories of Empathy	20
Appraisal Theory of Emotion	27
An Appraisal Theory of Empathy	32
Beyond Association-Based Processes for Vicarious Emotions	51
Conclusion	52
References	56
III. Feeling Emotions for Others That They Don't Feel: Appraisals of Agency and Vicarious Anger	67

Study 1 Method	72
Study 1 Results	79
Study 1 Discussion	87
Study 2 Method	88
Study 2 Results	91
Study 2 Discussion	97
General Discussion	97
Conclusion	101
References	102
IV. Using Others' Emotion Expressions to Appraise Their Situations: Backtracking as a Route to Empathy	105
Mimicry as an Explanation for Emotion Contagion	106
Backtracking as Another Explanation for Emotion Contagion	110
Testing the Backtracking Hypothesis	111
Overview of the Research	112
Pilot Study 1: Changing How Subjects Backtrack from Happy Expressions	113
Pilot Study 2: "Mimicry" of the Expressions When Subjects Have No Other Information	116
Main Study Method	126
Main Study Results	129
Discussion	140
References	144
V. Conclusion	147
Directions for Future Research	149

Conclusion	151
References	153

LIST OF FIGURES

FIGURE

II.1 Appraisal patterns of emotions. This schematic plot of six emotions along four appraisal dimensions is based on results from C. A. Smith & Ellsworth (1985).	30
III.1 Proportion of subjects who reported feeling sad or angry in the open-ended emotion question by condition (Study 1).	83
III.2 Subjects' average sadness and anger in the closed-ended emotion questions by condition (Study 2). The bars represent standard errors.	84
III.3 Predicted proportion of subjects who reported feeling sad or angry in the open-ended emotion question by condition (Study 2). The predicted proportions are based on a logistic regression model with appraised unpleasantness as a covariate and set equal to the mean.	92
III.4 Subjects' average sadness and anger from the closed-ended emotion questions by condition (Study 2). The bars represent standard errors.	93
IV.1 Average zygomaticus major activity during the first second that subjects saw happy, neutral, and sad faces. The bars depict ± 1 standard error. Analyses are based on a procedure from Dimberg and colleagues (e.g., Dimberg & Petterson, 2000).	120
IV.2 Average corrugator supercilii activity during the first second that subjects saw sad, neutral, and happy faces. The bars depict ± 1 standard error. Analyses are based on a procedure from Dimberg and colleagues (e.g., Dimberg & Petterson, 2000).	121
IV.3 Average zygomaticus major activity during the first second that subjects saw sad, neutral, and happy faces. The bars depict ± 1 standard error. Analyses are based on a procedure from Moody et al. (2007).	122

IV.4 Average corrugator supercillii activity during the first second that subjects saw sad, neutral, and happy faces. The bars depict ± 1 standard error. Analyses are based on a procedure from Moody et al. (2007).	123
IV.5 Average zygomaticus major activity during the whole period that subjects saw sad, neutral, and happy faces. The bars depict ± 1 standard error. Analyses are based on a procedure from Bourgeois & Hess (2008).	125
IV.6 Average zygomaticus major activity during the entire period that subjects saw sad, neutral, and happy faces. The bars depict ± 1 standard error. Analyses are based on a procedure from Bourgeois & Hess (2008).	126
IV.7 Average zygomaticus major activity during the first second that subjects saw sad, neutral, and happy faces. The bars depict ± 1 standard error. Analyses are based on a procedure from Dimberg and colleagues (e.g., Dimberg & Petterson, 2000).	130
IV.8 Average corrugator supercillii activity during the first second that subjects saw sad, neutral, and happy faces. The bars depict ± 1 standard error. Analyses are based on a procedure from Dimberg and colleagues (e.g., Dimberg & Petterson, 2000).	132
IV.9 Average zygomaticus major activity during the first second that subjects saw sad, neutral, and happy faces. The bars depict ± 1 standard error. Analyses are based on a procedure from Moody et al. (2007).	133
IV.10 Average corrugator supercillii activity during the first second that subjects saw sad, neutral, and happy faces. The bars depict ± 1 standard error. Analyses are based on a procedure from Moody et al. (2007).	135
IV.11 Average zygomaticus major activity during the entire period that subjects saw sad, neutral, and happy faces. The bars depict ± 1 standard error. Analyses are based on a procedure from Bourgeois & Hess (2008).	137
IV.12 Average corrugator supercillii activity during the entire period that subjects saw sad, neutral, and happy faces. The bars depict ± 1 standard error. Analyses are based on a procedure from Bourgeois & Hess (2008).	138
V.1 Model of the appraisal theory of vicarious emotions.	148

ABSTRACT

How does an observer feel an emotion for someone else who is going through an emotional experience? This phenomenon is called empathy when the observer's emotion is the same as or similar to the other person's emotion, or vicarious emotions more generally. In this dissertation, I introduce an appraisal theory of empathy and other vicarious emotional experiences. According to the theory, an observer will feel a vicarious emotion when they evaluate, or *appraise*, someone else's emotional situation. If the observer appraises the situation similarly to how the other person appraises it, then the observer will feel a similar emotion and experience empathy. If the observer appraises the situation differently, then the observer will feel a different emotion, or will have a relatively unemotional reaction.

Chapter I introduces a central question that the theory raises: is empathy caused by an observer's perception of someone else's emotions, or by the observer's perception of someone else's situation? Chapter II reviews existing theories of empathy and introduces the appraisal theory of vicarious emotions. Chapter III presents empirical research testing whether observers' vicarious emotions are affected by their appraisals, and finds that changing observers' appraisals of who or what caused someone's misfortune can make them feel vicarious anger that the other person does not feel. Chapter IV presents empirical research testing how observers' vicarious responses are affected by others' emotion expressions, and finds that when observers believe that someone's emotion expression is not a reliable sign of their situation, they "mimic" that

person's expressions less. Chapter V summarizes the work and offers directions for future research.

The appraisal theory treats vicarious emotions as a part of normal emotion processes, which are driven by the same appraisals that make people feel emotions for themselves.

CHAPTER I

On Empathy, Perceiving Emotions, and Perceiving Situations

This work is about empathy, a phenomenon where an observer perceives someone else's emotional experience and comes to feel the emotion that the other person feels. The central question that I raise is this: what is the proximate cause of empathy? If the observer feels sad when she sees someone crying, or feels happy when she sees someone smiling, what caused her own sadness or joy? There are two causes that frequently appear in scholarly treatments of empathy—first, the observer's perception of a target's emotion, and second, the observer's perception of the target's situation.

In philosophy, these causes appear in the writing of philosophers from the Scottish Enlightenment, where the term "sympathy" was used to describe what I call "empathy". David Hume (1739) described the nature of sympathy in his *Treatise on Human Nature*. Hume believed that when we perceive others' emotion expressions, the idea of the emotion comes to mind, and if the idea becomes vivid enough, then we will feel the emotion:

When any affection is infus'd by sympathy, it is at first known only by its effects, and by those external signs in the countenance and conversation, which convey an idea of it. This idea is presently converted into an impression, and acquires such a degree of force and vivacity, as to become the very passion itself, and produce an equal emotion, as any original affection. (p. 218)

In other words, Hume believed that the proximate cause of empathy was the observer's perception of the target's emotion.

But 20 years later, Adam Smith, Hume's friend, published his *Theory of Moral Sentiments* (1759/2002), where he offered a different perspective:

Even our sympathy with the grief or joy of another, before we are informed of the cause, is always extremely imperfect. General lamentations, which express nothing but the anguish of the sufferer, create rather a curiosity to inquire into his situation, along with some disposition to sympathize with him, than any actual sympathy that is very sensible. The first question which we ask is, What has befallen you? Till this be answered, though we are uneasy both from the vague idea of his misfortune, and still more from torturing ourselves with conjectures about what it may be, yet our fellow-feeling is not very considerable. Sympathy, therefore, does not arise so much from the view of the passion, as from that of the situation which excites it. (pp. 14-15)

Smith disagreed with Hume, and thought that the proximate cause of empathy was not the perception of the other's emotion, but rather the perception of the other's situation. If others' emotion expressions cause us to empathize, then it is because the expressions make us think the other's situation is good or bad.

More than a century and a half later, the same two causes of empathy appeared in psychology. William McDougall (1919/2001) argued that animals, including humans, have emotional instincts, and that these instincts are activated when we perceive a similar instinct in others:

How comes it that the instinctive behaviour of one animal directly excites similar behaviour on the part of his fellows?... I think the facts compel us to assume that in the gregarious animals each of the principal instincts has a special perceptual inlet (or recipient afferent part) that is adapted to receive and to elaborate the sense-impressions made by the expressions of the same instinct in other animals of the same species— that, e.g., the fear-instinct has, besides others, a special perceptual inlet that renders it excitable by the sound of the cry of fear, the instinct of pugnacity a perceptual inlet that renders it excitable by the sound of the roar of anger. (p. 72)

McDougall agreed with Hume—the proximate cause of empathy was the perception of the other's emotion. But five years later Floyd Allport (1924) argued against McDougall's theory and offered a perspective that was similar to Smith's:

Again, most persons strive to recognize the expression by recalling specific situations in which such a facial response would be fitting. This last point affords

us an important clue: *it is not the direct emotional behavior of the person, so much as the knowledge of the conditions affecting him that makes it possible for us to understand (and indeed to sympathize) with his state of mind...* If we witness the anger of two men who are fighting, our anger is not necessarily aroused. We may instead be amused, frightened, or interested, according to the circumstances. If one of the combatants is our dearest friend, we feel anger and participate in the conflict. But our anger is not a 'sympathetic anger' aroused by the sight of our friend's angry behavior. It is aroused by the enemy who is injuring our friend, and thereby thwarting certain of our own affections and interests. Here again it is the whole situation rather than the perception of an emotion in another which arouses the emotion in us. (pp. 234-235, emphasis original)

Similar to Smith, Allport believed that the proximate cause of empathy was not the perception of the emotion, but the perception of the situation, and if the emotion expression makes us empathize, it is because "we have learned to read these expressions as signs that *there really is something to be afraid of*" (p. 235, emphasis original).

In modern psychology, newer theories have emerged that echo the ideas of Hume and McDougall—they emphasize that empathy is caused by the perception of others' emotions. One theory is based on mimicry, and argues that an observer who perceives someone else's emotion expressions will automatically imitate the expression, and then afferent feedback from the mimicked expression will cause the observer to feel the associated emotion (Hatfield, Cacioppo, & Rapson, 1994; Hoffman, 2000). A second theory is based on mirror neurons, and argues that when an observer perceives someone else's emotion, it automatically activates the neurons in the observer's brain that underlie the firsthand experience of the emotion, which causes us the observer to feel the emotion (Gallese, 2003; Keysers & Gazzola, 2009). A third theory is the Perception-Action Model, which argues that when an observer perceives someone else's emotion, it automatically activates the observer's own representation of the emotion, which causes the observer to feel the emotion if the activation is strong enough (Preston, 2007; Preston & de Waal, 2002; Preston & Hofelich, 2012). The observer's

representation of the other's state draws on generic representations of emotion, representations of the other's situation (what it feels like to experience the situation), and representations of the other person (e.g., how the other has felt in the past). The mirror neuron and perception-action theories have inspired a great deal of research on empathy, particularly in social neuroscience, where researchers frequently use functional magnetic resonance imaging (fMRI) to test whether the neural regions that are active during firsthand experiences of pain are also active when people observe others who are in pain (e.g., Jackson, Meltzoff, & Decety, 2005; Lamm, Decety, & Singer, 2011; Morrison, Lloyd, di Pellegrino, & Roberts, 2004; however, see also Krishnan et al., 2016).

In this work, however, I will side with Smith and Allport by arguing that the role of emotion perception has been over-emphasized, and empathy is driven by our perceptions of others' situations. I develop a theory of empathy that is rooted in modern psychological research on emotion, specifically, appraisal theories of emotion (Ellsworth & Scherer, 2003; Roseman, 1984; Scherer, 1984; C. A. Smith & Ellsworth, 1985). Appraisal theories of emotion argue that the emotions we feel depend on how we evaluate, or *appraise*, situations, and they identify specific appraisals that are most important for differentiating emotional experience. So far, appraisal theorists have only studied how people feel emotions for themselves. However, I will develop an appraisal theory of empathy by arguing that people can appraise others' situations using the same appraisal dimensions. If an observer appraises a target's situation similarly to how the target appraises it, then the observer will feel an emotion that is similar to what the target feels (empathy); if the observer appraises a target's situation differently from how the target appraises it, then the observer will feel an emotion that is different from what the target feels, or will feel relatively unemotional.

In Chapter II, I present an overview of the appraisal theory of empathy and other vicarious emotional experiences. I review other psychological theories of empathy and discuss their limitations. Then I discuss how the appraisal theory addresses these limitations.

In Chapter III, I present the first empirical research to test the theory. In this research, I tested whether changing an observer's appraisals of a target's situation can lead the observer to feel a vicarious emotion that the target does not feel, a phenomenon that is not explained well by other theories of empathy. Specifically, I tested whether changing subjects' appraisals of agency for a target's misfortune could lead them to feel vicarious anger that the target did not feel.

In Chapter IV, I present an empirical investigation of whether people use targets' emotion expressions to inform their appraisals of the targets' situations, and how this affects their vicarious emotions. In this research, I tested an idea from Adam Smith and Floyd Allport—that if others' emotion expressions cause us to empathize, it is because we take them as a sign that something good or bad has happened to the other person. Specifically, I presented subjects with a target whose emotion expressions were *not* a reliable sign that something good happened to them, and tested whether this would attenuate subjects' vicarious responses to the target's emotion expressions.

Finally, in Chapter V, I will summarize the present work, discuss how it fits with prior theories, and offer directions for future research.

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CHAPTER II

An Appraisal Theory of Empathy and Other Vicarious Emotional Experiences

Adapted from Wondra, J. D., & Ellsworth, P. C. (2015). An appraisal theory of empathy and other vicarious emotional experiences.

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We feel sad when a crying friend's father has passed away. We feel embarrassed for our colleague when he blunders and blushes. We feel joy for our smiling friend when she succeeds. Empathy, feeling what another person feels, is pervasive, and it is a problem.

Empathy is a problem because it defies our assumption that emotions are about our own personal goals (Frijda, 1988; Lazarus, 1991; Moors, 2010; C. A. Smith, Haynes, Lazarus, & Pope, 1993). Indeed, empathic emotions are described as more appropriate for someone else's situation than for our own (Hoffman, 2000; Preston & de Waal, 2002). Yet just as we feel emotions when we see a great work of art or step outside on a sunny day, we feel emotions for others when our personal goals are not involved.

Emotion and empathy have been studied in isolation from each other. Theories of emotion neglect empathic emotions, and theories of empathy are full of special explanations for empathic emotions that are different from explanations for personal emotions. Nevertheless, empathic emotions are real emotions. They strike us quickly and redirect our attention just as any other emotion does and there is no reason to think that they are different from normal emotion processes. Bringing theories of empathy and emotion together explicitly can advance our understanding of both.

We begin with a discussion of what is usually meant by empathy. Then we

review and critically examine current theories of empathy. Finally, we present a theory of empathy based on appraisal theories of emotion.

What is Empathy?

We feel emotions about a wide variety of things. Sometimes we feel emotions because something happens to us. These are firsthand emotions. At other times we feel emotions because something happens to someone else. These are vicarious emotions. In some vicarious emotional experiences, we feel the same emotion that the other person feels. These experiences, when we feel an emotion because something happens to someone else and it is the same emotion that they feel, we call empathy.

The term empathy is used haphazardly to refer to different phenomena that are related to this kind of emotion sharing, which has led one prominent empathy researcher to suggest abandoning the term “empathy” altogether (Decety & Cowell, 2014a; Decety & Cowell, 2014b). We suspect part of the problem is that the term empathy is associated with at least three valued outcomes—caring for others, understanding others, and validating others’ emotions. Many processes that produce these outcomes, even if they are not the same, are considered to be empathic in some way. If the same process fails to produce these outcomes, it is rejected as not empathic. For example, perspective taking is treated as a part of empathy when it leads to emotion sharing or caring for others (e.g., Decety, 2011; Zaki, 2014). Yet if perspective taking is a part of empathy, then it should be considered empathic both when it leads to altruistic behavior (Toi & Batson, 1982) and when it leads to selfish behavior (Epley, Caruso, & Bazerman, 2006).¹

¹ Basch (1983, p. 122) makes a similar point about the problem with linking empathy to valued outcomes, but he preferred to use the term empathy to describe a process of understanding others rather than feeling what they feel.

The essence of empathy, agreed upon by most empathy researchers, is feeling what another person feels because something happens to them, and that is what we mean by empathy in our discussions. This conceptualization of empathy is equivalent to affective resonance / experience sharing in multi-component models of empathy, but it does not include other processes that some empathy theorists believe contribute to emotion sharing, such as perspective taking, self-regulation, and mind perception (Decety, 2011; Zaki, 2014). Nor does it require empathy to involve feelings of concern for another person, which is called compassion or sympathy (de Vignemont & Singer, 2006; Decety, 2011; Eisenberg, Shea, Carlo, & Knight, 1991; Singer & Lamm, 2009). Although you can feel sad with someone else who is sad (empathy) and also feel concern (compassion), you can also feel happy with someone who is happy (empathy) and feel no concern because nothing bad has happened. Our use of the term empathy does not require understanding another's internal states, which is sometimes called cognitive empathy (Cox et al., 2012; Hodges & Myers, 2007; Nummenmaa, Hirvonen, Parkkola, & Hietanen, 2008; Preston et al., 2007; Preston & de Waal, 2002; Saxe, 2006; Schnell, Bluschke, Konradt, & Walter, 2010; Shamay-Tsoory, Aharon-Peretz, & Perry, 2009), or validating another's emotions. In his *Theory of Moral Sentiments*, Adam Smith (1759/2002) wrote about feeling what others feel because he thought it was an important part of how we approve of their emotions. We think that this is an interesting and understudied topic, but we do not discuss it.

Emotion Theory and Empathy Theory are Strangers to Each Other

Emotion theories have not said much about emotions for others, though there have been some social approaches to emotion (e.g., Butler, 2011; Mackie, E. R. Smith, & Ray, 2008; Manstead & Fischer, 2001; Parkinson, 2011; Parkinson, Phiri, & Simons, 2012; E. R. Smith, 1993; E. R. Smith, Seger, & Mackie, 2007; van Kleef, 2009; van Kleef, van

Doorn, Heerdink, & Koning, 2011). These approaches emphasize that other people influence our firsthand emotions. Social appraisal theory argues that people use others' emotions to evaluate their own situations (Manstead & Fischer, 2001; Parkinson, 2011; see also Schachter, 1959). For example, infants look to their mothers' emotional reactions to decide whether to cross a visual cliff (Sorce, Emde, Campos, & Klinnert, 1985) and adults look at others' emotional reactions to decide how much of a risk to take (Parkinson et al., 2012). Intergroup emotion theory argues that important groups that people belong to change their emotions because people stereotype how they should feel to fit the group stereotype and because they adopt group goals as personal goals (Mackie et al., 2008; E. R. Smith, 1993; E. R. Smith et al., 2007). These theories address how our own emotions are affected by the emotions of others. They do not address our capacity to feel emotions for others when we are not in the same situation or when we are not members of the same group.

Empathy theories do discuss our capacity to feel emotions for others, but they treat empathy as something special and they do not relate empathy to the processes that drive firsthand emotional experiences. Also, current theories of empathy focus on situations where an observer² feels the same emotion as a target, and they do not consider other vicarious emotional experiences, as though matching makes empathy a separate phenomenon in its own right.³ The theories explain how an observer can feel sad for a target who feels sad, but not how an observer can feel angry for a target who

² Throughout the paper we call the person who empathizes the "observer" and the person with whom the observer empathizes the "target".

³ Empathic emotions are grouped with vicarious pain and vicarious motor action more often than they are grouped with firsthand emotions, as though their vicarious quality is more important than their emotional quality (Gallese et al., 2004; Keysers & Gazzola, 2009; but see Blair, 2005).

feels sad. Yet are vicarious emotions that match the target's feelings and those that do not match so different?

Imagine that your colleague uses the bathroom before he gives a conference talk. As he walks to the stage, you notice that a long strand of toilet paper is stuck to his foot. Everyone in the audience can see it. Your colleague might notice the toilet paper and blush, or he might fail to notice it and show no sign of embarrassment. Either way you can feel embarrassed for him (Krach et al., 2011). In the first case, you experience empathy because you feel the same as your colleague, and in the second case you do not because you feel something different. Between the two scenarios, what has changed about the cause or the nature of your own emotional experience? This point is important and we will return to it later, but first we review current theories of empathy.

Current Theories of Empathy

Hoffman's Theory of Moral Development

Psychological research on empathy through the 20th century is summarized well in the writing of the developmental psychologist Martin L. Hoffman (2000), whose theory of moral development has provided the most comprehensive view of empathy. Hoffman focuses on empathic distress in his writing. His theory includes five mechanisms to explain how an observer becomes distressed when observing a target's distress. The five mechanisms are (a) mimicry, (b) classical conditioning, (c) direct association, (d) mediated association, and (e) role-taking.

Mimicry, classical conditioning, and direct association. In Hoffman's (2000) first three mechanisms, the observer perceives the target's emotional experience directly. These mechanisms are considered "primitive, automatic, and... involuntary" (p. 36).

Mimicry. Empathy through mimicry involves a two-stage process. First, the observer automatically imitates the target's emotional facial, postural, or vocal expressions. Second, afferent feedback from the imitated expression causes the associated emotional state in the observer. So if you see a stray dog attack someone who looks scared, you automatically imitate the other person's expression of fear. Your own expression of fear causes you to feel scared too. This imitation and feedback process of mimicry is what Hatfield, Cacioppo, and Rapson (1994) call "primitive emotional contagion."⁴ The feedback stage is equivalent to a strong version of the facial feedback hypothesis, in which making an emotional face produces a subjective feeling of the emotion (Laird, 1974; Laird & Lacasse, 2014; Zajonc, Murphy, & Inglehart, 1989).

Classical conditioning. Classical conditioning of emotions begins with situations that make us feel emotional even if we have never experienced them before. For example, you might feel scared the first time a dog bites you. After we experience the intrinsically emotional situation, we learn that certain cues are a sign that it is about to happen again. As a result, we start to feel emotional when we perceive those cues. For example, you might learn that dogs growl before they bite and so you begin to feel scared when you hear a dog growl. In the language of classical conditioning, the dog bite is an unconditioned stimulus (UCS) that causes you to feel scared as an unconditioned response (UCR); the dog growl is the neutral stimulus (NS) that is paired with the dog bite often enough to become a conditioned stimulus (CS) that causes you to feel scared as a conditioned response (CR). What does this have to do with empathy? The idea is that features of others' emotional experiences can become the cues that

⁴ Some researchers distinguish emotional contagion from empathy by arguing that empathy requires self-other distinction, whereas emotional contagion does not. We address self-other distinction later in the paper.

trigger a conditioned emotional response.

In one version of classically conditioned empathy (Hoffman, 2000), during conditioning we experience emotional situations (UCS's) with others who are expressing emotions (NS's). This pairing of the situation and others' emotional expressions causes the emotional expressions to become the cues (CS's) that a similar situation is about to occur. As a result, others' emotional expressions cause us to feel emotions (CRs), which we experience as empathy. For example, you might see a stray dog attack another person who looks scared (NS) right before the same dog attacks you (UCS) and you feel afraid (UCR). In the future when you see others' fear expressions (CS), you will feel afraid again (CR).

In a second version of classically conditioned empathy (Humphrey, 1922), the conditioned stimuli are not others' emotional expressions, but instead they are perceived features of the situation. For example, you might hear a stray dog growl (NS) right before it attacks you (UCS) and you feel afraid (UCR). In the future when you hear a dog growl before it attacks someone else (CS), you will feel afraid (CR). In the first version the target's emotional expression causes empathic emotions, whereas in the second version features of the target's emotional situation cause empathic emotions.

Direct association. With direct association, when the observer sees the target's emotional expression or situation, it reminds the observer of her own past emotional experiences. Then the observer feels the emotions that she felt during the original experiences. For example, if you see a stray dog attack another person, then you might remember a time when an animal attacked you. You re-experience the original fear from the memory.

Mediated association and role-taking. In contrast to the first three mechanisms, Hoffman's fourth and fifth mechanisms do not require direct perception of the target's

emotional experience. For this reason, they are considered to involve more advanced cognitive abilities.

Mediated association. With mediated association, observers learn about targets' emotional experiences through words. Then observers imagine the targets' emotional expressions and mimic them, remember their own past experiences and feel the emotions from the memories, or both. Mediated association is similar to mimicry or direct association but the observer does not perceive the target's experience directly. For example, if someone else tells you that a dog attacked him earlier in the day, then you might remember a time when a dog attacked you and feel afraid because of the memory.

Role-taking. Role-taking occurs when observers either imagine themselves in the target's situation or imagine how the target feels. As with mediated association, observers might mimic imagined emotional expressions or might feel emotions by using their own emotional memories to imagine the target's situation. Nevertheless, role-taking is more effortful than mediated association. Role-taking involves active attempts to understand a target by bringing emotional memories or imagined emotional expressions to mind, whereas mediated association involves a more automatic activation of emotional memories or imagery. For example, if you learn that someone else was attacked by a dog, then you might try to actively imagine how she felt, recall a time when a dog attacked you, and feel afraid from the memory.

Hoffman discusses mimicry, direct association, mediated association, and role-taking as separate mechanisms for empathy even though they largely overlap. For all of them, the observer's vicarious emotional experience comes from imitating emotional expressions or recalling emotional memories. The differences are whether the observer must observe the target's emotion or situation directly (mimicry and direct association)

or can infer them indirectly (mediated association and role-taking) and whether the observer puts in some effort to empathize (role-taking) or not (the other four).

In his description of role-taking, Hoffman (2000) also states that observers can imagine the target's emotional situation so vividly that they feel the same emotion. This is the only case in which Hoffman says that empathy might not rely on prior experience (conditioning history or own emotional memories) or a context-free biological mechanism (mimicry) and it begins to sound like normal emotional experience. If an observer can feel the emotion by vividly *imagining* the target's situation, then why couldn't the observer feel the emotion by *directly perceiving* the target's situation? Are the memory-based and mimicry mechanisms necessary for empathy?

Mirror Neurons and the Perception-Action Model

Since the 2000s, empathy research has mostly become brain research. The discovery of mirror neurons in the 1990s was a major driving force that moved contemporary empathy research into the domain of neuroscience. Mirror neurons discharge during both the firsthand performance and the secondhand observation of goal-oriented action. These neurons were first discovered in the F5 region of the premotor cortex in macaque monkeys (di Pellegrino, Fadiga, Fogassi, Gallese, & Rizzolatti, 1992; Rizzolatti, Fadiga, Gallese, & Fogassi, 1996). For example, mirror neurons discharged both when a monkey grasped food and also when it watched an experimenter grasp food. This was an important breakthrough because it suggested a mechanism by which two seemingly different systems, the perceptual system and the motor system, could be linked. Some researchers have argued that mirror neurons help organisms understand and imitate others' actions (Gallese, 2003; Gallese, Keysers, & Rizzolatti, 2004; Rizzolatti et al., 1996; Rizzolatti, Fogassi, & Gallese, 2001), although the

role of mirror neurons in understanding action has been a topic of some debate (Gallese, Gernsbacher, Heyes, Hickok, & Iacoboni, 2011; Hickok, 2009; Jacob, 2008; Kosonogov, 2012).

Some have argued that mirror neurons are responsible for all vicarious experiences, including vicarious experiences of action, sensation, and emotion (Gallese, 2003; Gallese et al., 2004; Iacoboni, 2009; Keysers & Gazzola, 2009). For example, Gallese's "shared manifold hypothesis," proposes that, within a mirror neuron framework, empathy should "accommodate and account for *all* different aspects of expressive behavior... to unify under the same account the multiple aspects and possible levels of description of intersubjective relations" (Gallese, 2003, pp. 176-177). The idea is that whenever an observer perceives a target's emotion, the neurons of the observer that are responsible for the firsthand experience of that emotion automatically discharge. As a result, the observer feels the emotion and experiences empathy. For example, if you see a stray dog attack another person and you perceive that the person is scared, then the neurons that are involved in your own experiences of fear automatically discharge and you feel scared too. As with understanding action, the role of mirror neurons in empathy has been a topic of debate (Baird, Scheffer, & Wilson, 2011; Blair, 2011; Decety, 2010; Gallese et al., 2011).

Similar to the mirror neuron account is Preston and de Waal's (2002) perception-action model of empathy (see also Preston, 2007). Like mirror neurons, perception-action models were originally developed to explain how perceptual information turns into motor action. According to the common-coding account (Prinz, 1997), perception and action share some underlying representation or process so that perceptual information automatically prepares action without the need for any intervening cognitive process. Preston and de Waal applied the same idea to empathy and proposed

that “attended perception of the [target’s] state automatically activates the [observer’s] representations of the state, situation, and [target], and... activation of these representations automatically primes or generates the associated autonomic and somatic responses, unless inhibited” (p. 4). These emotional representations might involve mirror neurons, but mirror neurons are not required. The representations can have other components such as episodic memories or autonomic arousal. So if you see a stray dog attack another person who looks scared, then the neurons, physiological changes, and episodic memories that are part of your representation of fear automatically activate and cause you to feel scared too.

The mirror neuron and perception-action theories of empathy are something like a combination of Hoffman’s mimicry and association mechanisms. Instead of mimicking bodily expressions of emotion, mirror neurons skip over the body and mimic brain activity. Instead of the perception of a target’s state or situation activating the observer’s emotional memories, the perception of the target’s state activates the observer’s representation of the same state (which might include emotional memories).

The majority of the neuroscientific experiments on empathy examine vicarious experiences of physical pain rather than vicarious experiences of emotion (e.g., Fan & Han, 2008; Jackson, Meltzoff, & Decety, 2005; Lamm, Batson, & Decety, 2007a; Lamm, Meltzoff, & Decety, 2009; Lamm, Nusbaum, Meltzoff, & Decety, 2007b; Perry, Bentin, Bartal, Lamm, & Decety, 2010). For example, in one fMRI study (Jackson et al., 2005), subjects had more activity in two brain regions that are active during firsthand experiences of pain, the anterior insula (AI) and the anterior cingulate cortex (ACC), when they viewed photographs of hands and feet in painful situations (e.g., being cut with a knife) than when they viewed photographs of hands and feet in non-painful situations (e.g., next to a knife). Activity in the AI or ACC has also been found for

firsthand and vicarious disgust (Phillips et al., 1997; Wicker et al., 2003) and firsthand and vicarious social exclusion (Eisenberger, Lieberman, & Williams, 2003; Masten, Morelli, & Eisenberger, 2011; Meyer et al., 2013). Research on neural overlap for firsthand and empathic experiences of common emotions such as happiness, sadness, embarrassment, and anger is more scarce, though some studies have examined the AI and ACC as components of an automatic empathy system (Blair, Morris, Frith, Perrett, & Dolan, 1999; Bruneau, Pluta, & Saxe, 2012; de Greck et al., 2012; Krach et al., 2011; Morelli & Lieberman, 2013). Although research finding neural overlap for firsthand and vicarious experiences of emotions would be consistent with mirror neuron and perception-action theories of empathy, we do not think it would rule out other theories because they predict the same thing.

The original mirror neuron and common-coding approaches to perceptual information and motor action were exciting because they contradicted the common belief that perception and action involve separate systems that can only communicate through some intervening process. Watching someone reach for a doorknob does not require you to move; reaching to open a door does. Even in the case of vicarious physical pain, watching someone stub her toe does not require your foot to touch the wall; stubbing your own toe does. The problem in perception and action has been how to connect two apparently different systems. If there are overlapping representations for perception and motor action, then the idea that the two systems are separate comes into question. The evidence supports a common-coding theory over a separate representations theory.

Mirror neuron and common-coding approaches are less remarkable when they are applied to empathy. *All* prior theories of empathy assume that the same sorrow, joy, or embarrassment is active during firsthand and empathic experiences. No one thought

that empathic emotions involved separate representations, so there was no comparable underlying assumption for the newer theories to contradict. The problem in empathy has been how a single emotion is triggered by different kinds of events—one's own experiences and others' experiences—and not how to connect two different systems for firsthand and empathic emotions. Mirror neuron and perception-action theories of empathy argue for common representations of firsthand and empathic emotions, but so do all other theories of empathy. If there are overlapping representations, whether they involve neural activity or something else, then this is not evidence that favors mirror neuron or perception-action theories of empathy over other theories. It is evidence that empathy exists.

Critical Review of Current Theories of Empathy

We assume that the empirical evidence makes the best case for each empathy mechanism and discuss how they answer two general questions:

1) How does an observer feel the same emotion that a target is feeling when the observer is not in the same situation?

2) When does an observer's emotional response to a target's emotional experience not match what the target is feeling?

Theories of empathy are designed to answer the first question—how does empathy happen? They are not designed to answer the second question—when does empathy not happen, whether this involves an unemotional response or an emotional response that does not match what the target feels? Yet we believe that the second question is important, and intimately related to the first. When an observer does not feel what a target feels it is sometimes called an “empathy failure” (Cikara, Bruneau, & Saxe, 2011). The idea of “empathy failures” implies that matching is the default outcome of an empathy-specific process. Instead, the same process might produce both

matching and non-matching, empathic and non-empathic, vicarious emotions.

Matching might not be an inherent feature of the process and empathy might not be very different from other vicarious emotional experiences.

Consider our emotional reactions to horror films. You can feel scared for characters who know that a murderer is stalking them in their home, but you can also feel scared for characters who are clueless about the murderer's presence. Is the cause of your fear very different in these two cases? Does a new empathy-generating process take over from some other process once the clueless characters notice the murderer and become scared too?

The scenario in which the characters feel scared counts as empathy because you feel what they feel. The other scenario does not count as empathy because you do not feel what they feel. One way to resolve the discrepancy is to claim that different processes produce matching and non-matching vicarious emotions. This argument would substantially limit the explanatory value of the empathy-generating process and it seems unlikely. A better option is to seek a process that can explain both scenarios.

Explaining Emotion Matching

Each of the seven current processes proposed for empathy can explain emotion matching to some extent. Their limits with respect to emotion matching are based on whether or not they require the observer to (1) have some relevant past experience or (2) perceive the target's emotional state or situation directly.

Necessity of the observer's past experience. If empathy depends on the observer's past experience, then an observer can only feel vicarious emotions for events like those that he or she has experienced. Classical conditioning, direct and indirect association, role-taking, and the perception-action model rely on the observer's past

experience. With classical conditioning, the observer must have a conditioning history for any empathic emotion. With direct association and indirect association, the observer must have relevant emotional memories that can come to mind. The same applies to role-taking unless the observer mimics imagined emotional expressions of the target. The perception-action model is similar, though the observer's representation of the target's state could be activated without a specific emotional memory if the observer has experienced that state in the past. In contrast, mimicry and mirror neurons do not rely on the observer's past experience. The observer can mimic or mirror any expressed emotion.

Past experience most likely contributes to empathy when it comes to mind. Indeed, emotion researchers sometimes ask subjects to recall previous emotional experiences to make them feel specific emotions (e.g., Lerner & Keltner, 2001). Nevertheless, it seems unlikely that it is necessary for empathy. Otherwise children wouldn't be frightened by ghost stories involving other boys and girls and it would be hard to explain the power of literature in general. You would find it dull to hear about how a friend proposed to the love of his life if you have never been engaged. The importance of the observer's past experiences for many of the empathy mechanisms highlights the disconnection between theories of empathy and theories of emotion. The observer's emotional experiences must begin somewhere. Firsthand emotions do not require past experience, so why should vicarious emotions require it? Why should vicarious emotions not begin with the same process as any other emotion?

Direct or indirect perception. All theories of empathy require the observer to perceive the target's emotional state or situation. Some of the processes require the observer to view the target's emotional expression or situation directly (direct perception) and others allow the observer to imagine the target's emotional expression

or situation or to learn about them through language (indirect perception). Classical conditioning, mimicry, and mirror neurons require direct perception. With classical conditioning, conditioned emotional responses only occur when the learned cues (the conditioned stimuli) are present. With mimicry and mirror neurons, the observer must see the target to imitate or neurally match the target (unless the observer can mimic or mirror expressions that she imagines). By definition, direct association means that the observer's direct perception of the target's state or situation activates associated emotional memories. In contrast, mediated association and role-taking allow indirect perception through language or imagination. The perception-action model allows both direct perception and indirect perception of another's state (Preston, 2007). The observer can perceive the target's state by directly observing behavior such as facial expressions, by listening to the target say "I feel sad," by indirectly inferring the target's state from assumptions about the target's situation (e.g., "needles are painful," Y. Cheng et al., 2007), or by imagining the target's emotional state.

No process that requires direct perception of a target's emotional state or expression can explain how an observer can feel something that the target does not feel (unless one wants to argue that all non-matching vicarious emotions are based on incorrect perceptions of what the target feels). However, processes that allow the perception of a target's *situation* rather than the target's *state* to cause the empathic emotions can begin to explain non-matching emotional responses.

Explaining Non-Matching

Non-matching can mean one of two things. First, it can mean that the observer reacts unemotionally to a target's emotional experience. Here the question is whether the empathy-generating mechanism was not operating or it was operating but it

produced an unemotional state. Current empathy theories handle these “empathy failures” rather well. Second, it can mean that an observer feels something on behalf of the target that the target does not feel, such as feeling embarrassed for someone who shows no sign of embarrassment. In this case the question is whether the empathy-generating mechanism can produce vicarious emotions that differ from the target’s emotions. This is where current empathy theories lose their explanatory power.

Unemotional observer. Unemotional observer reactions pose a challenge to any claim that empathy happens automatically. If the process is automatic, then why do we not empathize with everyone all of the time?

One kind of explanation offered by empathy theorists is that empathy occurs automatically, but it requires some minimal conditions. One condition that applies to every mechanism is that the observer must attend to the target’s state or situation. If the observer never notices the target, or intentionally diverts attention away from the target, then there will be no empathy (Preston, 2007). For example, people might empathize with ingroup members more than with outgroup members (Molenberghs, 2013) because they attend more to others with whom they are interdependent (Preston, 2007). Another condition, as discussed previously, is that all of the mechanisms aside from mimicry and mirror neurons require the observer to have some past experience that is relevant to the target’s state or situation. If the observer lacks relevant experience, then these processes cannot operate and there will be no empathy.

A second kind of explanation is that empathy occurs automatically, but the observer can regulate and inhibit it. For example, physicians and acupuncture practitioners do not show empathic neural responses to needle pricks (Y. Cheng et al., 2007; Decety, Yang, & Cheng, 2010). Presumably, physicians and acupuncture practitioners have more experience than others with regulating their vicarious pain

responses because they must inhibit their empathic reactions to their patients. There are two perspectives on when regulation occurs: the “late appraisal model” and the “early appraisal model” (de Vignemont & Singer, 2006).⁵ A late appraisal model means that an observer begins to automatically match a target’s emotion, but then can regulate and inhibit the empathic emotion. This seems to be the dominant perspective in empathy research (e.g., Decety et al., 2010; Eisenberg et al., 1994; Fan & Han, 2008). In contrast, an early appraisal model means that the way an observer initially interprets a target’s situation determines whether neural matching ever begins. A late appraisal model can help automatic matching theories explain why an observer would feel nothing for a target. Even if the observer is attentive and has relevant experience, the observer might inhibit the empathic emotion after matching begins. But a late appraisal model cannot explain why an observer would feel something for a target who does not seem to feel anything, or who seems to feel something else. In contrast, an early appraisal model allows the observer to experience any vicarious emotion because the observer’s emotion is not tied to the target’s emotional state.

Emotional observer. Non-matching responses are a bigger problem for empathy theories when the observer feels something that the target doesn’t feel. The observer might feel embarrassed for a target who shows no sign of embarrassment (Krach et al., 2011) or feel angry for a target who is sad (Hoffman, 2000, p. 98). Classical conditioning can account for these cases, but only if the observer’s conditioned response to the target’s emotion expression or situation differs from the target’s response. For example, this could happen if others’ positive emotional expressions signal that they have won

⁵ Although the term appraisal has appeared in the empathy literature, it has not been used to connect empathy theories to appraisal theories of emotion, as we do in this paper.

the prize that you had been hoping for (Englis, Vaughan, & Lanzetta, 1982). Mimicry falls apart because the observer only mimics observed emotions. Similarly, mirror neuron and perception-action approaches require the observer to perceive the target's state and they do not explain vicarious emotions that do not match that state. Direct perception, mediated perception, and role-taking allow the observer to recall experiences that have emotional content that differs from the target's expressed emotion, though it may be difficult to predict when memories with matching or non-matching emotional content will come to mind.

Hoffman (2000) suggests that, at least in the cases of anger, sympathy, and guilt, the empathy-generating processes produce emotion matching first and then the observer transforms the empathic response by making attributions of responsibility for the target's situation. This second step of attribution goes beyond his five empathy-generating mechanisms. It begins to look like a late appraisal model of empathy where the observer's interpretation of the target's situation determines what the observer ultimately feels. Yet that first step of matching is only necessary if we reject an early appraisal model and insist that the target's state is what causes the observer's emotion.

Summary

Each of the seven processes proposed by empathy theorists explains how an observer feels what a target feels under certain circumstances: when the observer either has some relevant past experience, or directly perceives the target's state or situation, or both. Consequently, the observer has an unemotional response to the target when the observer lacks relevant experience or does not attend to (and therefore does not directly perceive) the target's emotional experience. In addition, the observer can regulate and inhibit an emotional response to the target. None of these three explanations apply

when the observer reacts to the target's emotional experience with an emotion that is different from what the target feels. Although this second case of non- matching receives little attention in the empathy literature, some of the processes could account for it if the observer's conditioning history or emotional memory involves an emotional response that is different from what the target feels. Other mechanisms offer no explanation.

Appraisal Theory of Emotion

Many of the current empathy mechanisms are limited in their ability to explain non- matching because they focus on the target's emotional *state* as the primary cause of empathy. If the target displays no emotion, then the observer will feel no vicarious emotion. Adam Smith (1759/2002) had a different idea in his *Theory of Moral Sentiments*:

Even our sympathy⁶ with the grief or joy of another, before we are informed of the cause of either, is always extremely imperfect. General lamentations, which express nothing but the anguish of the sufferer, create rather a curiosity to inquire into his situation, along with some disposition to sympathize with him, than any actual sympathy that is very sensible. The first question which we ask is, What has befallen you? Till this be answered, though we are uneasy both from the vague idea of his misfortune, and still more from torturing ourselves with conjectures about what it may be, yet our fellow- feeling is not very considerable. *Sympathy, therefore, does not arise so much from the view of the passion, as from that of the situation which excites it* [emphasis added]. (pp. 14-15)

In other words, Smith argues that empathic emotions are not based on how we perceive the other's state, but rather they are based on how we interpret the other's situation. If this is true, then non-matching emotional responses are no longer a problem—the observer's emotion is not limited to what the target feels, but instead it can be any emotion that the observer's interpretation of the target's situation can produce. Smith's emphasis on how we interpret others' situations fits nicely with appraisal theories of

⁶ The word empathy did not exist in the English language during Smith's time, so he uses the term sympathy to refer to "fellow-feeling"—what we mean by empathy.

emotion, which we can use to connect empathy to emotion theory.

Just as Smith argued that our empathic emotions are based on how we interpret another's situation, appraisal theories argue that firsthand emotions are based on how we interpret our own situations (Ellsworth & Scherer, 2003; Lazarus, 1991; Roseman, Spindel, & Jose, 1990; Scherer, 1984; Siemer, Mauss, & Gross, 2007; C. A. Smith & Ellsworth, 1985). Appraisal theories make three general claims about emotion. First, emotions are based on appraisals of the situation. Second, the boundary between qualitatively different emotions is continuous. Third, emotions have universal patterns of appraisal.

Emotions are Based on Appraisals of the Situation

Appraisal theories argue that emotional experience is based on evaluative interpretations of the situation (appraisals). In some of their early research, appraisal theorists tried to find combinations of appraisals that could map out typical emotional experience (Scherer, 1984; C. A. Smith & Ellsworth, 1985). As one example, C. A. Smith and Ellsworth (1985) found that subjects differentiated 15 emotion labels (e.g., happiness, pride, anger, guilt) with six appraisals. First, there was the appraisal of how pleasant the situation was (pleasantness). Second, there was the appraisal of how much effort was needed to deal with the situation (anticipated effort). Third, there was the appraisal of how much the situation was out of anyone's control (situational control). Fourth was the appraisal of how much oneself or another person was responsible for the situation (self-other agency). Fifth was the appraisal of how much their attention was drawn to the situation rather than diverted away from the situation (attentional activity), which is akin to the appraisal of novelty in other appraisal models (e.g., Scherer, 2013). Finally, there was the appraisal of certainty about what was happening

in the situation or what would happen next (certainty; for a review of appraisal theories and other proposed dimensions of appraisal, see Ellsworth & Scherer, 2003). C. A. Smith and Ellsworth initially proposed appraisal dimensions for legitimacy and perceived obstacle as well, but legitimacy was subsumed by pleasantness, and perceived obstacle was subsumed by pleasantness and anticipated effort. The factor on which effort and perceived obstacle loaded most strongly is akin to the appraisal of goal conduciveness in other appraisal models (e.g., Lazarus, 1991; Scherer, 2013).

Figure II.1 displays a schematic plot of where six of the emotions fell along four of the appraisal dimensions. Some emotions had largely overlapping patterns of appraisal—sadness and fear differed primarily on the appraisal of certainty, whereas happiness and challenge differed only on the appraisal of anticipated effort. So if two patients waiting to hear the results of their cancer screening tests feel sad and scared, an appraisal theorist would expect the sad patient to feel more convinced that the test will be positive (certainty appraisal) than the scared patient, though both would find it unpleasant (pleasantness appraisal) and out of anyone’s control (situational control appraisal); if two people working on a puzzle feel happy and challenged, an appraisal theorist would expect the latter to find the puzzle to be more difficult (anticipated effort appraisal) than the former, though both would find it enjoyable. Other emotions had very little overlap—pride and fear differed on pleasantness, anticipated effort, certainty, situational control, and self-other responsibility. This can be seen in Figure II.1, where pride and fear appear on opposite sides of each appraisal dimension.

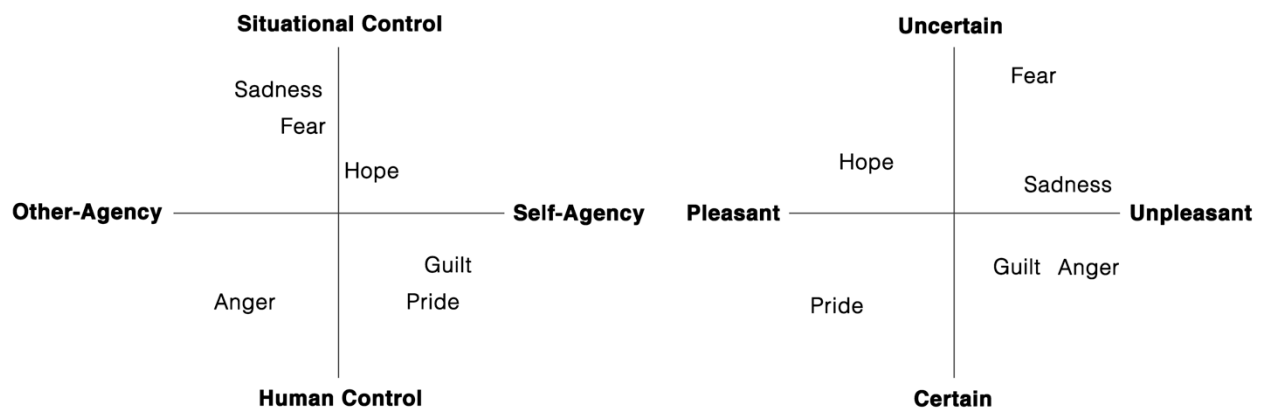


Figure II.1. Appraisal patterns of emotions. This schematic plot of six emotions along four appraisal dimensions is based on results from C. A. Smith & Ellsworth (1985).

The way that people appraise situations along the appraisal dimensions can vary continuously. One does not need to have either full control or no control in a situation, but there can be degrees of control. The outcome of a situation does not need to be either completely certain or completely uncertain, but there can be degrees of certainty. The facts that emotional experience is based on appraisals and that appraisals vary continuously brings us to the second claim of appraisal theories: the boundary between “qualitatively different” emotions is continuous.

Boundaries Between Emotions are Continuous

The common sense view of emotions is that they are discrete states that are governed by separate psychobiological systems. You feel fear because there is a dedicated fear system that turns on. You feel joy when a dedicated joy system turns on. Your anger ends when the anger system turns off. In the emotion literature, this is called a categorical or basic emotions theory (Ekman, 1992; Izard, 2007). In contrast, appraisal theories argue that the boundaries between different emotions are continuous. There are no separate emotion systems. Because our appraisals of situations occur along

a continuum and what we feel is based on our appraisals, so too our emotional experiences occur along a continuum. When we say that we feel angry, we are really describing a variety of emotional experiences that shade into each other with no clear boundaries. There can be many different kinds of anger that vary somewhat in the pattern of appraisal, but that are similar enough for us to use the same word to describe them. Even the boundary between experiences that we call anger and experiences that we call fear or any other emotion is fuzzy. From an appraisal theory perspective, we use emotion labels such as “anger,” “fear,” “gratitude”, and “hope” because they describe common feelings that go with common ways that we appraise situations, not because they have separate emotion systems (Scherer, 1984; 1994).

From a basic emotions perspective, the question for empathy research to answer is how seeing another person’s emotion system turned on (e.g., that person’s sad system) activates one’s own system for the same emotion (one’s own sad system). From an appraisal theory perspective, this is the wrong question to ask because there are no distinct emotion systems. Instead, the question to ask is how appraisals of the situation contribute to both firsthand and vicarious emotions. We believe that an answer to this question can be found in a third claim of appraisal theories: that emotions have universal patterns of appraisal.

Emotions Have Universal Patterns of Appraisal

Appraisal theories claim that any two people who appraise situations in the same way, regardless of whether they appraise the same situation or different situations, will feel the same thing (Scherer, 1997). This is the way that emotions are universal. So far appraisal theorists have only discussed the universality of appraisals when different people react to situations that happen to them personally. Appraisal theorists have not

said much about feeling emotions for someone else, either the same or different emotions. Nevertheless, we think that the claim of universal patterns of appraisal is the way to bridge emotion theory and empathy theory—an observer who appraises a target’s situation in the same way that the target appraises it will feel the same emotion as the target.

An Appraisal Theory of Empathy

We propose an appraisal theory of empathy based on appraisal theories of emotion. Although others have discussed appraisals in the context of empathy (Omdahl, 1995), the implications of appraisal theory for empathy are missing from the peer-reviewed literature. When appraisals are mentioned by empathy theorists, they are treated as moderators that change or eliminate empathy (Lamm et al., 2007a; Lamm et al., 2007b; Preston & Hofelich, 2012) A central element of an appraisal theory of empathy is that an observer’s appraisal of a target’s situation crucially determines the observer’s vicarious emotional experiences, including empathy.

According to the theory, empathy is possible whenever an observer appraises a target’s situation. If the observer appraises the target’s situation the same way as the target, then empathy occurs. If the observer appraises the target’s situation differently, then a different emotional experience occurs. Empathy is not a special process. Instead, it is a part of normal emotion processes.

The Relationship Between Empathy, Vicarious Emotions, and Firsthand Emotions

The phenomenon that empathy researchers want to explain is emotion matching. Some theorists have found it useful to identify empathy as the process that produces emotion matching rather than the outcome itself (Hoffman, 2000; Preston & de Waal, 2002). This approach works well if one assumes that emotion matching requires a

unique process. In contrast, in an appraisal theory of empathy, empathy is just one possible outcome of a general emotion process. What distinguishes empathy from other emotional experiences? Empathy occurs when an observer appraises a target's situation and appraises it in the same way as the target.

Empathy and other vicarious emotional experiences. How does empathy relate to non-matching vicarious emotions, such as feeling scared for someone who is sad? In an appraisal theory of empathy, all vicarious emotions occur when an observer appraises a target's situation. The difference is that with empathy the observer's appraisal and the target's appraisal match and with other vicarious emotional experiences they do not.

Imagine that your friend got sick following an international vacation that the two of you took together. You are waiting with your friend in the hospital to hear the results of a test for malaria. Both you and your friend think that a positive test result would be awful (low pleasantness appraisal) and that your friend was extremely unlucky (high situational control appraisal). Your friend feels fairly sure that the test will come back positive (moderate certainty appraisal) and feels sad. If you also feel confident that the test will be positive, then you will feel sad with your friend. We would call this empathy because you feel what your friend feels. If, however, you feel that you have no idea what the test result will be (low certainty appraisal), then you will feel scared for your friend. We would call this a non-matching vicarious emotion because it is not what your friend feels. The only difference is whether you have appraised the situation in the same way as your friend or not.

If we could quantify how certain you are about the negative outcome, then would your sadness become fear—would your empathy become a non-matching vicarious emotion—when you are 70% certain? What about 60% certain? Or would it

have to be as low as 50% certain? What if you go back and forth between feeling certain and uncertain about the test result while you wait with your friend? You would waver between empathy (sadness in this case) and vicarious fear. The degree to which your appraisals match—and to which your emotional experience is empathic and not just vicarious—is continuous. There is no distinct boundary between empathic and non-matching vicarious emotions, just as there is no distinct boundary between sadness and fear. You might experience multiple vicarious emotions as your appraisal of the other's situation unfolds.

Vicarious emotions and firsthand emotions. How do empathy and other vicarious emotional experiences relate to firsthand emotions? From an appraisal theory perspective, all emotions are part of the same appraisal process. The difference between firsthand and vicarious emotions is whether observers appraise something that happens to themselves or something that happens to someone else.

Imagine again that you are waiting with your friend in the hospital. As you wait with your friend, you begin to wonder if you should also get a malaria test. You begin to entertain the real possibility that you too have malaria but you feel terribly uncertain about it. Now your appraisals are like the example of vicarious fear above, but you are appraising your own situation and not your friend's situation. We would call this a firsthand, non-vicarious emotion.

The line between firsthand emotions and vicarious emotions is not defined by whether or not the target's situation has personal consequences for the observer, but by what the observer is appraising in the moment. You may simultaneously fear that your friend has malaria and that you have malaria, or you may feel each fear in turn as your attention shifts between your friend and yourself.

Several theoretical perspectives on empathy emphasize that the observer must

maintain a sense of self as distinct from the target for emotion matching to become true empathy and not to become a firsthand emotional experience (Decety & Chaminade, 2003; Eisenberg et al., 1991; Singer & Lamm, 2009). The self-other distinction is important for theories where the target's emotional state automatically causes the same emotion in the observer. The idea is that if an observer automatically matches a target's emotion, then she might become confused and think that something is happening to her. Therefore, the observer must maintain a self-other distinction in order to remember that the cause of her emotion is something that happened to the target and not something that happened to her. If she maintains this self-other distinction, then she experiences empathy; otherwise she feels some firsthand emotion. From the perspective of an appraisal theory of empathy, observers already know whether they are appraising something that has happened to them or to the target, and in some situations they appraise both. Observers are aware of what caused their emotions and there is not the same risk of confusion that comes from context-free automatic matching processes.

In summary, the differences between firsthand emotions, empathy, and other vicarious emotional experiences have to do with what one appraises (another's situation or one's own situation) and how one appraises it (in the same way as the other or differently from the other). What they have in common is that they are all a part of the same general emotion process. Empathy is one possible outcome of the process. Alternative outcomes are common. We discuss this point next.

Empathy is One Possible Outcome of the Appraisal Process

It is sometimes called an empathy failure when an observer does not match a target's emotions, as though empathy is the default outcome of encountering another's emotional experience and a lack of empathy means that something has gone wrong

(Cikara et al., 2011). In contrast, the appraisal theory perspective treats empathy as a special case of the observer's appraisal process. Alternative outcomes that are discussed in the empathy literature such as empathic anger, personal distress, and schadenfreude are also special cases of the same appraisal process.

Imagine that your co-worker has just learned that she will be laid off. Your co-worker finds this to be an unpleasant event (low pleasantness appraisal) that it is likely to happen (moderate certainty appraisal). Your co-worker believes that the general state of the economy made it necessary for the company to cut costs and so she lost her job due to bad circumstances (a high situational control appraisal). An appraisal theorist would predict that appraisals of low pleasantness, moderate certainty, and high situational control would mean that your co-worker feels sad about losing her job. You also appraise her situation to be unpleasant, certain, and caused by bad circumstances. You feel sad for your co-worker. This is prototypical empathy.

Now imagine a similar scenario, but you know something that your co-worker does not know. You know that the boss dislikes her and has wanted to find an excuse to fire her for a long time. You appraise the situation differently—like your co-worker, you still find it to be unpleasant and certain, but you believe the boss is lying about the bad economic circumstances and you blame the boss for your co-worker's job loss (a low situational control appraisal and high other-agency appraisal). An appraisal theorist would predict that the appraisal of low situational control and high other-agency would make you feel angry. You feel angry for your co-worker but your co-worker feels sad. This experience departs from the empathy prototype because the appraisals differ. Some call this empathic anger, even though the target is not angry (Vitaglione & Barnett, 2003).

Perhaps instead your co-worker's situation reminds you that the boss has asked

to meet with you later. You suspect that you will be laid off next and you prepare yourself to cope with the loss of your job. You feel that this is an unpleasant event (low pleasantness appraisal), you feel somewhat confident that it will happen (moderate certainty appraisal), and you blame the bad economy (high situational control appraisal). You are no longer paying attention to your co-worker's situation, even though your appraisal pattern matches hers and you also feel sad. This experience departs from the empathy prototype because you are appraising your own situation rather than your co-worker's situation, even though your co-worker's situation contributed to your emotional state and your appraisal patterns match. This is personal distress (Batson, Duncan, Ackerman, Buckley, & Birch, 1981; Eisenberg, Fabes, Schaller, & Miller, 1989; Singer & Lamm, 2009).

Finally, the person who gets laid off might not be just any co-worker, but someone who you think is a jerk. You might not appraise the situation as a bad thing at all, but as a well-deserved punishment (high pleasantness) that will definitely happen (high certainty) and that is your co-worker's own fault (low situational control/high other-agency). You feel happy that justice has been done. This experience departs from the empathy prototype because your appraisal differs (more radically than in the previous example). This is *schadenfreude* (Cikara et al., 2011; R. H. Smith, Powell, Combs, & Schurtz, 2009).

Each of these cases involves a different emotional outcome, but each comes from the same appraisal process. What differs is what you appraise (your own situation or another's situation) and how you appraise it (in the same way as or in a different way from the other person). There are no empathy failures because empathy is not the default outcome. The same appraisal process is involved in all emotional experience, not just empathy.

We have now presented the basic ideas behind an appraisal theory of empathy and vicarious emotions. We evaluated other theories of empathy based on their ability to explain matching and non-matching emotional responses to others' emotional experiences. In order for the appraisal theory of empathy to be useful, it must address the two non-matching problems.

Appraisal and the Non-Matching, Unemotional Observer

From an appraisal theory perspective, an observer should feel emotional for a target as long as the observer appraises the target's situation. If the target's situation does not attract the observer's attention, which involves appraisals of novelty, or if the observer lacks enough information to appraise the target's situation, then the observer will react relatively unemotionally.

Novelty. Emotional episodes begin when something changes. In appraisal theories this involves the appraisal of novelty. Although the focus of appraisal theories has been on novel events that happen to oneself, the "something new" could be someone else's emotional expression, such as when a person near you begins to furrow her brow, clench her teeth, and ball her fists. Or it could be someone else's situation, such as when you hear on the news that an apartment caught fire and dozens of residents are now without a home.

If the observer is too distracted or if the event is too subtle, then she is unlikely to detect that something new has happened and feel emotional for a target. As with other empathy theories, the observer must notice the target's emotion expression or situation. If the observer is occupied with work, watching television, daydreaming, in the middle of a conversation with someone else, or engrossed in some other emotional experience, then she is unlikely to react emotionally to the target's situation. If the target inhibits his emotional expression, then the observer might be less likely to notice, appraise what has

happened, and feel emotional for the target.

The target's emotion expression or situation must truly be novel from the observer's point of view. If the target is always in a foul mood, then a scowl is nothing new. If the observer encounters situations like the target's on a routine basis, then even if it is novel for the target, the observer might not react emotionally. Perhaps this is one reason why doctors have weak vicarious responses to images of physical pain (Y. Cheng et al., 2007; Decety et al., 2010)—when you treat patients every day, the novelty wears off.

Lack of Information. Once the target catches the observer's attention, the observer must have enough information about the target's situation to make some relevant appraisals. If the observer lacks sufficient information about the target's situation, then he might feel little more than confusion.

The discussion of direct and indirect perception is relevant here. Observers who perceive targets' situations directly might often have more information about what happened compared to those who learn about it indirectly. If they learn about what happened to the target through language or imagination, they might have a harder time understanding the situation well enough to make an appraisal. Emotional memories might not just make an observer emotional because of the past personal experience, but they might also fill in some gaps in the observer's appraisal of the target's situation. So if a target discusses her divorce, an observer might use his own experience of divorce to better understand what exactly the target is going through. His appraisal of the target's situation is supplemented by his own experience. This might change if the target points out differences in their experiences or if the informational value of the observer's own experience is otherwise called into question. If past experiences help observers appraise targets' situations, then this might be one reason why people are more sympathetic

toward each other when they have had similar experiences (Barnett, Tetreault, & Masbad, 1987; Hodges, Kiel, Kramer, Veach, & Villanueva, 2010)—those who lack experience are not sure how to make an appraisal.

The information that the observer has does not need to be complete in order for him to feel something for the target. It only must be enough to make him feel confident in his appraisal (for a similar argument about firsthand emotions, see Tong, Teo, & Chia, 2014). In many cases of vicarious emotions, the information that the observer has about the target's situation is likely to be incomplete. As a result, the observer's emotions will differ from the target's emotions to the extent that the different information leads to different appraisals (and we return to this point later).

Empathy theorists generally emphasize perception of another's emotional state rather than situation as the primary cause of empathic emotions. Although an appraisal theory of empathy and vicarious emotions emphasizes perception of another's situation, emotional expressions also provide information about the situation. Indeed, observers use targets' emotional expressions to make inferences about both the observers' own situations (Parkinson, 2011; Parkinson & Simons, 2009) and about how the targets evaluate their own situations (de Melo, Carnevale, Read, & Gratch, 2014; Hareli & Hess, 2010; Scherer & Grandjean, 2008; van Kleef, 2009; van Kleef et al., 2011). Most obviously, emotional expressions usually communicate whether something good or bad has happened. Expressions of emotions such as joy, fear, and sadness might be sufficient to trigger an observer's appraisals of pleasantness. For these emotions, an observer might trust the emotional expression of the target unless given a reason not to do so. For example, if the observer believes that the target is chronically anxious, then the observer might not believe that the target's fearful emotional expression is informative. Some emotions, such as anger, might require knowledge of the situation

before they are vicariously experienced. There is too much risk in setting oneself against the object of the target's anger before knowing whether this third party actually did something wrong (A. Smith, 1759/2000).

We have discussed ways in which a lack of novelty or a lack of information could lead the observer to react relatively unemotionally. Another way that an observer might react "unemotionally" is when the observer appraises the target's situation as a neutral event rather than as something good or bad. This involves appraisals that contribute to the valence of the situation, and it brings us to the question of goals in emotion. We discuss valence next.

Valence. Next comes the problem of valence—is what happened good or bad? What makes it good or bad? To answer this question for firsthand emotions, many have emphasized that emotions are about personal goals or personal wellbeing (Frijda, 1988; Lazarus, 1991; Lazarus & C. A. Smith, 1988; Moors, 2010; C. A. Smith et al., 1993). If an event helps you achieve some personal goal, then it's good. If it gets in the way of a personal goal, then it's bad. Empathy becomes an anomaly because it seems to have little do with our own goals.

Some empathy theorists have dealt with this problem by proposing processes that link vicarious emotions to past emotional experiences that did involve personal goals (classical conditioning, direct and mediated association, role-taking, some aspects of perception-action models). Others have dealt with it by proposing processes that operate independently of the emotional context (mimicry, mirror neurons, some aspects of perception-action models), so that goals are irrelevant. Emotion theorists have dealt with it by remaining silent about vicarious emotions .

All appraisal theorists think that goals are important for emotion. This has led them to propose appraisals of goal relevance—the extent to which the situation impacts

one's goals, needs, or other aspects of personal wellbeing—and goal congruence—the extent to which the situation advances or obstructs these concerns (Lazarus, 1991; Roseman et al., 1990; Scherer, 2013; C. A. Smith & Ellsworth, 1985). Some appraisal theorists believe that all emotions are about personal goals or concerns (Frijda, 1988; Lazarus, 1991). These theorists often call goal relevance and goal conduciveness “primary appraisals” because there can be no emotion without them (Lazarus, 1991). This means that what happens to us can only make us emotional if it affects our personal wellbeing. For example, if what happens to someone else affects your own situation, then it should affect your firsthand emotions. If you learn that another person was rejected for a job that you applied to, then you've lost a competitor and have a better chance to get the job yourself. If the parents of a young child die, then the child has lost the people who take care of him.

From the perspective that all emotions are about personal wellbeing, emotions for others are a challenge. If what happens to someone else does not affect your own situation, then you should only feel emotions for the other person if you have made their wellbeing a personal goal. When something good happens to them, you should appraise it as goal-congruent and feel some pleasant emotion. When something bad happens to them, you should appraise it as goal-obstructive and feel some unpleasant emotion.

The strong claim that emotions are always about personal wellbeing does not just suggest that we should feel less emotional for strangers than for close others—it implies that we should not feel emotional at all. This does not seem to be the case. Some of the earliest experimental work on appraisal theory had American college students watch videos of men from an indigenous tribe in Australia who had the underside of their penises cut as part of a cultural tradition (Lazarus & Alfert, 1964; Speisman,

Lazarus, Mordkoff, & Davison, 1964). It seems unlikely that the students either spontaneously adopted goals for the wellbeing of the men in the video or that they became concerned that the same thing would happen to them.

More likely, the American college students appraised the procedure as intrinsically unpleasant even though it was motivationally irrelevant. Some appraisal theorists have maintained a separation between appraisals of intrinsic pleasantness, the pleasantness of the situation in the absence of any salient motivation, and appraisals of goal congruence. Although intrinsic pleasantness and goal congruence jointly contribute to valence and determine whether a positive or negative emotion will be felt (Aue & Scherer, 2008, 2011), there is utility in separating them. First, goal congruence is inapplicable if the goal relevance of an event is low, whereas intrinsic pleasantness is still applicable. Second, goal congruence can qualify the impact of intrinsic pleasantness on the emotional experience. Muscle pain is likely to be a negative experience in the absence of a salient goal, but positive if it is interpreted as a sign of progress toward a fitness goal (as expressed in the saying, "no pain, no gain"). And the sound of one's favorite song is pleasant during leisure time, but potentially unpleasant during work time if it becomes distracting. This division allows motivational concerns to have a place when they are relevant without (a) making it impossible for people to feel emotions when they do not want anything in particular, such as feeling amused when you hear a funny joke, or (b) making it necessary to invent a goal, need, or other motivational construct to fit every emotional situation, such as deciding that the joke must be congruent with your need to be entertained.

Separating intrinsic pleasantness from motivational concerns makes it possible to feel emotions that are not about personal goals, but it raises other questions about emotions for others. Do we only appraise a situation as good or bad when we think it

could happen to us? Or do we appraise it as good or bad without inserting ourselves into the situation? In other words, we might not think that things like being excluded from a group are unpleasant because they're happening to us, but we might just think they are unpleasant for anybody. This might be all that is needed to feel positive and negative vicarious emotions. Inserting oneself into the situation might actually counteract the vicarious emotions when, through social comparison, an observer feels either relieved because the target's misfortune has not happened to him or envious because the target's good fortune has not happened to him (Brandstätter, 2000; R. H. Smith, Eyre, Powell, & Kim, 2010).

The proposition that we appraise the pleasantness of situations without the need to personally experience them is speculative, but if it is true, then there are several ways that intrinsic pleasantness and motivational concerns could influence emotions for others.

First, if the target's situation is not relevant to the observer's goals, then the observer's appraisal of intrinsic pleasantness should drive the valence of the observer's vicarious emotions. If you learn that some poor children are starving, you appraise their hunger as intrinsically unpleasant, even though it does not affect you personally, and you feel some negative emotion for them. If you learn that these hungry children now have food, then you appraise this as intrinsically pleasant and feel some positive emotion for them.

Second, if the target's situation is relevant to the observer's goals but it does not affect whether or not the observer attains the goal, then the observer's salient goal could still influence her appraisal of how pleasant the target's situation is. Thirsty observers think that a lost hiker's worst peril is a lack of water, but cold observers think it's a lack of warm clothes (Van Boven & Loewenstein, 2003; O'Brien & Ellsworth, 2012). If you are

hungry when you learn that some poor children are starving, you should appraise the situation as even more unpleasant than you would if you were sated. Your relief on their behalf should be greater when you learn that they now have food. If a target is hungry from religious fasting, then devout observers should appraise the situation as consistent with religious motives and nonreligious observers should appraise it as goal-irrelevant and intrinsically unpleasant.

Third, if the target's situation is relevant to the observer's motivational state and it advances or obstructs the observer's goals, then the observer's appraisals of goal-relevance and goal-congruence will drive the valence of the observer's emotion. In this case the emotion is likely to be firsthand and not vicarious. For example, if your competitor for a job withdraws his application and takes a position at another company, then you should appraise the situation as congruent with your goal to get the job. If the competitor takes the job that you want, however, then you should appraise the situation as goal-obstructive.

Fourth, if the observer has a goal about the wellbeing of the target, then the observer's appraisals of goal-congruence will drive valence. If your goal is for another person to be happy, as with loved ones, then you should appraise whatever contributes to the other person's wellbeing as goal-congruent and whatever detracts from the other person's wellbeing as goal-obstructive. If your goal is for the target to suffer, as with a desire to punish someone who has acted unfairly (Singer et al., 2006), then you should appraise whatever contributes to the other person's wellbeing as goal-obstructive and whatever detracts from the other person's wellbeing as goal-congruent. In this case, the observer's emotional reaction can be connected more closely to the target's emotion than to the situation by itself. For example, you might not find losing a teddy bear to be a particularly troubling situation. However, if your child is crying because he cannot find

his teddy bear, then you might find the situation unpleasant because it upsets your child, which is inconsistent with your goal to keep your child happy. Parkinson and Simons (2012) call this kind of experience, when we feel emotional about another's emotion, an interpersonal meta- emotion.

The general proposal from an appraisal theory of emotions for others is that an observer will feel an emotion for a target, regardless of whether or not the target feels emotional, as long as the target's situation catches the observer's attention, the observer has enough information to appraise the target's situation, and the observer appraises the target's situation as something good or bad. If the target's situation lacks novelty, the observer lacks information about the target's situation, or the observer appraises the target's situation as neutral rather than good or bad, then the observer will respond unemotionally, regardless of what the target feels. Given that the observer feels some emotion for the target, the next question is how to explain vicarious emotions that do not match what the target feels.

Appraisal and the Non-Matching, Emotional Observer

Sometimes observers describe themselves as "identifying with" targets. We suspect that when an observer identifies with a target, it means that he recognizes that he appraises the target's situation the same way as the target (and therefore empathizes). However, if the observer does not identify with the target, meaning that he appraises the target's situation differently from the target, then that does not mean that the observer responds unemotionally. Instead, the observer can feel a vicarious emotion that does not match what the target feels.

In an appraisal theory of empathy and vicarious emotions, empathy occurs when an observer appraises a target's situation in the same way as the target. If the observer appraises the target's situation differently, then the observer will have a non-matching

vicarious emotional experience. The benefit of the appraisal theory of empathy is that one can predict specific matching or non-matching emotions if one knows the observer's pattern of appraisals. The non-matching appraisals hypothesis can be broken down into two more specific hypotheses.

First, the observer's and target's emotions will not match if they use different information to appraise the target's situation (different information hypothesis). This can occur if the observer knows more about the target's situation than the target knows or if the target has not communicated all of the important information about the situation to the observer. This is how we feel fear for the protagonist of a horror film who, unlike us, does not know that the killer is lurking around the corner. Empirically, the different information hypothesis can be tested by giving information to an observer about a target's situation that the target lacks. This information should affect the observer's appraisal of the target's situation and the observer's corresponding emotions. There is limited evidence in support of the different information hypothesis from a study in which subjects' empathic responses to patients undergoing a painful medical treatment were affected by their knowledge of whether or not treatment was successful (Lamm et al., 2007a). Presumably, the patients (who were actually actors posing as patients) did not know whether the treatment would succeed. This study was not designed to vary the dimensions from appraisal theories and more research is needed to test the different information hypothesis. In a recent paper in the organizational psychology literature about affective linkage, Elfenbein (2014) discusses how the similarity of people's emotional reactions might depend on whether they have a shared vantage point, which is similar to our different information hypothesis.

Second, the observer's and target's emotions will not match if their psychological states are likely to lead them to appraise the same information differently (different

states hypothesis). To put this hypothesis another way, the same facts of the situation are available to the observer and the target, but differences in their psychological states cause differences in their appraisals. A similar idea was presented by Elfenbein (2014) in her discussion of convergent and divergent affective linkages when two people have a high shared vantage point.

As one example of the different states hypothesis, some research suggests that people of high power and high social class, or those who have been primed to feel that they are high power or high social class, are less empathic and compassionate than those with low power or low social class (Kraus, Côté, & Keltner, 2010; Piff, Kraus, Côté, Cheng, & Keltner, 2010; van Kleef et al., 2008). Empathy research generally involves situations in which the target is sad or afraid, both of which are emotions that usually are high in appraisals of situational control (C. A. Smith & Ellsworth, 1985), and people who feel powerful might be unlikely to make high situational control appraisals (Kraus et al., 2010; Tiedens, Ellsworth, & Mesquita, 2000). As a consequence, observers who feel powerful (high personal control) should be less likely to empathize with high situational control emotions such as sadness and fear, but they may be more likely to empathize with high human agency emotions such as anger and pride.

As another example of the different states hypothesis, when the observer and target have different goals then they should appraise the same facts of the target's situation differently. One mundane example is sporting events. If the star player on an observer's opposing team is injured by a member of the observer's team, this is inconsistent with the player's desire to win the game but it is consistent with the observer's desire for the opposing team to lose. Observers in this scenario might ignore their own team's fault in the injury more than the injured player and differ in their agency appraisals (Hastorf & Cantril, 1954) or they may simply feel happy about the

injury because of its goal-congruence (Ellsworth & Scherer, 2003).

As a third example of the different states hypothesis, the observer and the target might have different comparison standards that come to mind when they appraise the target's situation. For example, suppose your friend has just had his heart broken by the woman he loved. Many would find this situation reasonably painful and feel sad with their friend. On the other hand, if earlier that same day you learned that another friend's spouse was killed in a car crash, then the heartbreak might not seem so bad and you might not feel so sad.

The psychological states that affect empathy could involve chronic differences in thinking based on things like social class, culture, and experience or they could involve temporary differences in thinking based on the current context. They could change how the observer and target appraise the same features of the target's situation or change how much attention they pay to specific features. Either way the different states hypothesis predicts that any differences in the observer's and target's psychological states that produce differences in their appraisals of the target's situation will produce non-matching emotions, even if the observer and target have access to the same information about the situation.

The major strength of the appraisal theory of empathy and vicarious emotions is that it makes general organizing predictions about emotion matching that can be translated into specific, novel hypotheses. Equipped with research-based knowledge of the appraisal profiles of different emotions, researchers can manipulate or measure appraisals to predict both empathic and non-matching vicarious emotions. Alternatively, researchers can use an observer's emotional response to a target's situation to infer the observer's appraisals. Problematic appraisal dimensions can be

identified and targeted for interventions that increase empathy.

Implications of the Theory for Perspective Taking

Perspective taking is discussed as a mechanism for empathy both in Hoffman's theory and in some perception-action approaches (Decety & Jackson, 2006; Decety & Moriguchi, 2007; Hoffman, 2000). Perspective taking is considered to be an effortful process that is especially important when more automatic processes do not cause empathy. We propose that perspective taking can cause empathy if it either directs an observer's attention to important features of the target's situation that are not salient or changes the observer's appraisals so that they match the target's appraisals.

Most experimental manipulations of perspective taking ask subjects to consider what a target is thinking or feeling (Batson, Early, & Salvarani, 1997; Lamm et al., 2007a). According to an appraisal theory of empathy and other vicarious emotional experiences, these general instructions should only succeed if the subject attends to the appropriate features of the target's situation and appraises them the same way that the target appraises them. Imagine if instead researchers were to use more guided perspective taking manipulations. For example, perspective taking instructions could be specific about which aspects of the target's situation subjects should consider. Or, if the researcher believes that the subject's appraisal of the target's situation will differ from the target's appraisal, then the researcher could address the problematic appraisal dimensions directly. For example, the appraisal of perceived effort differentiates frustration from boredom and challenge from happiness (C. A. Smith & Ellsworth, 1985). Observers who have experience with tasks are likely to appraise them as less effortful than targets who are trying them for the first time. It may be more effective to remind the experienced observers how much effort it took their first time than to give

them general perspective taking instructions. Guided perspective taking instructions also might produce empathy more effectively when the observer and target have a conflict of interest (Epley et al., 2006).

We are not aware of any research that has used specific appraisals to guide perspective taking. The effects of perspective taking on empathy might be mediated by changes in the observer's appraisals, but research is needed to test this idea. The effects of perspective taking on appraisal also may explain its success at increasing compassion (Batson et al., 1997; Batson & Ahmad, 2001; Coke, Batson, & McDavis, 1978). Although there are only *ad hoc* descriptions of compassion appraisals that are not based on empirical investigations (Goetz, Keltner, & Simon-Thomas, 2010), there is strong evidence that appraisals of high situational control make people feel compassion for others (Schwarzer & Weiner, 1991; Weiner, Graham, & Chandler, 1982). Other research has demonstrated that perspective taking can decrease the actor-observer bias by increasing observers' situational attributions for actors' behavior, particularly for negative events (Betancourt, 1990; Galper, 1976; Gould & Sigall, 1977; Storms, 1973; Vescio, Sechrist, & Paolucci, 2003). When perspective taking manipulations are employed in typical compassion research paradigms, they might increase compassion by directing subjects' attention to situational causes of a target's misfortune. Appraisals of situational control might mediate the effects of perspective taking on compassion in typical compassion experiments.

Beyond Association-Based Processes for Vicarious Emotions

The history of empathy research in psychology is rich with association-based processes.⁷ In classical conditioning, the target's emotional experience is associated with

⁷ We are grateful to Richard Gonzalez for this idea.

an unconditioned stimulus that produces the observer's empathic emotion. In mediated association, direct association, and role-taking the target's experience is associated with the observer's emotional memories that produce the empathic emotion. In mimicry, the target's emotional experience is associated with the observer's emotional expression, which is associated with the related emotion. In mirror neuron and perception-action theories, the target's emotional experience is associated directly with the observer's representation of the same emotional state.

The main limitation of association-based processes is that they do not explain the variety of vicarious emotional experiences that diverge from a target's experience. We do not propose that such associative processes do not occur, just that they are incomplete. Appraisal theory complements some of them well. With classical conditioning, the conditioned cues might continue to signal that some pleasant or unpleasant situation is coming, but the observer's emotional response depends on his current appraisal of the situation, not just the past appraisal. If the observer feels greater or lesser degrees of control, for example, then he might feel angry instead of afraid, or vice versa. We have discussed how the emotional memories from direct association, mediated association, and role-taking might help the observer appraise the target's situation. Nevertheless, the appraisal theory, as a theory of emotion in general rather than empathy in particular, can go beyond association-based processes to explain a broader range of emotional phenomena, including empathy and non-matching vicarious emotions, without becoming so broad that it loses its theoretical value.

Conclusion

Empathy, feeling what another person feels, has a name. It has been treated as a special kind of phenomenon that is separate from firsthand emotional experience. Current empathy theories explain it fairly well. Empathy's sibling, feeling something

for others that they do not feel, remains nameless. Despite their strong resemblance to empathy, non-matching vicarious emotions are neglected by empathy theorists as well as emotion theorists. Yet, are empathy, non-matching vicarious emotions, and firsthand emotions really three separate phenomena that require three separate explanations?

We have introduced an appraisal theory of empathy and vicarious emotions based on appraisal theories of emotion to provide a unified view of emotion in which the same appraisal process explains all three phenomena. The differences among the three are what one appraises and how one appraises it. The main propositions from the theory are:

1. Firsthand and vicarious emotions are based on appraisals of situations.
2. Firsthand emotions occur when observers appraise their own situations and vicarious emotions occur when observers appraise targets' situations.
3. An observer has a relatively unemotional reaction to a target's emotional experience when:
 - a. The observer does not appraise the target's situation.
 - b. The observer appraises the target's situation as ordinary rather than novel.
 - c. The observer does not have enough information about the target's situation to appraise it.
 - d. The observer appraises the target's situation as neutral rather than pleasant or unpleasant.
4. Empathy occurs as a special case of vicarious emotions when the observer appraises the target's situation in the same way that the target appraises it.
5. An observer has an emotional reaction to a target's emotional experience that does not match what the target feels when:

- a. The observer appraises the target's situation differently from the target because the observer and target use different information to appraise the situation (different information hypothesis).
- b. The observer appraises the target's situation differently from the target because the observer and target are in psychological states that make them appraise the same information differently (different states hypothesis).

The theory emphasizes the perception of a target's situation. Although other theories have acknowledged the target's situation, it has not been the main thrust. Instead the target's emotional state or expression has been emphasized, especially in the more recent mirror neuron and perception-action theories. Additionally, the appraisal theory perspective makes novel predictions about how the target's situation influences an observer's vicarious emotions.

One of the central problems in the study of emotions for others is what makes something that is happening to another person good or bad to an observer. We have proposed several possible solutions, but each raises new questions. One solution is that we only feel emotions for others when they are relevant to our personal goals—but how do we feel emotions for strangers? A second solution is that we automatically feel whatever we think someone else feels—but how do we feel emotions for others that are different from what they feel? A third solution is that our emotions for others are based on personal emotional experiences that do involve personal goals—then why don't we ignore others and become focused on our own emotional memories?

We propose a new possible solution—perhaps we appraise situations as pleasant or unpleasant in and of themselves, and not just pleasant or unpleasant because they happen to us. And perhaps we can then understand situations in terms of other appraisals. This proposal is not so far-fetched. There is no doubt that human emotions

can be evoked by the experiences of others. Storytelling is universal across cultures. Even very young children are easily moved by the adventures of imaginary people, including members of other species such as Peter Rabbit. When Mr. McGregor suddenly appears, when he chases Peter with a rake, when Peter gets tangled in a net and can't escape, the child feels fear; when Peter escapes, the child feels relief. No one has to teach a child how to understand a story. Instead children seem able to understand emotional events without seeing the emotional expression of the characters and without ever having experienced the same events; they feel for Peter without ever having been chased by a man with a rake or caught in a net.

Empathy and other vicarious emotional experiences are still a problem, but not a unique problem. An empathy problem is why one person feels sad and a second person feels nothing about the same bad thing that happens to someone else. An emotion problem is why one person feels sad and a second person feels nothing about the same bad thing that happens to themselves. These two similar problems might have similar answers. Our answer is that the two problems have to do with appraisals of the situation.

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CHAPTER III

Feeling Emotions for Others That They Don't Feel: Agency Appraisals and Vicarious Anger

Emotions can feel contagious. When someone else laughs or cries it can feel as if their expression of emotion infects you with the same joy or sadness, even though nothing happened to you. Yet sometimes you feel emotions for others that they do not express at all. You can feel intensely embarrassed for a colleague who walks in front of an audience with toilet paper stuck to their shoe even if they do not realize it.

The case of feeling emotions for others, or vicarious emotions, is most interesting when whatever happened to them has little to do with what happened to you. Emotions are supposed to be about personal concerns (Frijda, 1988; Lazarus, 1991; Lazarus & Smith, 1988; Moors, 2010), so why would anyone feel emotions for others? Because of this problem, vicarious emotions are often treated as though they come from some special process, which has been the topic of empathy theories.

Some empathy theories have tried to address the problem by proposing that you automatically feel the emotions that you perceive in others because you mimic their emotion expressions and feel the mimicked emotion or because their expression of emotion activates your own representation of their emotional state (Bernhardt & Singer, 2012; Gallese, 2003; Hatfield, Rapson, & Cacioppo, 1993; Hoffman, 2000; Keysers & Gazzola, 2009; Preston, 2007; Preston & de Waal, 2002; Preston & Hofelich, 2012). If the

primary cause of vicarious emotions is your perception of what someone else feels, then it is irrelevant whether or not you have personal concerns at stake in the situation.

But although you might encounter many people who express emotions on a typical day, no one empathizes with everyone all of the time. Why not? The emphasis in empathy research has been on situations where you feel the same emotion as another person. One way that your emotional response might not match what the other person feels is if you feel relatively unemotional. Empathy theories offer two explanations for this type of non-matching: you don't always attend to others' emotional experiences or you're motivated to avoid empathizing (Keysers & Gazzola, 2014; Zaki, 2014). But if you are attentive and motivated to empathize, does that mean you will feel the same emotion that the other person feels?

A second way that your emotional response might not match what the other person feels is if you do feel an emotion, but it is different from what they feel. You can feel embarrassed for others who show no sign of embarrassment (Krach et al., 2011). You can feel afraid for the characters in a horror movie who do not know that the bad guy is waiting for them around the corner. Empathy theories that say you feel the emotions that you perceive in others cannot explain this kind of non-matching. If you match the emotion that you think someone else feels, then how do you feel an emotion for them that they don't feel?

Wondra and Ellsworth (2015) recently proposed an appraisal theory of empathy and other vicarious emotional experiences to account for both vicarious emotions that match what the other person feels and those that differ from what the other person feels. The theory is based on appraisal theories of emotion, which argue that firsthand emotional experiences are based on appraisals of the situation. Appraisal theorists have proposed sets of appraisals that are most important for differentiating emotional

experience. As one example, Smith and Ellsworth (1985) found that subjects differentiated 14 emotions using six appraisal dimensions: pleasantness, attentional activity, perceived effort, self/other-agency, situational control, and certainty. Some emotions had largely overlapping appraisal patterns, such as anger and contempt. Others had very little overlap, such as sadness and pride. The six appraisal dimensions, and the way that they mapped on to emotional experience, are similar to those found in other appraisal theories (for a review, see Ellsworth & Scherer, 2003).

Appraisals of agency and control are especially important for differentiating negative emotions (Ellsworth & Smith, 1988; Smith & Ellsworth, 1985). For example, appraisals that a negative event was caused by someone else (other-agency) characterize anger, whereas appraisals that the event was caused by circumstances out of anyone's control (situational control) characterize sadness. Suppose that a car owner witnesses another driver hit and dent her parked car in the middle of winter. If the owner believes the driver's recklessness caused the accident (other-agency), then an appraisal theorist would expect her to feel angry. If instead the owner believes that the icy roads caused the accident (situational control), then an appraisal theorist would expect her to feel sad. The appraisals might change over time and the owner might go back and forth between blaming the weather and the driver and feel both sad and angry as a consequence.

The appraisal theory of empathy and vicarious emotions explains vicarious emotional experiences with the same appraisal process (Wondra & Ellsworth, 2015). Just as you feel emotions for yourself when you appraise your own situations, you feel emotions for others when you appraise their situations. If your appraisal of someone else's situation matches that person's appraisal, then you will feel what the other person feels and experience empathy. If not, then you will have some other vicarious

emotional experience. An observer's perception of the situation has been used to explain how people infer what someone else feels (e.g., Barrett, Mesquita, & Gendron, 2011; Carroll & Russell, 1996). We are saying something else—that an observer's appraisal of the situation also affects what the observer feels.

So far, the theory has not been tested at all. Some indirect experimental evidence exists (Hepach, Vaish, & Tomasello, 2013; Lamm, Batson, & Decety, 2007), but this research was not designed to investigate the appraisal-emotion relationships that have been studied in the appraisal literature. In the present research, we provide the first experimental test of the appraisal theory approach to empathy and vicarious emotions. We investigated negative emotional experiences because the emphasis in empathy research has been on empathy for negative emotions. And we investigated appraisals of agency because agency is particularly important for differentiating negative emotional experiences (Ellsworth & Smith, 1988; Smith & Ellsworth, 1985).

Our first step in testing the theory was to see if changing an observer's appraisals of someone else's situation could make them feel an emotion that the other person doesn't feel. We varied the information that subjects received about someone else's bad situation in order to create different appraisals of agency. In two conditions, the target of empathy felt sad and believed that circumstances out of their control were responsible for their misfortune. In one condition, subjects received information that was similar to what the target knew. In a second condition, subjects received information that the target didn't have—someone else was responsible for the misfortune. We predicted that subjects whose information implied that a third person was to blame would appraise the situation as high in other-agency and feel angry for the target (experience a non-matching vicarious emotion).

The main purpose of the research was to see if, when subjects had privileged information, they would appraise the situation as high in other-agency and feel vicarious anger that the target didn't feel. However, a secondary goal was to see if, when subjects did not have privileged information, we could get them to appraise the situation as the target appraised it—due to a situation that was out of the target's control. This was challenging for a couple of reasons. First, prototypical negative events that involve high levels of situational control are things like natural disasters or unpreventable diseases—victims of tsunamis and brain cancer are rarely blamed. We thought it would be implausible to create an other-agency condition in which a third party caused a tsunami or brain cancer. Instead, we tried to create a situation in which the target mistakenly makes a bad decision, but due to his youth, lack of resources, and general disadvantaged life, subjects would attribute his misfortune to his bad situation. This meant that we were working against actor-observer bias—people perceive strong situational forces that cause their own behavior but not others' behavior (Eisen, 1979; Jones & Nisbett, 1972; Malle, 2006). Second, there was a challenge of emotion language—people often say that they feel sad as a general way to express that something bad happened and not to refer to specific feelings of sorrow (Smith & Lazarus, 1993, p. 261). This meant that subjects might report feeling sad across conditions, regardless of their emotional state.

According to some empathy theories, people match the feelings of another person based on their perceptions of what that person is feeling (Hatfield et al., 1993; Gallese, 2003; Keysers & Gazzola, 2009; Preston & de Waal, 2002). If we see a person crying we feel sad; if we see a person laughing we feel happy. According to the appraisal theory of vicarious emotions, this sort of matching only happens if our perceptions of the situation are the same as the other person's. If we see the situation

differently we will experience a different emotion from what the other person feels. The purpose of our research is to take the first empirical step to differentiate these two perspectives.

Study 1 Method

In Study 1, subjects read about a disadvantaged high school student named Brian who applied to college and was rejected from every school. There were two experimental conditions. In one condition, Brian's friend sabotaged his applications but Brian did not know this (other-agency condition). In the second condition, the rejections resulted from Brian's disadvantaged background (situational control condition). In both conditions, Brian expressed sadness at the end of the story. We predicted that subjects would feel angrier in the other-agency condition and sadder in the situational control condition. We also predicted that differences in subjects' emotions would be due to differences in their appraisals of what caused the rejections.

Subjects

Subjects were 145 ($n = 86$ women) undergraduate students and community members who received course credit or \$5 for participating. Two additional subjects were excluded because one was sending text messages during the study and the other did not finish reading the script. We terminated data collection the week after we had at least 64 subjects per condition, which is the sample size needed for 80% power to detect a medium-sized effect ($d = .5$) with a t test. Subjects' ages ranged from 18 to 50 ($M = 18.92$, $SD = 2.77$). The majority of subjects were European American/White ($n = 89$) or Asian/Asian American ($n = 37$); 14 were African American/Black, six were Latino/Hispanic, one was Native Hawaiian/Pacific Islander, and two identified as another racial or ethnic heritage.

The Story

In everyday life, empathy is often evoked by reading or hearing about people we have never met. Communicators from novelists, to journalists, to charitable organizations seek to create empathy through rich descriptions of people and their situations. Instead of using simple vignettes, we attempted to replicate these rich descriptions by creating a vivid narrative along the lines of the public radio show *This American Life* (<http://www.thisamericanlife.org/>). In *This American Life*, each broadcast includes real people's stories exemplifying a particular theme, such as "Summer Camp" or "Encounters with the Police". The host interviews people about their experience and adds background narrative to provide context. We followed this format, using the theme "Rejected". Subjects in Study 1 read the script for the "broadcast", and in Study 2 we increased the realism by creating an actual audio broadcast.

The story was about a high school student named Brian who comes from a disadvantaged background and wants to go to college. No one in Brian's family has gone to college. He is the son of a single mother who was the only person in her family to graduate from high school. He spends time with a student group that volunteers in poor neighborhoods like his. His high school guidance counselor has been unhelpful and he has no other guidance about how to get into college.

In contrast, Brian's friend Andrew comes from a more well-off background. Andrew's parents graduated from Stanford and they have college funds for their children. Andrew's two older sisters are attending elite universities and he has no doubt that he will do the same.

One night Andrew takes Brian to a park where Andrew's friends are smoking marijuana. Brian declines the drugs and asks Andrew to take him home, but before they can leave the police arrive and arrest both of them for drug possession. Andrew apologizes to Brian for the arrest and asks if he can do anything to make it up. Brian

asks Andrew to help him get into college. With Andrew's help, Brian quickly turns his academic life around, becomes a very competitive college candidate, and decides to apply to many of the same elite schools as Andrew. Andrew begins to worry that Brian's application is stronger than his own, so Andrew stops helping.

Brian comes to a point in the Common Application where he must write about his delinquency history and explain the drug arrest. Brian has no idea what he should say. What happens next differs by condition:

HOST: So what did you do?

BRIAN: Well, again, I really didn't know what I was supposed to do. At first I wrote that it was a huge mistake, I made some bad decisions, I had learned to make better choices, and wouldn't let it happen again.

(other-agency condition) I figured that I should talk to Andrew because he had to do it too, so I called him and showed him what I wrote, and he said I was doing it completely wrong. He said it made me sound too guilty, and you're not supposed to do that in this kind of situation, so he said I should try to play it down a bit. He said that's the kind of thing that he was doing – he wasn't going to sound too guilty or apologetic and neither should I. I asked if I could see what he wrote, and he said no, but he said that he would help me write something that was really close to what he wrote, so we worked on the explanation together.

(situational control condition) But then I thought it made me sound too guilty, and I thought I remember hearing that you're not supposed to do that in this kind of situation, so I tried to play it down a bit. I thought that I shouldn't sound too guilty or apologetic.

Later, Brian's application is rejected by every college. The radio show host meets privately with a college admissions counselor who reviews Brian's application and says

that his explanation for the drug arrest was the fatal flaw. The admissions counselor reads the following letter, which the host introduces as the letter that that Andrew helped Brian write (other-agency condition) or as the letter that Brian wrote (situational control condition):

“To whom it may concern,

I was arrested once in high school for smoking marijuana with a few other people in a park.

With regard to my alleged drug offense, I would like to clarify a few facts. First, I am committed to avoiding illegal drugs and I have not been around them before or since that night. That night was a mistake that I do not plan to repeat. Second, I wasn’t even the one who was smoking it, it was the other people. The police officer who arrested us was just unwilling to recognize that fact. Third, this offense is incredibly common among high school students and so it should not reflect poorly on me as a candidate for your school. Fourth, my record is completely clean aside from that one incident, so clearly I am not some kind of criminal. I was just a victim of circumstances.

To conclude, with all of my other qualifications considered, I feel that it would be a mistake on your part to deny me admission for this isolated incident. I hope that you take all of this into consideration as you make your decision, because I really feel that I deserve to get into your school.”

The admissions counselor explains that the applicant never takes responsibility or says that he learned anything from the experience, which makes her think that the student may not be mature enough for the university environment. The admissions

counselor then contrasts Brian's letter with a letter she remembers reading from another applicant who had gone through a similar incident. The other applicant had also hidden from the police in a car trunk with drugs (a detail about Brian and Andrew's situation from earlier in the story) but had taken responsibility and his application was accepted. The host reminds the audience that this applicant might have been Andrew. The host also states that Brian did not know anything about the interview with the admissions counselor.

In the last lines of the story, Brian expresses his sadness about the rejections:

HOST: Do you remember how you were feeling the moment that you opened that last letter from one of the schools and found out that you weren't going to college this year?

BRIAN: Yeah. I felt terrible. It was the worst feeling. Like I just couldn't do anything right.

HOST: And how do you feel about it now?

BRIAN: You know... I don't know... defeated? Um... it sucks. It still sucks. I don't know. It was just dumb luck. I guess I just try to remember that it was the luck of the draw. I did everything I could, but... I'm still really upset about it. I tried so hard to make things work out, but it wasn't enough, and that just makes me feel really sad. I just don't know how I could do any better.

In summary, the only difference between conditions was whether Andrew told Brian to change the explanation (other-agency condition) or Brian decided to change it himself (situational control condition).

Pilot Testing

Before we conducted the experiment, we ran a pilot study with focus groups to develop the story. Our goal was to make the two conditions as identical as possible while still having subjects blame Brian's rejections on Andrew in the other-agency condition and on Brian's disadvantaged circumstances in the situational control condition. Pilot subjects participated in groups of 1-6, read one of the two versions of the story individually, and then discussed their reactions to the story as a group. Questions during pilot testing focused on who subjects thought was responsible for Brian's rejections, but not on their emotional reactions.

Through this process we revised the story to reduce the chance that subjects would blame the police officer, blame Brian for not talking to his high school guidance counselor, or blame Andrew for not trying to get the arrest expunged from Brian's record. We found that it was important to show subjects the letter that Brian wrote so that they would not blame college admissions. We also found that it was important in the other-agency condition to make sure that Andrew was not too helpful, to emphasize that Andrew lied about what kind of explanation that he wrote for himself, and to remind subjects that Andrew helped Brian write the explanation before they saw it. Otherwise they would not realize that Andrew intentionally sabotaged Brian's application.

Procedure

Subjects participated in groups of up to six. They were randomly assigned to read the read the other-agency script ($n = 71$) or to read the situational control script ($n = 74$). The experimenter told subjects that they would read scripts for a storytelling radio show, explained the format of the show, and told subjects that they would read the story individually and then complete a questionnaire.

The questionnaire measured subjects' emotional reactions to the story, their agency appraisals, their perceptions of Brian's emotions, and their perceptions of Brian's agency appraisals.

First, there was an open-ended question that asked subjects to report their main feelings after reading the story. There three short lines for them to write their feelings and space below to explain their feelings if they wanted to do so.

Second, subjects were asked how much they felt each of the following emotions after reading the story (1 = not at all, 6 = extremely): angry, mad, sad, unhappy, sympathetic, happy, interested, afraid, compassionate, proud, hopeful, guilty, pitying. The items angry and mad ($r = .89$) were averaged to measure anger. The items sad and unhappy were intended to measure sadness, but unhappy was more strongly correlated with mad and angry ($r_s > .64$) than with sad ($r = .53$), so we used sad by itself. We also averaged sympathetic and compassionate ($r = .60$) to measure sympathy, but excluded pity due to its lower correlations with sympathetic (.49) and compassionate ($r = .26$).

Third, there was an open-ended question about Brian's feelings at the end of the story that had the same format as the open-ended question for subjects' own feelings.

Fourth, subjects were asked how much Brian felt the same emotions at the end of the story that they reported for themselves (1 = not at all, 6 = extremely), except for compassionate, sympathetic, and pitying because they are emotions typically felt for someone else. The items angry and mad ($r = .82$) were averaged to measure perceptions of Brian's anger. Although unhappy was most strongly correlated with sad ($r = .55$), we used the single item sad to measure perceptions of Brian's sadness so that it would comparable to subjects' own sadness.

Fifth, to measure agency appraisals, subjects were asked who was responsible for Brian not getting into college (1 = not at all responsible, 6 = completely responsible):

Brian, Andrew, college admissions, and bad luck. We predicted that subjects in the other-agency condition would blame Andrew and those in the situational control condition would blame bad luck. We included Brian and college admissions because during pilot testing we found that these were the most common alternative targets of blame.

Sixth, subjects were asked who Brian thought was responsible for him not getting into college (1 = not at all responsible, 6 = completely responsible): Brian, Andrew, college admissions, and bad luck. These items are not relevant to our hypotheses and so for the sake of brevity we do not discuss them further.

Next, we included two open-ended questions asking subjects to indicate with whom they felt angry if they said they felt angry and with whom Brian felt angry if they said Brian felt angry. We initially decided to include these because we found that subjects could express anger at a number of different targets during pilot testing, but we did not analyze the responses and we do not discuss them in this paper.

Finally, subjects completed a demographics questionnaire.

Subjects always completed the sections of dependent variables in the same order, but the specific items in each of the closed-ended emotion and appraisal sections were in one of four randomized orders.

Study 1 Results

We tested four main hypotheses. First, we predicted that subjects in the other-agency condition would feel angrier than those in the situational control condition. Second, we predicted that subjects in the situational control condition would feel sadder than those in the other-agency condition. Third, we predicted that the appraisal that Andrew was to blame would mediate the difference in anger between conditions. Fourth, we predicted that the appraisal that bad luck was to blame would mediate the

difference in sadness between conditions. We also tested whether subjects' perceptions of Brian's emotions affected their own emotions, as some empathy theories predict.

Plan for Analysis of Open-Ended Emotion Data

To test for differences in subjects' own emotions and their perceptions of Brian's emotions in the open-ended emotion questions, we created groups of emotion words that communicated similar feelings. There were four steps to create the emotion groups. First, the first author removed subjects' experimental conditions from the open-ended responses, randomized the order of the responses, and identified each emotion word that subjects used. Second, the first author used emotion labels from research on basic emotions (e.g., Ekman & Friesen, 1971) and from research on appraisal theory (e.g., Smith & Ellsworth, 1985) as a guide to create emotion groups. Third, the second author suggested revisions to the emotion groups. Fourth, each subject received a score of 1 for an emotion group if they mentioned at least one word in the group and a score of 0 if they did not.

We examined the emotion groups that had at least 10 observations (see Table 1). For subjects' own emotions, there were six groups: sadness, anger, sympathy, surprise, general unpleasantness, and frustration. Frustration was separated from anger because the appraisal patterns for the two have some differences; in particular, frustration is not necessarily directed toward another person (Smith & Ellsworth, 1985). For subjects' perceptions of Brian's emotions, there were also six groups with at least 10 observations: sadness, anger, general unpleasantness, regret, confusion, and rejection. We used logistic regression to test whether experimental condition (0 = situational control, 1 = other-agency) affected the probability that subjects felt each emotion or thought that Brian felt each emotion.

Table 1

Open-Ended Emotion Groups for Studies 1 and 2

Group	Words
Own Emotions	
Sadness	depressed, defeated, depressed, despondence, disappointed, disappointment, down, helpless, sad, saddened, sadness, solemn, sorrow, unfulfilled, unsatisfied
Anger	aggravated, anger, angry, annoyance, annoyed, bitter, enraged, irritated, irritation, mad, resentment
Sympathy	compassion, concern, empathetic, empathy, pity, sorry, sympathetic, sympathy
Surprise	disbelief, shock, shocked, surprise, surprised
Unpleasantness	bad, bothered, disturbed, bad, horrible, hurt, stress, uncomfortable, unease, uneasiness, uneasy, unfortunate, upset
Frustration	frustration
Confusion	confused, confusion
Brian's Emotions	
Sadness	broken down, crushed, defeat, defeated, dejected, depressed, depression, demotivated, depressed, despair, devastated, disappointed, disappointment, discontent, discouraged, disheartened, disillusioned, down, down in the dumps, downtrodden, gloomy, grief, heartbroken, helpless, hopeless, hopelessness, let down, melancholy, put down, sad, sadness, sorrow, unfulfilled, unsatisfied,
Anger	anger, angry, bitter, indignant, mad, resentment
Unpleasantness	awful, distraught, horrible, hurt, it sucked, terrible, unhappy, upset
Regret	regret, regretful, remorse

Surprise	disbelief, shock, shocked, surprised
Incompetence	failed, failure, inadequacy, incompetent, insecure, insufficient, let himself down, like a failure, like he can't do anything right, not good enough, prideless, self-doubt, unqualified, unworthiness, worthless
Confusion	confounded, confused, confusion, no idea what to do, perplexed, uncertainty, unsure
Rejection	rejected

Subjects' Own Emotions

Our first two hypotheses were that (1) subjects in the other-agency condition would feel angrier and (2) subjects in the situational control condition would feel sadder.

Open-ended data. Figure III.1 displays the proportion of subjects who felt sad and angry by condition. The data supported our hypotheses. Subjects were more likely to feel angry in the other-agency condition (41%) than in the situational control condition (20%), $B = 1.00$, $SE = .38$, $Z = 2.65$, $p = .008$, 95% CI [.27, 1.76], whereas they were more likely to feel sad in the situational control condition (51%) than in the other agency condition (32%), $B = -.79$, $SE = .08$, $Z = 2.30$, $p = .02$, 95% CI [-1.47, -.12].

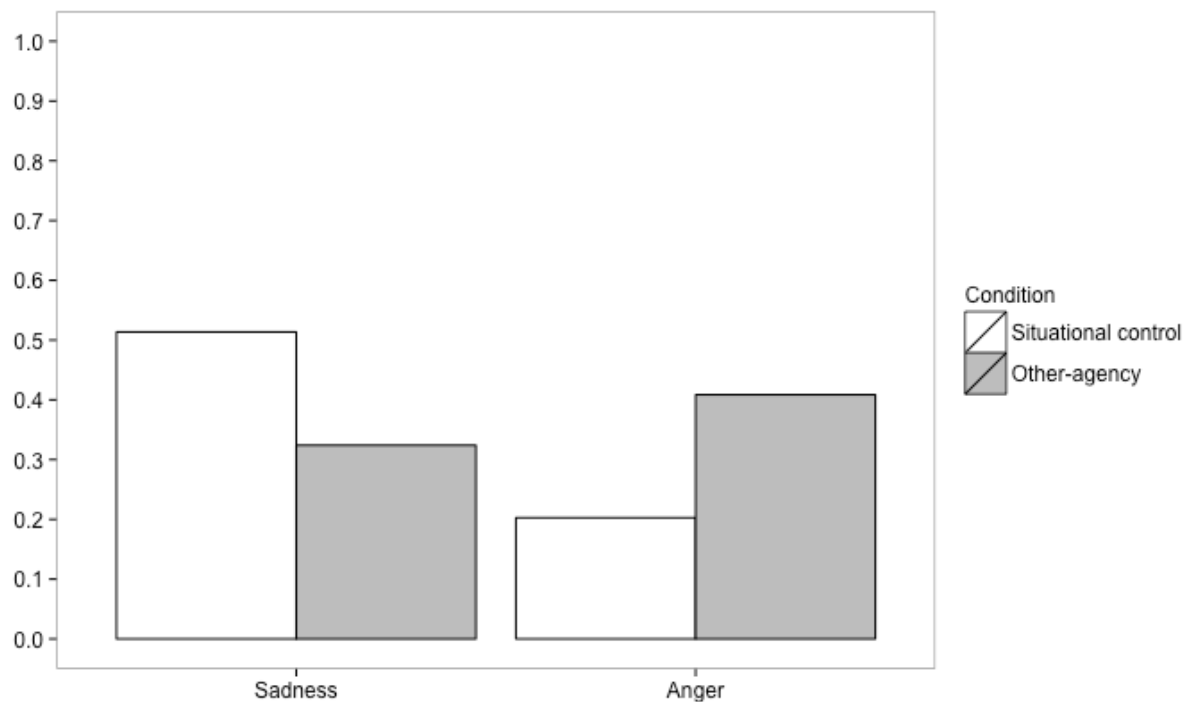


Figure III.1. Proportion of subjects who reported feeling sad or angry in the open-ended emotion question by condition (Study 1).

Additionally, subjects were more likely to feel sympathy in the situational control condition (51%) than in the other-agency condition (34%), $B = -.73$, $SE = .34$, $Z = 2.12$, $p = .03$, 95% CI [-1.41, -.06], but they were more likely to feel surprised in the other-agency condition (17%) than in the situational control condition (5%), $B = 1.27$, $SE = .60$, $Z = 2.10$, $p = .04$, 95% CI [.16, 2.59]. There were no other differences in their emotions.

Closed-ended data. Figure III.2 displays the means and standard errors for sadness and anger by condition. Confirming the open-ended analyses and our second hypothesis, subjects felt angrier in the other-agency condition ($M = 3.37$, $SD = 1.50$), than in the situational control condition ($M = 2.44$, $SD = 1.35$), $t(139.93) = 3.90$, $p < .001$, 95% CI [.46, 1.40]. In contrast to the open-ended data, subjects did not feel sadder in the situational control condition ($M = 3.30$, $SD = 1.40$) than in the other-agency condition ($M = 3.45$, $SDs = 1.34$), $t(143) = .67$, $p = .50$, 95% CI [-.30, .60].

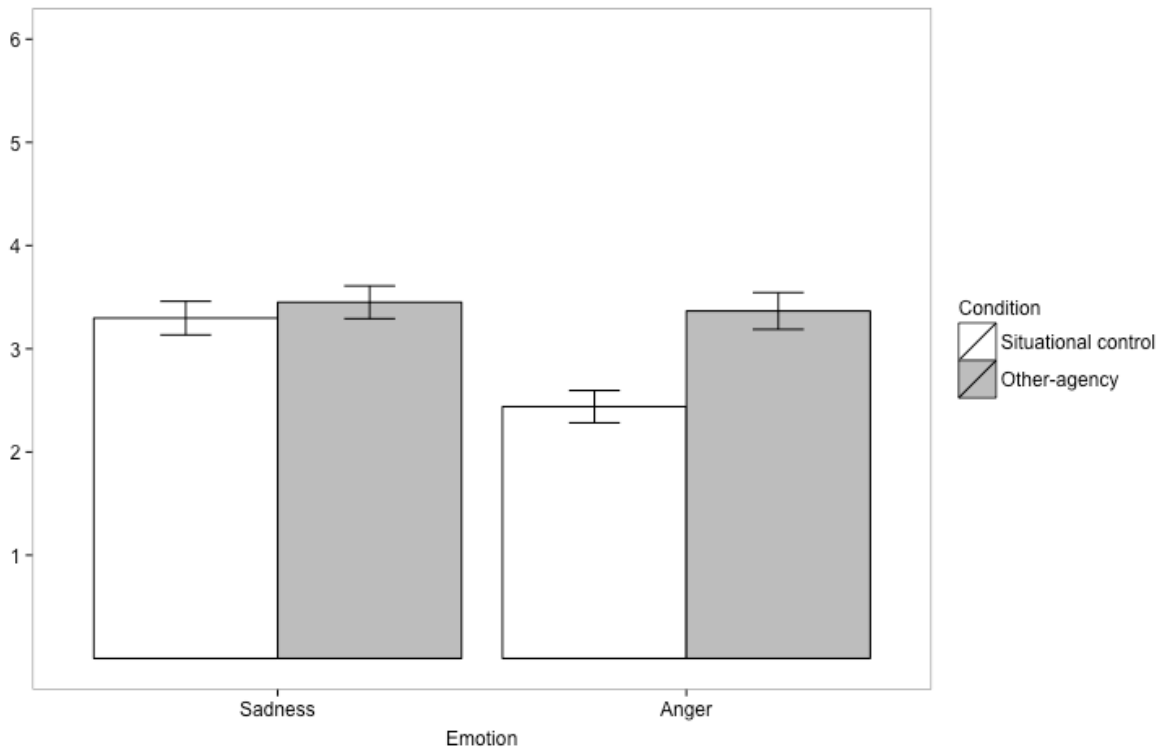


Figure III.2. Subjects' average sadness and anger in the closed-ended emotion questions by condition (Study 2). The bars represent standard errors.

Also in contrast to the open-ended data, there were no differences in sympathy between the situational control condition ($M = 4.14$, $SD = 1.18$) and other-agency condition ($M = 4.30$, $SD = 1.12$), $t(142.99) = .84$, $p = .40$, 95% CI [-.22, .54].

In summary, we found consistent support for our first hypothesis that subjects in the other-agency condition would feel angrier than those in the situational control conditions. We also found support for our second hypothesis that subjects in the situational control condition would feel sadder than those in the other-agency condition in the open-ended emotion data, but not in the closed-ended emotion data.

Did Appraisals Mediate the Effects of Condition on Subjects' Emotions?

Our third and fourth hypotheses were that (3) the appraisal that Andrew was to blame would mediate the difference in anger between conditions, and, (4) the appraisal

that bad luck was to blame would mediate the difference in sadness between conditions. First, we examined differences in appraisals by condition. Then, we examined the indirect effects of condition on emotions through appraisals.

Subjects' agency appraisals. We predicted that subjects would blame Andrew in the other-agency condition and that they would blame bad luck for Brian's rejections in the situational control condition. As predicted, subjects thought that Andrew was responsible more in the other-agency condition ($M = 4.75$, $SD = 1.01$) than in the situational control condition ($M = 3.20$, $SD = 1.37$), $t(134.02) = 7.23$, $p < .001$, 95% CI [1.15, 1.94]; however, they did not think that bad luck was responsible more in the situational control condition ($M = 2.65$, $SD = 1.48$) than in the other-agency condition ($M = 2.61$, $SD = 1.35$), $t(142.56) = .18$, $p = .86$, 95% CI [-.51, .42]. Instead, subjects thought that Brian was responsible more in the situational control condition ($M = 4.59$, $SD = 1.15$) than in the other-agency condition ($M = 3.75$, $SD = 1.22$), $t(141.57) = 4.32$, $p < .001$, 95% CI [-1.24, -.46]. There was also a trend for subjects to think that college admissions was responsible more in the situational control condition ($M = 2.78$, $SD = 1.37$) than in the other-agency condition ($M = 2.39$, $SD = 1.27$) as well, $t(142.85) = 1.78$, $p = .08$, 95% CI [-.82, .04].

Indirect effect of condition on anger through appraisals. If the appraisal theory account explains differences in subjects' vicarious emotions, then the appraisal that Andrew was responsible for Brian not getting into college should mediate the difference in anger by condition. We used the mediation function from the MBESS (v. 3.3.3) package in R to test for mediation using 10,000 bootstrap samples (Kelley, 2007a, 2007b). A contrast coded variable for subject condition (-1 = situational control, 1 = other-agency) was the predictor, the appraisal that Andrew was to blame was the mediator, and closed-ended anger was the dependent variable. Indeed, there was an indirect effect of experimental condition on anger through appraisals that Andrew was

responsible, 95% bias-corrected CI [-.42, -.11], which eliminated the direct effect of condition on anger, 95% CI [-.47, .06].³

Did Perceptions of Brian's Emotions Cause Subjects' Vicarious Emotions?

According to empathy theories that base one's emotions for others on perceptions of their emotions, subjects' perceptions of Brian's emotions should match their own vicarious emotions. Although we hypothesized that there would be a difference in subjects' appraisals of agency, not in their perceptions of Brian's emotions, we had the opportunity to test the alternative explanation that our manipulation changed subjects' vicarious emotions by changing their perceptions of Brian's emotions. We examined whether the differences in subjects' own emotions by condition were matched by differences in their perceptions of Brian's emotions.

Open-Ended Data. The open-ended data for perceptions of Brian's emotions were missing for three subjects due to coding errors. Overwhelmingly, subjects thought that Brian felt sad, as we intended. Over 80% of the subjects in both conditions thought that Brian felt sad. Subjects were equally likely to think that Brian felt sad in the situational control condition (86%) and in the other-agency condition (85%), $B = -.13$, $SE = .47$, $Z = .27$, $p = .79$, 95% CI [-1.07, .80]. They were also equally likely to think that Brian felt angry in the situational control condition (10%) and in the other-agency condition (4%), $B = -.89$, $SE = .71$, $Z = 1.25$, $p = .21$, 95% CI [-2.46, .43]. There were no other differences in their perceptions of Brian's emotions. Unlike subjects' own emotions, the probability that subjects' thought Brian felt sad or angry did not differ by condition. These results fail to support the alternative explanation that subjects' own emotions were based on their perceptions of Brian's emotions.

Closed-Ended Data. There was no difference in perceptions of how sad Brian felt in the situational control condition ($M = 4.76$, $SD = 1.06$) and the other-agency condition

($M = 4.86$, $SD = 1.09$), $t(142.33) = .57$, $p = .57$, 95% CI [-.25, .45]. Unexpectedly, there was a difference in how angry subjects thought that Brian felt—but it was in the opposite direction of their own anger. Subjects thought that Brian was *less* angry in the other-agency condition ($M = 2.85$, $SD = 1.34$) than in the situational control condition ($M = 3.36$, $SD = 1.23$), $t(140.83) = 2.43$, $p = .02$, 95% CI [-.94, -.10]. Because this pattern of results is the opposite of what subjects felt, it conflicts with theories that predict that perceiving another's emotion causes the same emotional state in oneself. There were no other differences in subjects' perceptions of Brian's emotions.

Correlations Between Own Emotions and Perceptions of Brian's Emotions.

Subjects in the other-agency condition felt angrier but thought that Brian was less angry compared to those in the situational control condition. This pattern of results is the opposite of what would be expected if perceptions of the Brian's emotions caused subjects' emotions. Nevertheless, the group-level differences might not reflect the individual-level relationship between subjects' perceptions of Brian's emotions and their own emotions. If perceptions of Brian's emotions caused subjects' emotions, then there should be positive correlations between subjects' perceptions of Brian's sadness and their own sadness and between subjects' perceptions of Brian's anger and their own anger. However, there was no correlation between subjects' own sadness and their perceptions of Brian's sadness ($r = .11$, $p = .20$), nor was there a correlation between subjects' own anger and their perceptions of Brian's anger ($r = .01$, $p = .91$). Whether subjects felt sad, angry, or both, this was not caused by their perceptions that Brian felt the same emotions.

Study 1 Discussion

In Study 1, we found evidence that subjects' feelings for another person differed according to their appraisals of who was to blame for the other person's misfortune.

Specifically, they felt angrier for the other person when they thought that another human agent was responsible, even though the other person only felt sad. There was no evidence that their anger had anything to do with their perceptions of how the victim felt. This result is consistent with the idea that you can feel an emotion that someone else does not feel when you appraise their situation differently from how they appraise it.

Subjects' vicarious sadness and sympathy were less consistent than their anger. The appraisal data revealed that although pilot testing suggested that subjects would forgive Brian's mistake because of his disadvantage, they blamed him for his misfortune in the situational control condition. We tried to address this problem in Study 2 by emphasizing Brian's disadvantage further and downplaying the severity of his mistake so that subjects would be less likely to blame him for the rejections. In addition, we recorded the story with actors so that subjects could listen to the radio show instead of just reading the script.

Study 2 Method

Study 2 was similar to Study 1 except that subjects listened to an audio recorded version of the story instead of reading the script. Subjects listened to the story on headphones in front of a computer. They completed the dependent measures on the computer.

Changes to the Story

There were several changes to the story to try to reduce the chance that subjects would blame Brian for his failure to get into college. The introductory section that introduced the theme, "Rejected", was cut for the sake of time and Brian's disadvantage was emphasized more by adding a statement that his schoolwork was not great because he had to work late every night after school to bring in money for his family.

Additionally, the paragraphs that differed between the two conditions were modified to emphasize the idea that in the situational control condition Brian was clueless and he made a well-intentioned mistake:

HOST: So what did you do?

BRIAN: Well, again, I really didn't know what I was supposed to do. At first I wrote that it was a huge mistake, I made some bad decisions, I had learned to make better choices, and wouldn't let it happen again, but I really wasn't sure what they were looking for.

(situational control condition) I mentioned it to my mom one morning during breakfast, and she gave me this great advice that if you just put your best foot forward in this kind of situation, then people will respect you for that. Later on I read what I had written and I thought my letter wasn't doing that. I thought it made me sound too guilty, and that you're not supposed to do that in this kind of situation, so I tried to play it down a bit. I thought that I should sound more confident in myself, so I rewrote it. I did the best I could, but I still really didn't have a clue if that's what they were looking for.

(other-agency condition) I figured that I should talk to Andrew because he had to do it too, so I called him and showed him what I wrote, and he said I was doing it completely wrong. He said it made me sound too guilty, and you're not supposed to do that in this kind of situation, so he said I should try to play it down a bit. He said that's the kind of thing that he was doing – he wasn't going to sound too guilty or apologetic and neither should I. I asked if I could see what he wrote, and he said no, but he said that he would help me write something that was really close to what he wrote, so we worked on the explanation together. I still really didn't have a clue if it's what they were looking for, but Andrew said it was perfect.

The other major changes were that the letter Brian submitted to explain his drug arrest was modified to sound less harsh and his emotion expression at the end was modified to de-emphasize the role of luck in his rejections.

Changes to the Dependent Variables

Subjects' closed-ended self-reports of emotions, their appraisals, their closed-ended perceptions of Brian's emotions, and their perceptions of Brian's appraisals were converted to slider scales with scores from 0 to 100. The emotion word "down" replaced "unhappy" to measure sadness.

Because people see intentional harm as worse than unintentional harm (Ames & Fiske, 2013), we added one item to measure subjects' appraisals of pleasantness ("How good or bad do you think it is that Brian didn't get into college?", 0 = Extremely good, 100 = Extremely bad) and one item to measure their perceptions of Brian's appraisals of pleasantness ("How good or bad did Brian think it was that he didn't get into college?", 0 = Extremely good, 100 = Extremely bad). If subjects appraised Brian's situation as worse when he was sabotaged, then this might have increased their reports of negative emotions across the board. On the one hand, this might have increased reports of sadness in the other-agency condition and eliminated a difference that would have otherwise emerged. On the other hand, this might have increased reports of anger in the other-agency condition so that the observed differences in anger were due to differences in appraised pleasantness, not agency.

Finally, the appraisal questions were changed to reflect who subjects blamed more explicitly and to refer to bad circumstances rather than bad luck to measure situational agency appraisals. Subjects were asked to think about why Brian didn't get into college and state their agreement (0 = Strongly Disagree, 100 = Strongly Agree) that it was Brian's fault, it was Andrew's fault, it was college admissions' fault, and it was

because of bad circumstances.⁴ They were asked the same questions about why Brian feels that he didn't get into college, but as in Study 1 these questions are not relevant to our main hypotheses and we do not discuss them further.

Subjects

Subjects participated in groups of up to ten. We recruited 126 undergraduate students and community members ($n = 61$ women) who received course credit or \$8 for participating. We terminated data collection the week after we had at least 64 subjects per condition, which is the sample size needed for 80% power to detect a medium-sized effect ($d = .5$) with a t test; however, 10 additional subjects were excluded from analyses (5 per condition). Five were excluded because they suspected that the story was fake, two because they were using their cell phones or surfing the internet during the study, one because she was confused and thought the show mixed up the names of Brian and Andrew, one because was falling asleep during the study, and the last because the experimenter suspected that he was high on drugs when he arrived. Subjects' ages ranged from 17 to 25 ($M = 19.02$, $SD = 1.26$). The majority of subjects were European American/White ($n = 80$) or Asian/Asian American ($n = 34$); seven were African American/Black, seven were Latino/Hispanic, and one identified as another racial or ethnic heritage.

Study 2 Results

For all hypothesis tests about subjects own emotions, subjects' appraisals of unpleasantness were added as a covariate in the logistic and linear regression models. The coding procedure for the open-ended data in Study 2 was similar to Study 1, except that two research assistants assisted the first author with the data coding.

Subjects' Own Emotions

Once again, we predicted that subjects in the other-agency condition would be more likely to feel angry and subjects in the situational control condition would be more likely to feel sad.

Open-Ended Data. As in Study 1, there were six emotion groups that had at least 10 observations, but frustration was replaced by confusion.

Figure III.3 displays the predicted probability that subjects felt sad and angry by condition at an average level of appraised unpleasantness. As in Study 1, subjects were more likely to feel angry in the other-agency condition (68%) than in the situational control condition (24%), $B = -.95$, $SE = .21$, $Z = 4.50$, $p < .001$, 95% CI [-1.39, -.55].

Although the pattern for sadness was in the same direction as Study 1, there was no significant difference in the probability that subjects felt sad in the situational control condition (67%) and in the other-agency condition (60%), $B = .16$, $SE = .19$, $Z = .86$, $p = .39$, 95% CI [-.21, .54]. There were no other differences in subjects' emotions by condition.

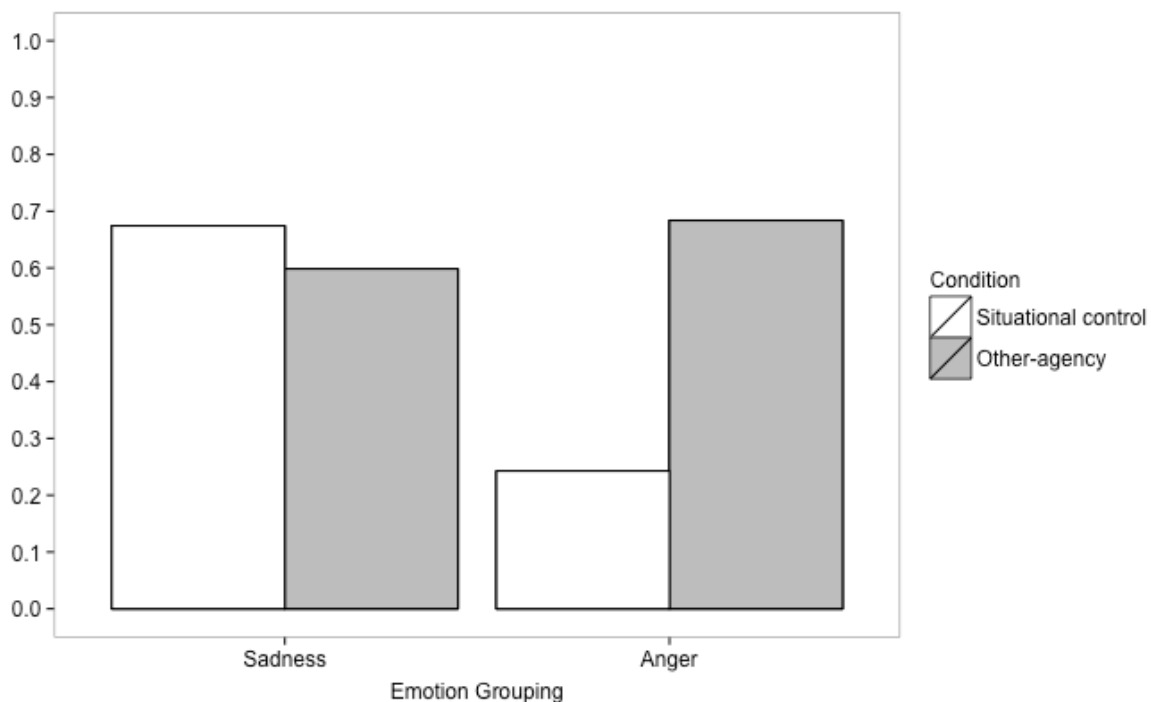


Figure III.3. Predicted proportion of subjects who reported feeling sad or angry in the open-ended emotion question by condition (Study 2). The predicted proportions are based on a logistic regression model with appraised unpleasantness as a covariate and set equal to the mean.

Closed-Ended Data. The items angry and mad ($r = .88$) were averaged to measure anger, sad and down were averaged to measure sadness ($r = .66$), and sympathetic and compassionate were averaged to measure sympathy ($r = .48$).

Figure III.4 displays the means and standard errors for sadness and anger by condition at an average level of appraised unpleasantness. As in Study 1, subjects felt angrier in the other-agency condition ($M = 72.62, SE = 2.98$) than in the situational control condition ($M = 54.84, SE = 3.16$), $t(116) = 4.07, p < .001, 95\% CI [4.56, 13.21]$. And as in Study 1, subjects felt just as sad in the situational control condition ($M = 68.29, SE = 2.69$) as they did in the other-agency condition ($M = 64.94, SE = 2.52$), $t(119) = .90, p = .37, 95\% CI [-5.35, 2.00]$. Also like in Study 1, subjects felt just as sympathetic in the situational control condition ($M = 76.87, SE = 2.27$) as they did in the other-agency condition ($M = 72.14, SE = 2.22$), $t(114) = 1.60, p = .14, 95\% CI [-5.54, .81]$.

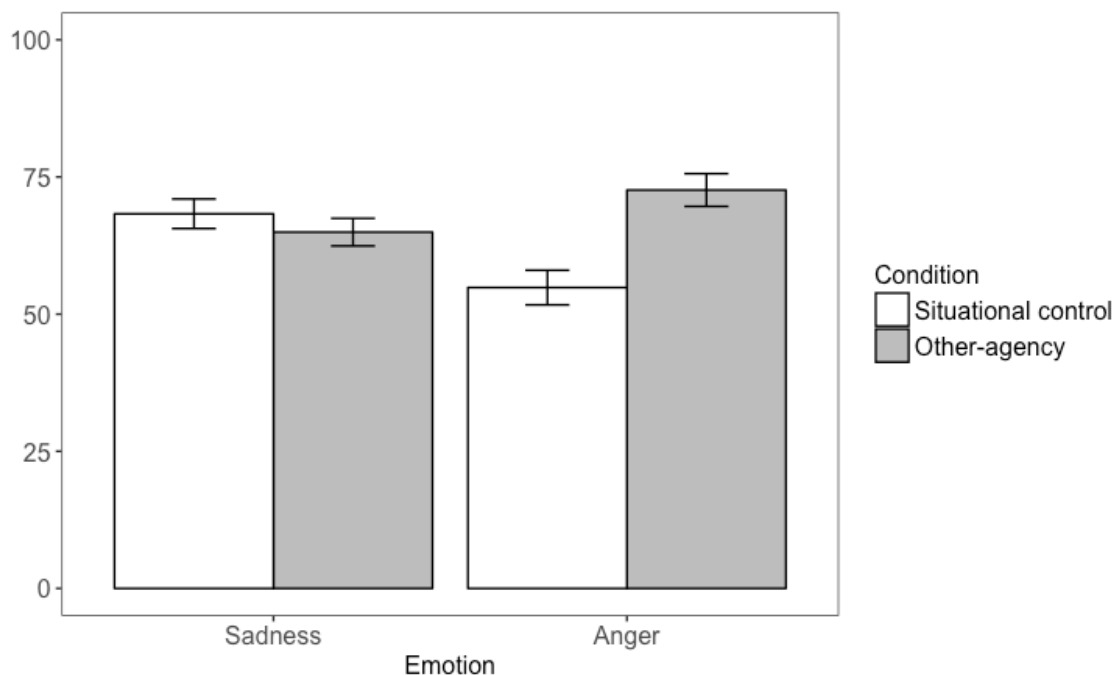


Figure III.4. Subjects' average sadness and anger from the closed-ended emotion questions by condition (Study 2). The bars represent standard errors.

Once again, there was consistent support for the hypothesis that subjects in the other-agency condition would feel angrier than those in the situational control condition. But although the pattern of means was in the predicted direction, there was little support for the hypothesis that subjects in the situational control condition would feel sadder than those in the other-agency condition.

Did Appraisals Mediate the Effects of Condition on Subjects' Emotions?

As in Study 1, we predicted that the appraisal that Andrew was to blame would mediate the difference in anger between conditions and that the appraisal that bad circumstances were to blame would mediate the difference in sadness between conditions.

Subjects' agency appraisals. We predicted that subjects would blame Andrew in the other-agency condition and that they would blame bad circumstances in the situational control condition. As predicted, subjects thought that Andrew was responsible for Brian's rejections more in the other-agency ($M = 76.45$, $SD = 21.85$) than in the situational control condition ($M = 53.61$, $SD = 26.59$), $t(108.62) = 5.14$, $p < .001$, 95% CI [-31.64, -14.02]. Additionally, there was a trend for subjects to blame bad circumstances more in the situational control condition ($M = 72.76$, $SD = 25.78$) than in the other-agency condition ($M = 64.72$, $SD = 27.25$), $t(121.78) = 1.69$, $p = .09$, 95% CI [-1.39, 17.47]. As in Study 1, subjects thought that it was Brian's fault more in the situational control condition ($M = 54.68$, $SD = 28.17$) than in the other-agency condition ($M = 35.16$, $SD = 27.56$), $t(115.17) = 3.83$, $p < .001$, 95% CI [9.41, 29.63]. There was no difference in appraisals that college admissions' was to blame between the situational

control condition ($M = 33.39$, $SD = 27.36$) and the other-agency condition ($M = 33.69$, $SD = 27.26$), $t(113.83) = .06$, $p = .95$, 95% CI [-10.36, 9.74].

Indirect effect of condition on emotions through appraisals. As in Study 1, we tested whether the difference in anger by condition was mediated by appraisals. We used the lavaan package in R (Rosseel, 2012) to test for mediation using 10,000 bootstrap samples (Hayes, 2012). Once again, there was an indirect effect of experimental condition on anger through appraisals that Andrew was responsible, 95% bias-corrected CI [1.65, 10.58], though there was still a direct effect of condition on anger, 95% bias-corrected CI [3.70, 21.32].

Did Perceptions of Brian's Emotions Cause Subjects' Vicarious Emotions?

As in Study 1, we examined whether the differences in subjects' own emotions by condition were matched by differences in their perceptions of Brian's emotions. For the open-ended responses, there were eight emotion groups with 10 or more observations: anger, sadness, confusion, regret, general unpleasantness, surprise, and incompetence. Although feelings of incompetence are not commonly studied in emotion research, it is a common experience in real life and subjects mentioned it frequently.

Open-Ended Data. Over 90% of the subjects in both conditions thought that Brian felt sad. There was no difference in the proportion of subjects who thought that Brian felt sad between the situational control (93%) and the other-agency condition (91%), $B = .17$, $SE = .35$, $Z = .50$, $p = .62$, 95% CI [-.48, .87]. In contrast to subjects' own anger, there was no difference in the proportion of subjects who thought that Brian felt angry between the situational control condition (17%) and the other-agency condition (9%), $B = .35$, $SE = .28$, $Z = 1.26$, $p = .21$, 95% CI [-.18, .92]. These results fail to support

the alternative explanation that differences in subjects' anger was due to differences in their perceptions of Brian's emotions.

There was only one difference in subjects' perceptions of Brian's emotions: they were more likely to say that Brian was surprised in the other-agency condition (17%) than in the situational control condition (5%), $B = -.67$, $SE = .34$, $Z = 1.97$, $p = .049$, 95% CI [-1.43, -.05].

Closed-Ended Data. The items angry and mad ($r = .73$) were averaged to measure anger and the items sad and down ($r = .52$) were averaged to measure sadness. There were six outliers for perceptions that Andrew felt sad (within-group studentized residuals with an absolute value greater than 3); these observations were excluded from analyses, but we report the results of the analysis when they are retained as well.

Similar to Study 1, there was a trend for subjects to perceive that Brian was angrier in the situational control condition ($M = 59.73$, $SD = 22.99$) than in the other-agency condition ($M = 52.16$, $SD = 22.14$), $t(121.97) = 1.79$, $p = .08$, 95% CI [-15.95, .81], which is in the opposite direction of the differences in their own anger by condition. This result means that the differences in subjects' own anger by condition were not due to perceptions that Brian was angry.

Unlike Study 1, there was a trend for subjects to perceive that Brian was sadder in the situational control condition ($M = 94.21$, $SD = 8.74$) than in the other-agency condition ($M = 91.15$, $SD = 9.20$), $t(116.87) = 1.86$, $p = .07$, 95% CI [-6.32, .20].⁷ When perceptions of Brian's sadness was added to the model predicting subjects' own sadness, there was an indirect effect of condition on subjects' own sadness through their perceptions of Brian's sadness, 95% bias-corrected CI [-3.71, -.10] and there was no direct effect of condition on subjects' sadness, 95% bias-corrected CI [-11.86, 1.12]. This result is consistent with theories that predict emotion matching.

Correlations Between Own Emotions and Perceptions of Brian's Emotions. As in Study 1, we examined the individual-level correlations between subjects' emotions and their perceptions of Brian's emotions. Once again, there was no correlation between subjects' own anger and their perceptions of Brian's anger ($r = .03, p = .91$). Unlike Study 1, subjects who felt sadder also thought that Brian felt sadder ($r = .29, p < .001$).

Study 2 Discussion

In Study 2, we replicated the major finding from Study 1 that subjects' vicarious anger had to do with their appraisals of agency for the other person's misfortune. Once again, there was no evidence that they felt angry through some contagious process.

Unlike Study 1, there were no differences in sadness and sympathy by condition in either the open-ended or closed-ended emotion data. In addition, although there was no evidence that an emotion-matching process made subjects feel vicariously angry, some of the data were consistent with the idea that an emotion-matching process made subjects feel sad.

General Discussion

Sometimes we feel emotions for others that match what they feel and we experience empathy. At other times we feel emotions for them that do not match what they feel. We hypothesized that emotions for others are based on appraisals of their situations. This perspective applies to both matching and non-matching vicarious emotions and treats empathy as a special case of a general emotional appraisal process.

The results of the two studies provide initial support for appraisal as a process that is involved in vicarious emotions, which was the primary goal of the research. Subjects in the other-agency condition were angrier than those in the situational control condition in both the open-ended and closed-ended emotion data. The appraisal that Brian's friend was to blame mediated the effects of experimental condition on anger.

Additionally, there was some evidence that subjects in the situational control condition were sadder than those in the other-agency condition, although this difference was inconsistent across two studies and the two sources of emotion reports.

Some theories of empathy argue that perceiving a target's emotional state causes empathic emotions (Gallese, 2003; Keysers & Gazzola, 2009; Preston, 2007; Preston & de Waal, 2002). These theories do not predict the appraisal-based differences in anger that we observed. Instead, they predict that what we feel for others should match what we think they feel. In contrast, we found some evidence that the opposite was true: subjects in the other-agency condition, who felt angrier than those in the situational control condition, thought that Brian was less angry. Additionally, there was no correlation between subjects' own anger and their perceptions of Brian's anger.

Our secondary goal was to try to examine vicarious sadness and situational control. This goal was less successful due to the variability in the results across the two studies. One reason for this is that we did not find differences in the appraisal of situational control, which differentiates sadness (and fear) from other negative emotions (Ellsworth & Smith, 1988; Roseman, Spindel, & Jose, 1990; Siemer, Mauss, & Gross, 2007; Smith & Ellsworth, 1985). Our main goal was to change appraisals of other-agency to make subjects feel vicarious anger that Brian didn't feel. To keep the two conditions as parallel as possible, our second condition had Brian deliver the same letter that Andrew had him write in the first condition. Although we hoped that subjects would take Brian's disadvantage into account and blame his circumstances, they still tended to blame him. Future research on vicarious sadness and appraisal might be more successful by using scenarios that have less of a risk that subjects will blame the target.

Nevertheless, in Study 2 there was evidence that subjects' perceptions of Brian's sadness were responsible for their own feelings of sadness. It's possible that by listening

to the radio show instead of reading it, subjects had a more salient representation of Brian's sadness that was better able to activate the same state in themselves (Preston & Hofelich, 2012). In that case, a perception-action process may have been involved in subjects' sadness separately from the appraisal process that was involved in their anger. If Brian had expressed strong anger instead, then the perception-action process might have been more involved in subjects' anger and appraisal might have been more involved in their sadness.

Alternatively, there might be something specific about sadness that elicits similar emotions from observers. In particular, signs of vulnerability can encourage feelings of tenderness and concern, even in the absence of a misfortune (Batson, Lishner, Cook, & Sawyer, 2005; Lishner, Batson, & Huss, 2011). In appraisal theories, this has to do with appraisals of low coping potential (Ellsworth & Scherer, 2003; Lazarus, 1991). When someone expresses sadness, this can signal their vulnerability and inability to cope with a misfortune. Whatever the cause of Brian's rejections, the impact on his future was the same, and there was nothing he could do about it. Future research should explore the role of appraisals of situational agency and appraisals of low coping potential in vicarious sadness and sympathy.

This is the first test of the appraisal approach to vicarious emotions, and many questions remain. One clear direction for future research is to go beyond agency to examine other appraisal dimensions, and to examine other vicarious emotional experiences. Do people feel non-matching vicarious emotions when they differ in their appraisals of certainty (e.g., the other person thinks the situation is hopeless but you think there's a chance of success) or control (e.g., the other person thinks her precautions are sufficient but you have your doubts) or morality (e.g., the other person thinks something immoral is going on but you think it's just a cultural difference)?

Our choice to examine appraisals of agency makes our predictions from perspectives on appraisal akin to predictions from perspectives in moral psychology. For example, Gray and Wegner (2011) argued that those who perpetuate harm ("moral agents") should elicit moral anger, just as appraisal theories predict that appraisals that someone else is to blame for an unpleasant situation should elicit anger. Many situations in which we feel vicarious emotions involve moral judgments of benefits or harms, and Scherer's component process model includes an appraisal of compatibility with norms (Scherer, 1984; Scherer, 2013). Nevertheless, appraisal theories don't deal with what makes people develop norms about morality in the first place and moral psychology doesn't deal with vicarious emotions in situations that don't involve moral goods and ills. Future research can emphasize this point by manipulating appraisals other than agency. For example, when something bad happens that was not caused by another person, appraisals of certainty differentiate sadness from fear (Ellsworth & Smith, 1988; Smith & Ellsworth, 1985). If subjects receive information that a target's misfortune is certain, then the theory predicts that they should feel sad, but if the misfortune is uncertain, then they should feel anxious.

The experiment was rooted in an expanded view of appraisal theories of emotion (Ellsworth & Scherer, 2003; Wondra & Ellsworth, in press). Some appraisal theorists have emphasized that emotions are about personal goals and prioritized appraisals of the motivational relevance and motivational congruence of situations (Frijda, 1988; Lazarus & Smith, 1988). This perspective makes vicarious emotions a problem because there doesn't seem to be a personal goal at stake. Other appraisal theorists have argued that situations can be appraised as pleasant or unpleasant even if no personal goals are at stake (Scherer, 1984; Scherer, 2013; Smith & Ellsworth, 1985). Although these latter perspectives don't exclude the possibility of vicarious emotions, they have not said

much about vicarious emotions either. We are happy to expand empirical research on specific dimensions of appraisal to vicarious emotions.

Whether we feel vicarious emotions for others, and what we feel, depends on who the other person is. We are more motivated to empathize with some people than others (Zaki, 2014), and a number of studies have demonstrated that people empathize more with others who share their group membership (e.g., Cikara, Bruneau, Van Bavel, & Saxe, 2014; Gutsell & Inzlicht, 2012; Xu, Zuo, Wang, & Han, 2009). One possibility is that people are motivated to make favorable appraisals of the situation for others whom they like and to make unfavorable appraisals for others whom they dislike. If a friend experiences some misfortune, you might blame the situation, but when an enemy experiences the same misfortune, you might blame the victim. Future research can explore whether motivated appraising contributes to differences in vicarious emotions for friends, strangers, and enemies.

Conclusion

The results of this experiment provide initial support for two general points about emotions for others. First, appraisals of others' situations can affect our emotions for others regardless of what we think they are feeling. Second, appraisal theories suggest processes that have the potential to explain both matching and non-matching emotions for others instead of focusing on matching as a special case. An appraisal theory of vicarious emotions treats emotions for others as a part of normal emotional experience.

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CHAPTER IV

Using Others' Emotion Expressions to Appraise Their Situations: Backtracking as a Route to Empathy

Upon some occasions sympathy may seem to arise merely from the view of a certain emotion in another person... Grief and joy, for example, strongly expressed in the look and gestures of any one, at once affect the spectator with some degree of a like painful or agreeable emotion... If the very appearances of grief and joy inspire us with some degree of the like emotions, it is because they suggest to us the general idea of some good or bad fortune that has befallen the person in whom we observe them: and in these passions this is sufficient to have some little influence upon us.

— Adam Smith, *The Theory of Moral Sentiments*, 1759

When an observer sees someone cry or smile, it can infect her with a similar sadness or joy. This idea, that an observer can “catch” others’ emotions, has been referred to as emotion contagion, which is treated by some as a synonym for empathy and by others as a precursor to empathy. One theoretical explanation for emotion contagion is rooted in the mimicry of emotion expressions (Hatfield, Cacioppo, & Rapson, 1994; Hoffman, 2000, pp. 37–45). Through this process, when an observer sees someone else’s lips pulled up in a smile, or the inner eyebrows raised in a look of sad concern, she automatically mimics those expressions, and by mimicking the expression she feels the associated emotion. From this perspective, the perception of someone else’s emotion expression can make the observer feel the same emotion.

However, as Adam Smith suggests in the opening quote, an alternative possibility is that when an observer sees someone else smile or frown, she uses the

expression to infer a likely situation, and by inferring their likely situation, she comes to feel a similar emotion. From this perspective, it is not the perception of the other's emotion expression, but the perception of their situation that makes the observer feel the same emotion. Inferring someone's situation from their emotion expression has been called *backtracking* (Elfenbein, 2007). The backtracking explanation for emotion contagion fits appraisal theories of emotion and empathy (Ellsworth & Scherer, 2003; Wondra & Ellsworth, 2015), which propose that emotions are based on how we evaluate, or appraise, situations, whether they are emotions we feel for ourselves or emotions we feel for others.

The present research investigates how observers' vicarious emotional responses are affected by others' emotion expressions. Specifically, do observers simply mimic the expression, or do they backtrack and appraise the inferred situation? Let us begin by reviewing the evidence for mimicry.

Mimicry as an Explanation for Emotion Contagion

Mimicry is supposed to cause emotion contagion through a two-step process (Hoffman, 2000; Hatfield et al., 1994). The first step is imitation: when an observer perceives a target's emotion expression, it causes him to automatically imitate the expression. The second step is feedback: the observer's imitated expression produces afferent feedback, which causes him to feel the emotion that is associated with the expression. The focus of the present research is on the first step, imitation of others' emotion expressions, and so I will review past research on imitation, but not on the second step, feedback.

The first step in mimicry is the automatic imitation of others' emotion expressions. To provide evidence for automatic imitation, empirical research must demonstrate that an observer is more likely to perform a specific behavior when he sees

a target express the same behavior than when he sees the target express a different behavior. For example, an observer should be more likely to smile if he sees the target smile than if he sees the target frown. Although this evidence is necessary to demonstrate automatic imitation, it is insufficient, because not all imitation is automatic, and not all automatic expressions are imitations. For example, when an observer sees someone else smile, he might intentionally smile back because he wants to be friendly, which would be imitation but not necessarily automatic, or he might unintentionally smile back because he feels happy for the other person, which would be automatic but not imitation.

When the term “automatic” is used to describe imitation, it likely means that imitation is stimulus-driven (for other features that make a psychological process automatic, see Bargh, 1994; Moors & De Houwer, 2006). Moors and De Houwer (2006) defined a stimulus-driven process as one that is engaged by the presence of a stimulus without the need for awareness, attention, or the intention to engage in the process. In the case of imitation, the stimulus is the target’s expressive behavior, whose presence causes the observer to express the same behavior (without awareness, attention, or intention). This feature is what makes mimicry different from backtracking. With mimicry, the presence of a target’s smiling face is enough to make an observer smile. With backtracking, the observer must also infer what the smile says about the target’s situation. This is not to say that backtracking is not automatic. It might be automatic in other ways, if it occurs rapidly, unintentionally, and with few demands on attention. If someone is crying, it doesn’t take much to infer that something bad happened.

So to find evidence of automatic, stimulus-driven mimicry, empirical research must show (1) that an observer is more likely to perform some behavior when he sees a target perform the same behavior than when he sees the target perform a different

behavior, and (2) that the observer's behavior is caused by the presence of the target's behavior, and does not require further mental processing.

One promising area of research is imitation in newborn infants. If infants imitate someone else's facial expressions, then it is most likely caused by the presence of the other's expression, because infants lack the experience they would need to make sense of the expression. In support of automatic imitation, two well-known studies found that 12- to 21-day-old infants were more likely to make facial gestures (lip protrusion, tongue protrusion, mouth opening) after an adult experimenter made the same gesture than after the experimenter made a different gesture (Meltzoff & Moore, 1977). Later research found that even younger infants (average age of 36 hours) were more likely to make happy, sad, and surprised facial expressions after an adult experimenter made the same expression than after the experimenter made a different expression (Field, Woodson, Greenberg, & Cohen, 1982).

Although this research is sometimes cited as evidence that imitation is automatic, this point is unclear in at least one respect—the speed of imitation. The displays of the gestures, and the test periods when imitation was measured, were relatively long (e.g., 20-second response periods; Meltzoff & Moore, 1977), meaning that the infants might not have responded for a relatively long time. Notably, the same limitation exists in studies where infants cried after they heard the cries of another infant (Sagi & Hoffman, 1976; Simner, 1971). In those studies, the infants were exposed to the cries for six minutes, and the average time before they cried was 1.5 minutes or longer. If the responses were automatic, one would expect them to be more immediate.

Whether it's automatic or not, subsequent research has produced mixed evidence for infant imitation and led to a debate about its existence (for a recent review see Oostenbroek, Slaughter, Nielsen, & Suddendorf, 2013). Furthermore, a recent study,

which had one of the largest samples and the most comprehensive set of control conditions, found no evidence that infants imitate facial gestures, and found that previous evidence for imitation might only have been found because past studies lacked the right control conditions (Oostenbroek et al., 2016). Pertinent to emotion mimicry, the infants were no more likely to make emotional faces when an adult experimenter made the same face than when the experimenter made a different face.

Even if mimicry is not innate from infancy, it could emerge by adulthood (through maturation or learning) as an automatic, stimulus-driven response to others' expressions. Many studies find that when adults see emotional faces they respond with similar facial expressions (e.g., Blair, Herrera, & Hess, 1999; Dimberg & Petterson, 2000; Dimberg & Thunberg, 2012; Krumhuber, Likowski, & Weyers, 2013; Weyers, Mühlberger, Hefele, & Pauli, 2006). Frequently, this research uses facial electromyography (EMG) to measure the activity of facial muscles, particularly the *zygomaticus major* (*zygomaticus* for the sake of brevity), which pulls the corners of the lips up during smiles, and the *corrugator supercilii* (*corrugator* for the sake of brevity), which pulls the brows together during frowns, though sometimes the activity of other muscles is measured.

To find evidence of emotion mimicry in EMG studies, subjects must have more activity in a facial muscle when they observe emotion expressions that use the muscle than when they view expressions that do not use it. Most studies look for greater *zygomaticus* activity when subjects see happy faces and greater *corrugator* activity when they see angry faces. These facial responses happen as early as 500ms after the emotional faces appear (Dimberg & Petterson, 2000; Dimberg & Thunberg, 2012), can happen when participants are unaware of the emotional faces (Dimberg, Thunberg, & Elmehed, 2000), and are at least somewhat uncontrollable (Dimberg, Thunberg, &

Grunedal, 2002). These results are consistent with the theory that people mimic others' emotion expressions, and that mimicry is at least somewhat automatic. However, there are alternative explanations. Specifically, facial responses to emotional faces might reflect not mimicry of the expression, but the observer's emotions. And part of the observer's emotions might be a vicarious response from backtracking.

Backtracking as Another Explanation for Emotion Contagion

Most of the EMG evidence for facial mimicry has compared zygomaticus and corrugator responses when subjects see happy and angry faces. This is a problem because the corrugator is used to not only make angry expressions, but also sad and fearful expressions. Thus, in a comprehensive review of the research on emotion mimicry, Hess and Fischer (2013, 2014) pointed out that there is limited evidence that people mimic specific emotion expressions, and more evidence that people smile when they see happy faces and frown when they see negative emotional faces. In this case, observers' facial responses might reflect an emotional reaction to the emotional faces, positive to happy faces and negative to negative faces, and not just mimicry of the expression. For example, when subjects see angry faces (but not neutral faces), if they incidentally feel afraid, they have more activity in the *frontalis*, the forehead muscle that raises the eyes in fear expressions (Moody, McIntosh, Mann, & Weisser, 2007). This is inconsistent with mimicry, because the *frontalis* is not active in angry faces, but it's consistent with an emotional reaction of fear to angry faces.

Observers might also have an empathic emotional reaction to emotional faces, if they consider what made the other person emotional in the first place. This hypothesis comes from an appraisal theory of vicarious emotions (Wondra & Ellsworth, 2015). According to the appraisal theory, an observer will feel a vicarious emotion when she appraises a target's situation as good or bad, at the minimum. Although the observer

might not know all the details of the target's situation from the face alone, she can backtrack and infer that if the target is smiling, then something good happened, and if the target is frowning, then something bad happened. Based on this minimal appraisal, the observer could feel an empathic emotion, and her face would express that empathic emotion. Thus, one would expect the observer to show more zygomaticus activity in responses to happy faces, because she feels empathic joy for the other person, and greater corrugator activity in response to negative faces, because she feels some negative empathic emotion for the other person.

Although mimicry would predict the same pattern of facial activity, the backtracking hypothesis reverses the relationship between the observer's expression and vicarious emotion. With mimicry, when an observer sees a target smiling, the target's smile causes her to smile, and her smile causes her vicarious joy. With backtracking, when an observer sees a target smiling, she infers that something good happened, her appraisal that something good happened causes her vicarious joy, and her vicarious joy causes her smile.

Testing the Backtracking Hypothesis

Both mimicry and backtracking predict more zygomaticus activity in response to happy faces and more corrugator activity in response to negative faces. How do we test whether the facial responses come from backtracking and not just mimicry? One way to test the backtracking hypothesis is to change how observers backtrack from emotional faces to the situations that caused them.

Observers might typically assume that others' emotion expressions are reliable signs of the situations that caused them, so if they see someone smiling, they assume that something good happened. But if this assumption is violated, then it might change the observers' inferences. For example, the observer might learn that a target gets

excited about things that are not very exciting. What would happen when the observer sees the same target smile later? According to stimulus-driven mimicry, the observer should smile back just as much, because it is the presence of the target's expression that causes the observer's expression. According to the backtracking hypothesis, the observer should smile back less, because the observer will distrust that the smile means that something truly good happened to the target.

I tested the backtracking hypothesis by having subjects watch a video of a young woman who was excited about her romantic relationship. In the video, she revealed that she had been dating her partner for two years, or that she had been dating her partner for one week. Then subjects saw images of her with happy expressions, neutral expressions, and sad expressions. Subjects' facial expressions were measured using EMG. I predicted that when subjects saw the woman get excited about a one-week relationship, they would distrust that her smiles were a sign that something good happened, and when they saw her happy expressions vs. sad expressions, their own expressions would be less happy.

Overview of the Research

Subjects watched a video interview of a young woman named Meredith who was overjoyed about her relationship with her boyfriend, Nick. In the middle of the video, Meredith revealed that the relationship had lasted for two years or for one week, but she expressed the same joy about it either way. I predicted that subjects would think a one-week relationship was less exciting than a two-year relationship, and those who thought Meredith was excited about a one-week relationship would distrust that her smiles were a sign that something good happened to her.

After watching the video, subjects saw images of Meredith with happy, neutral, and sad expressions. Their facial muscle activity was measured with electromyography

(EMG). I predicted that when subjects saw the happy faces vs. sad faces, they would have more muscle activity in the *zygomaticus major* (for brevity, *zygomaticus*), the muscle that pulls the lips back in a smile, and less activity in the *corrugator supercilii* (for brevity, *corrugator*), the muscle that pulls the eyebrows together in a frown.⁸ Based on the backtracking hypothesis, I predicted that these differences in muscle activity would be smaller when subjects believed Meredith was excited about a one-week relationship. In other words, if she was excited about a one-week relationship, subjects would distrust that her smiles were a sign that something good happened, and they would be less likely to smile back at her smiles.

There were two pilot studies. The purpose of the first pilot study was to make sure that the videos changed how subjects backtracked from Meredith's happy expressions to her situation. The purpose of the second pilot study was to make sure that without the videos, subjects' "mimicked" Meredith's happy and sad expressions.

Pilot Study 1: Changing How Subjects Backtrack from Happy Expressions

To test the backtracking hypothesis, it was important to make sure that the videos changed how subjects backtracked from Meredith's expressions to her situation. Specifically, I predicted that after subjects watched her get excited about a one-week relationship vs. a two-year relationship, when they saw her smile again, they would infer that her situation wasn't as good.

Method

⁸ The difference in corrugator activity can reflect relaxation of the corrugator in response to happy faces rather than contraction of the corrugator in response to sad faces, because subjects concentrate and contract the corrugator as they prepare for the faces to appear (e.g., Dimberg & Petterson, 2000; Dimberg & Thunberg, 2012; Dimberg et al., 2000).

Pilot subjects were approached in public locations on the University of Michigan campus. They watched a video with headphones on a mobile phone and completed a paper survey. Data were excluded from one subject because he knew the actress in the video, and from another because the experimenter made a procedural error.

The video showed a young woman named Meredith who was interviewed about her romantic relationship. Each interview question appeared on a black screen before Meredith answered. She answered questions about her name and her partner's name, how they met, and how the relationship makes her feel. Then she revealed that they had been dating for two years ($n = 22$) or for one week ($n = 21$):

How long ago did your relationship begin?

So we got together a couple weeks after me and my last boyfriend broke up after a year-long relationship. So we've been together for two years now (*for about a week*).

Finally, she described how excited she was to think about her future with Nick.

Where do you see your relationship heading in the future?

Ahhh. . . I just. . . I really think that he's the one. He makes me so happy and I just get so excited imagining what the rest of our life is going to be like together. I just. . . I can't believe that I found my soulmate. I really think that he's the one and it makes me so happy. I think I'm going to be with him forever—it feels like that. I. . . I think I've found the one.

After they watched the video, subjects completed a survey. On the first page, they saw images of Meredith with different emotion expressions. They were told that these images came from other parts of the interview, when Meredith was talking about topics that were different from what they had watched her talk about. The images showed her with a happy face, a sad face, and a neutral face (two of each). The sad and neutral faces were included to hide the fact that the research was about their reactions to her happy faces. Subjects were asked to consider what Meredith might have been talking about when each image was taken, to rate how good or bad *she* thought it was, and to rate

how good or bad *they* would think it was (-4 = extremely bad, 0 = neutral, 4 = extremely good). Backtracking was measured as how good or bad *they* would think it was.

On the second page, subjects rated how good or bad they thought Meredith felt in the video, how good or bad they thought the situation was, and how appropriate her emotion expression was (-4 = extremely bad / inappropriate, 0 = neutral, 4 = extremely good / appropriate).

Results

When subjects saw Meredith's happy faces, they thought whatever she was talking about was not as good in the one-week condition ($M = 2.08$, $SD = 0.95$) as in the two-years condition ($M = 2.82$, $SD = 0.75$), $t(37.96) = 2.8$, $p = 0.01$, 95% CI [0.2, 1.27]. This means that the manipulation successfully changed the way subjects backtracked from her emotion expressions—if she got excited about a one-week relationship, when they saw her smile again, they inferred that her situation wasn't as good.

In contrast, when subjects saw Meredith's sad faces, they thought whatever she was talking about was just as bad in the one-week condition ($M = -1.88$, $SD = 1.23$) as in the two-years condition ($M = -1.84$, $SD = 0.68$), $t(28.93) = 0.11$, $p = 0.91$, 95% CI [-0.6, 0.67]. Similarly, when subjects saw Meredith's neutral faces, there was no difference in their perceptions of what she was talking about in the one-week condition ($M = -0.43$, $SD = 0.73$) and the two-years condition ($M = -0.32$, $SD = 0.5$), $t(35.26) = 0.58$, $p = 0.57$, 95% CI [-0.28, 0.5]. This suggests that, although the videos changed how subjects backtracked from her happy expressions to her situation, it did not change how they backtracked from her sad or neutral expressions.

In addition, subjects thought that Meredith's situation wasn't as good in the one-week condition ($M = 1.95$, $SD = 1.4$) as in the two-years condition ($M = 3.18$, $SD = 0.73$), $t(29.94) = 3.59$, $p = .001$, 95% CI [0.53, 1.93], and they thought her emotion expression

was less appropriate in the one-week condition ($M = 0.81$, $SD = 0.84$) than in the two-years condition ($M = 3.32$, $SD = 0.84$), $t(26.96) = 5.46$, $p < .001$, 95% CI [1.57, 3.45]. In contrast, subjects thought that Meredith felt just as happy in the in the one-week condition ($M = 3.43$, $SD = 1.12$) as in the two-years condition ($M = 3.77$, $SD = 0.43$), $t(25.5) = 1.32$, $p = 0.20$, 95% CI [-0.19, 0.88].

The goal of the videos was to make sure that when subjects saw Meredith get excited about a one-week relationship, it would change the way they backtracked from her happy expressions, and they would be less likely to think that her smiles were a reliable sign that something good happened to her. The results of the pilot study confirm that this goal was successful.

Pilot Study 2: “Mimicry” of the Expressions When Subjects Have No Other Information

The backtracking hypothesis predicts that people smile less in response to smiles, and frown less in response to negative emotional faces, when they have a reason to distrust that the expressions are a reliable sign that something good or bad happened. To test this hypothesis, it was important to demonstrate that when there was no reason to distrust the expressions, subjects would “mimic” them. I predicted that when subjects saw the images of Meredith with emotional expressions (but did not watch the videos), they would have more activity in the zygomaticus, the muscle that pulls the cheeks back in a smile, and less activity in the corrugator, the muscle that pulls the brows together in a frown, when they saw her happy faces than when they saw her sad faces.

Method

Subjects. Pilot subjects were 24 undergraduate students who received course credit for participation. Data from four additional subjects were excluded from

analyses: one suspected the study was about mimicry, two suspected that the sensors were tracking their facial movements, and one had a tech failure. Additionally, one subject had incomplete data because he touched his face during the study and knocked off one of the zygomaticus electrodes; because this changed the psychological experience of the study, all data after that point were excluded.

Procedure. Subjects were told that the study was about emotion perception. They would see images from an interview about an emotional experience, and they would try to guess how the other person felt when each image was taken. To hide the purpose of the EMG sensors, subjects were told they measured sweating on the skin, because their physiological reactions could change how they perceived the other person's emotions.

Next, subjects were escorted to a room where the EMG sensors were attached to the zygomaticus, to the corrugator, and to the middle of the forehead (the grounding electrode). Additionally, sensors to measure electrodermal activity were placed on the distal phalanges of the middle and ring fingers of the subject's non-dominant hand (these sensors enhanced the cover story, and the electrodermal activity data are not discussed further). The EMG sensors were placed on the same side of the face.

Next, subjects were escorted to a second room where they were introduced to the emotion perception task. For each trial of the emotion perception task, subjects saw a blank screen for eight seconds, then a fixation cross for one second, then an image of an emotional face for eight seconds. There were four images of Meredith with a happy expression, four with a sad expression, and four with a neutral expression, and each image was displayed twice and in random order. After the image disappeared, subjects rated how good she felt and how bad she felt (1 = not at all, 7 = extremely). The neutral expressions and the ratings of how good and bad she felt were included to enhance the cover story, that the study was about emotion perception.

Subjects practiced two trials of the emotion perception task with images of neutral expressions. Then the experimenter left the room and the subjects completed the emotion perception task. Once they finished the emotion perception task, they completed a short demographics questionnaire. Finally, subjects were debriefed.

EMG Processing. EMG data were collected with bipolar electrodes from the zygomaticus and corrugator, with a single ground electrode in the middle of the forehead, according to the guidelines of Fridlund and Cacioppo (1986). The skin at the EMG sites was prepared by wiping it with alcohol and an abrasive pad. Biopac 4mm-diameter Ag/AgCl cup electrodes were filled with Parker Laboratories Signagel electrode gel and placed at each EMG site using adhesive disks. Electrodes at each muscle site were spaced 1.5cm apart. Interelectrode impedance was checked, and if it was above 10 k Ω , attempts were made to reduce it to 10 k Ω or less by cleaning the skin again. A Biopac Dual Wireless EMG BioNomadix model BN-EMG2 was used to record EMG signals at a sampling rate of 1000 Hz. The data were subsequently filtered with a 30-500-Hz bandpass filter and a 60-Hz notch filter.

The filtered EMG data were full-wave rectified and integrated over 20ms and 200ms epochs for different methods of analysis (see Results for details). During the study, subjects were surreptitiously video-recorded. Research assistants watched the videos to code behavioral artifacts that were unrelated to the phenomenon of interest (e.g., yawning, pursing lips, touching the face). The EMG data were set to missing in epochs that included an artifact (7% of the epochs during the periods that were used in data analysis).

Results

There is no standard way to analyze EMG data in studies of facial mimicry, and different labs used different methods. The decisions that researchers make about how to

process and analyze the data are not trivial, and they can lead to different statistical and psychological conclusions. Because there is no standard, I chose to replicate the methods that are used in three different labs. I predicted that subjects would have more zygomaticus activity and less corrugator activity when they saw happy faces than when they saw sad faces.

Analyses based on Dimberg and colleagues. The first method of analysis was based on the procedure that is typically used by Dimberg and colleagues (e.g., Dimberg & Petterson, 2000). The rectified EMG data were integrated over 20ms epochs.

To plot the data, during the first second after each image appeared, the integrated EMG data were averaged into ten 100ms periods. During the first second before each image appeared (during the fixation cross), the integrated EMG data were averaged to create a baseline. This baseline was subtracted from each 100ms period in the trial.

To analyze the data, during the first second after each image appeared, the integrated EMG data were averaged from 0-500ms and from 500-1000ms. This made it possible to separately analyze muscle activity during the first 500ms and during the second 500ms.

Zygomaticus. Figure IV.1 displays subjects' average zygomaticus activity during the first second that they saw the happy, neutral, and sad faces. On average, subjects had more zygomaticus activity when they saw happy faces than when they saw sad faces during every 100ms period of the first second, but this difference was not significant overall, $t(23) = 1.3$, $p = 0.21$, 95% CI [-.009, .039], during the first 500ms, $t(23) = 1.26$, $p = .22$, 95% CI [-.005, .022], or during the second 500ms, $t(23) = 1.26$, $p = .22$, 95% CI [-.004, .018]. There was no difference in zygomaticus activity when subjects saw happy faces and neutral faces overall, $t(23) = .29$, $p = .78$, 95% CI [-.012, .016], during the

first 500ms, $t(23) = .34, p = .74, 95\% \text{ CI} [-.007, .010]$, or during the second 500ms, $t(23) = .14, p = .89, 95\% \text{ CI} [-.007, .008]$. In summary, although the pattern was in the predicted direction, with more zygomaticus activity when subjects saw happy faces than when they saw sad faces, the differences were not statistically significant.

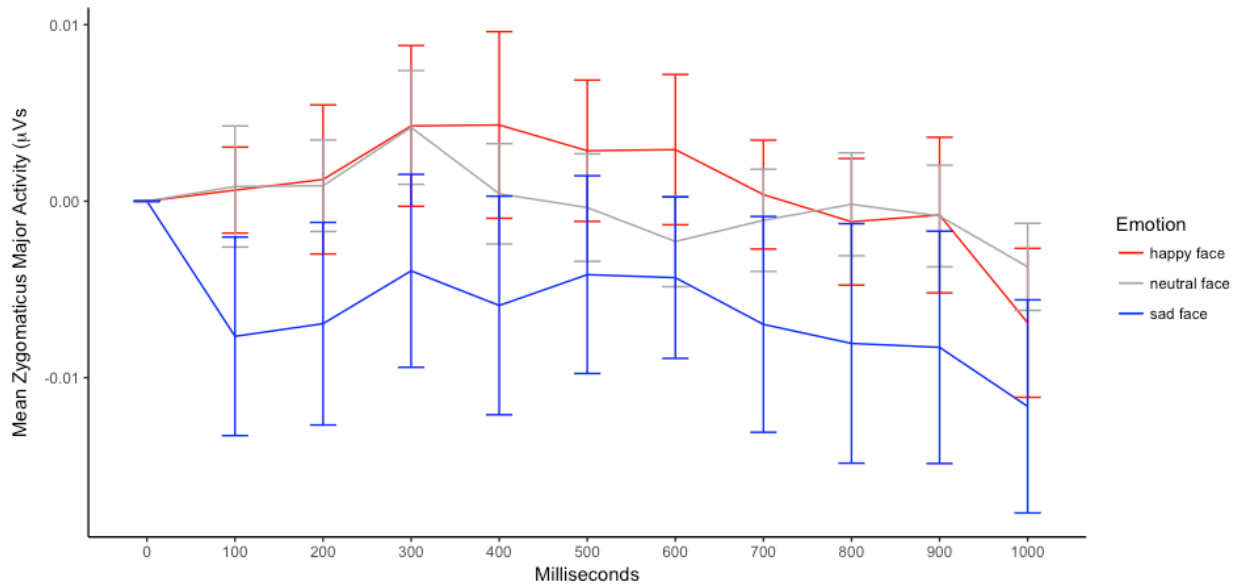


Figure IV.1. Average zygomaticus major activity during the first second that subjects saw happy, neutral, and sad faces. The bars depict ± 1 standard error. Analyses are based on a procedure from Dimberg and colleagues (e.g., Dimberg & Petterson, 2000).

Corrugator. Figure IV.2 displays subjects' average corrugator activity during the first second that they saw the happy, neutral, and sad faces. On average, subjects had less corrugator activity when they saw happy faces than when they saw sad faces, $t(23) = 2.07, p = .0496, 95\% \text{ CI} [-.023, -.00002]$, which primarily occurred during the second 500ms, $t(23) = 3.11, p = .005, 95\% \text{ CI} [-.020, -.004]$, and not during the first 500ms, $t(23) = .22, p = .83, 95\% \text{ CI} [-.004, .005]$. This difference during the second 500ms was due to a greater decrease in corrugator activity from the baseline when subjects saw happy faces, $t(23) = 2.56, p = .02, 95\% \text{ CI} [-.019, -.002]$, and not due to an increase in activity when they saw sad faces, $t(23) = .69, p = .50, 95\% \text{ CI} [-.003, .006]$. There was no difference in corrugator activity when subjects saw sad and neutral faces overall, $t(23) = .80, p = .43,$

95% CI [-.03, .01], during the first 500ms, $t(23) = 1.04$, $p = .31$, 95% CI [-.029, .010], or during the second 500ms, $t(23) = .34$, $p = .74$, 95% CI [-.007, .009]. In summary, the data supported the prediction that subjects would have less corrugator activity when they saw happy faces than when they saw sad faces.

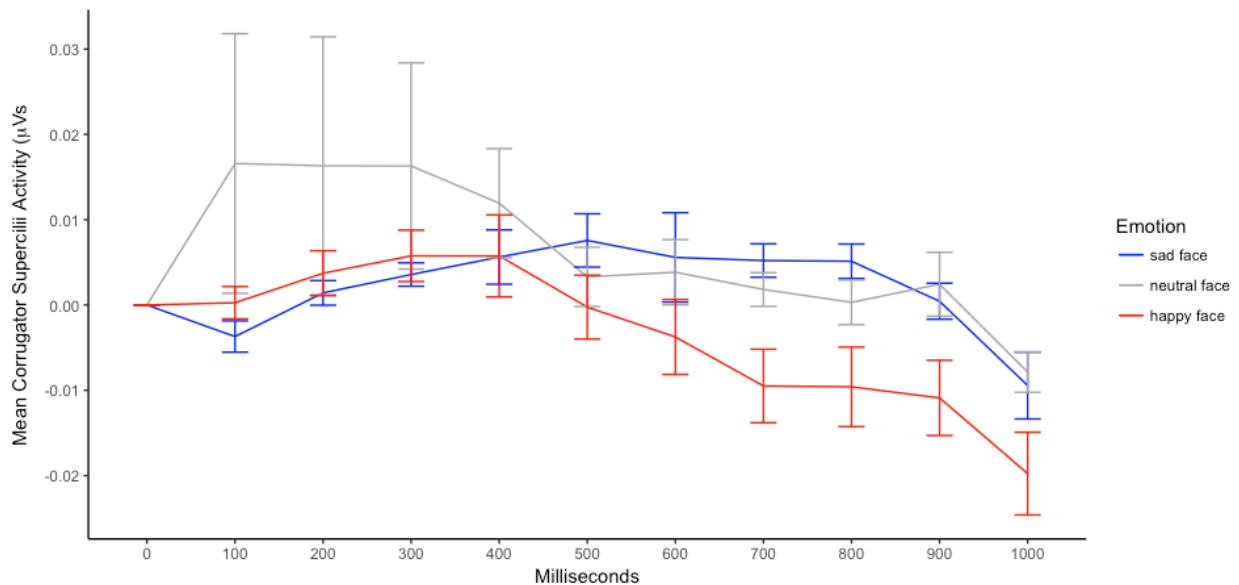


Figure IV.2. Average corrugator supercillii activity during the first second that subjects saw sad, neutral, and happy faces. The bars depict ± 1 standard error. Analyses are based on a procedure from Dimberg and colleagues (e.g., Dimberg & Petterson, 2000).

Analyses based on Moody and colleagues. The second method of analysis was based on a procedure from Moody and colleagues (Moody, McIntosh, Mann, & Weisser, 2007). The method is similar to the method from Dimberg and colleagues, but with two differences. First, the integrated EMG data were log₁₀-transformed and standardized within participant and muscle. Second, the baseline was the average integrated EMG activity during the last 500ms before stimulus onset (during the second half of the fixation cross) instead of during the last second.

Zygomaticus. Figure IV.3 displays subjects' average zygomaticus activity during the first second that they saw the happy, neutral, and sad faces. Note that the choice of analytic method has consequences. Using this method, on average, subjects had greater

zygomaticus activity when they saw neutral faces than when they saw happy faces at all but two of the 100ms periods. This pattern did not match the one from the method of Dimberg and colleagues.

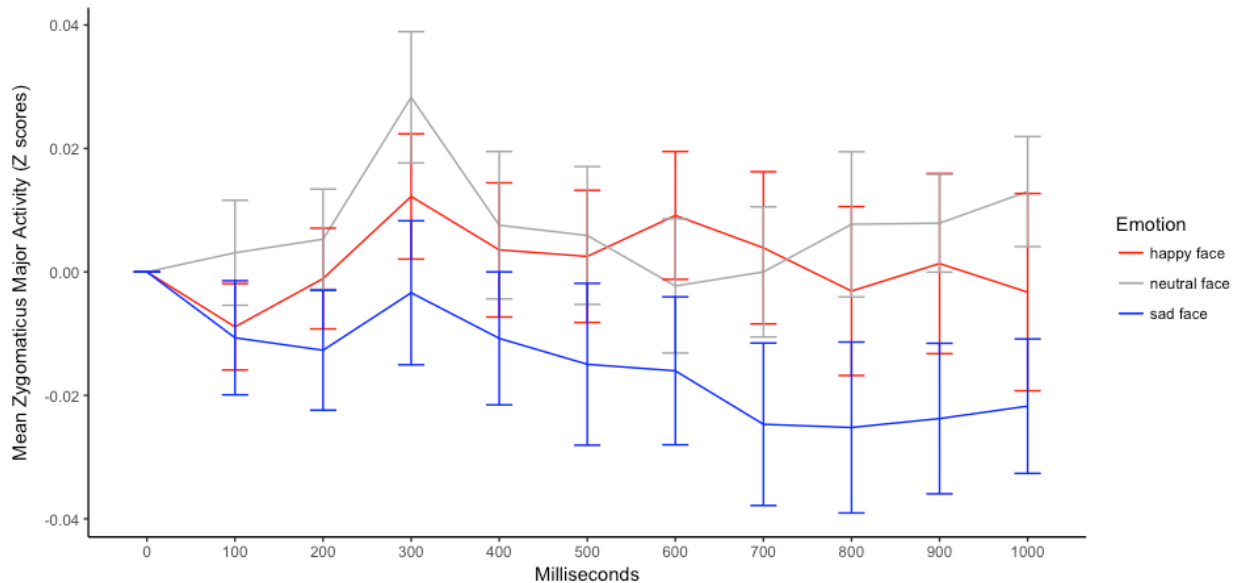


Figure IV.3. Average zygomaticus major activity during the first second that subjects saw sad, neutral, and happy faces. The bars depict ± 1 standard error. Analyses are based on a procedure from Moody et al. (2007).

On average, subjects had more zygomaticus activity when they saw happy faces than when they saw sad faces during every 100ms period of the first second, but this difference was not significant overall, $t(23) = 1.45, p = 0.16, 95\% \text{ CI} [-.015, .087]$, during the first 500ms, $t(23) = 1.03, p = .32, 95\% \text{ CI} [-.012, .037]$, or during the second 500ms, $t(23) = 1.65, p = .11, 95\% \text{ CI} [-.006, .054]$. There was no difference in zygomaticus activity when subjects saw happy faces and neutral faces overall, $t(23) = .57, p = .57, 95\% \text{ CI} [-.056, .032]$, during the first 500ms, $t(23) = .99, p = .33, 95\% \text{ CI} [-.026, .009]$, or during the second 500ms, $t(23) = .25, p = .80, 95\% \text{ CI} [-.034, .026]$. In summary, although the pattern was in the predicted direction, with more zygomaticus activity when subjects saw happy faces than when they saw sad faces, the differences were not statistically significant.

Corrugator. Figure IV.4 displays subjects' average corrugator activity during the first second that they saw the sad, neutral, and happy faces. On average, subjects had less corrugator activity when they saw happy faces than when they saw sad faces, $t(23) = 3.40$, $p = 0.002$, 95% CI [-.205, -.026], which primarily occurred during the second 500ms, $t(23) = 4.26$, $p < .001$, 95% CI [-.087, -.030], and not during the first 500ms, $t(23) = .88$, $p = .39$, 95% CI [-.023, .009]. As Figure IV.4 shows, this difference during the second 500ms was due to a drop from the baseline when subjects saw happy faces, $t(23) = 3.50$, $p = .002$, 95% CI [-.073, -.019] and not due to an increase from the baseline when subjects saw sad faces, $t(23) = 1.40$, $p = .18$, 95% CI [-.006, .031]. There was no difference in corrugator activity when subjects saw sad and neutral faces overall, $t(23) = .58$, $p = .57$, 95% CI [-.018, .032], during the first 500ms, $t(23) = .72$, $p = .48$, 95% CI [-.021, .010], or during the second 500ms, $t(23) = 1.69$, $p = .11$, 95% CI [-.003, .028]. In summary, the data supported the prediction that subjects would have less corrugator activity when they saw happy faces than when they saw sad faces.

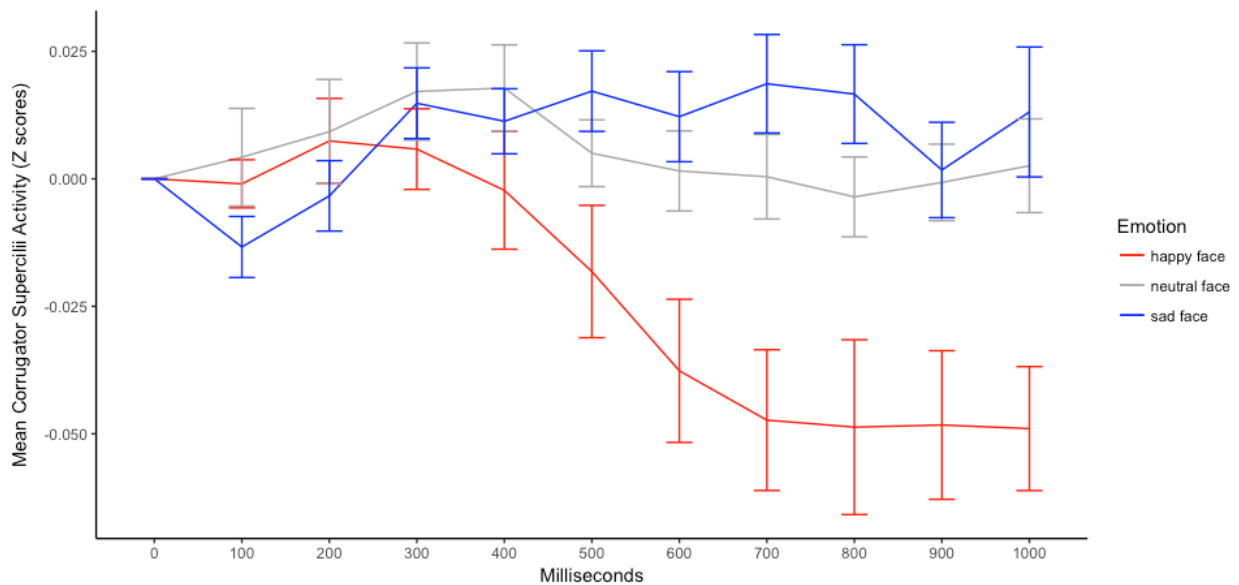


Figure IV.4. Average corrugator supercillii activity during the first second that subjects saw sad, neutral, and happy faces. The bars depict ± 1 standard error. Analyses are based on a procedure from Moody et al. (2007).

Analyses based on Bourgeois and Hess. The third method of analysis was based on a procedure from Bourgeois and Hess (2008). This method departs from the previous methods in a few ways. First, the EMG data were integrated over 200ms epochs instead of 20ms epochs. Second, the EMG data were standardized within participants and muscle, but there was no log-transformation. Third, there was no subtraction from a baseline. Fourth, the EMG data were averaged over the entire eight-second period that subjects saw the images instead of during just the first second. I made one departure from the procedure of Bourgeois and Hess: they sampled their EMG data at 20 Hz, but the data from the pilot study were sampled at 1000 Hz. It seemed unreasonable to discard data to match their sampling rate.

Zygomaticus. Figure IV.5 displays subjects' average zygomaticus activity when they saw happy, neutral, and sad faces. Unlike the prior analyses, on average subjects had less zygomaticus activity when they saw happy faces than when they saw sad faces, though the difference was not significant, $t(23) = .59, p = 0.56, 95\% \text{ CI } [-.156, .086]$. There was no difference in zygomaticus activity when subjects saw happy faces and neutral faces, $t(23) = .36, p = .72, 95\% \text{ CI } [-.086, .122]$.

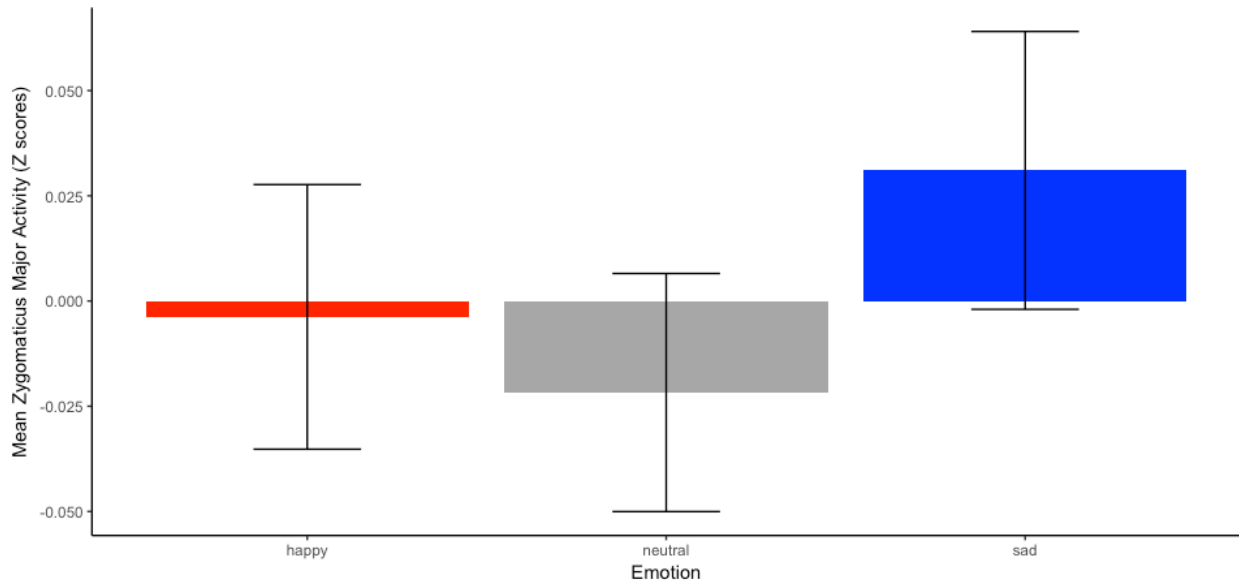


Figure IV.5. Average zygomaticus major activity during the whole period that subjects saw sad, neutral, and happy faces. The bars depict ± 1 standard error. Analyses are based on a procedure from Bourgeois & Hess (2008).

Corrugator. Figure IV.6 displays subjects' average corrugator activity when they saw sad, neutral, and happy faces. Similar to the previous analyses, on average subjects had less corrugator activity when they saw happy faces than when they saw sad faces, $t(23) = 3.33, p = .003, 95\% \text{ CI } [-.198, -.046]$. There was no difference in corrugator activity when subjects saw sad and neutral faces, $t(23) = .73, p = .47, 95\% \text{ CI } [-.044, .092]$, but they did have less corrugator activity when they saw happy faces than when they saw neutral faces, $t(23) = 3.16, p = .004, 95\% \text{ CI } [-.163, -.034]$. Thus, similarly to the previous analyses, the differences in corrugator activity seemed to be due to relaxation when subjects saw happy faces and not due to contraction when they saw sad faces.

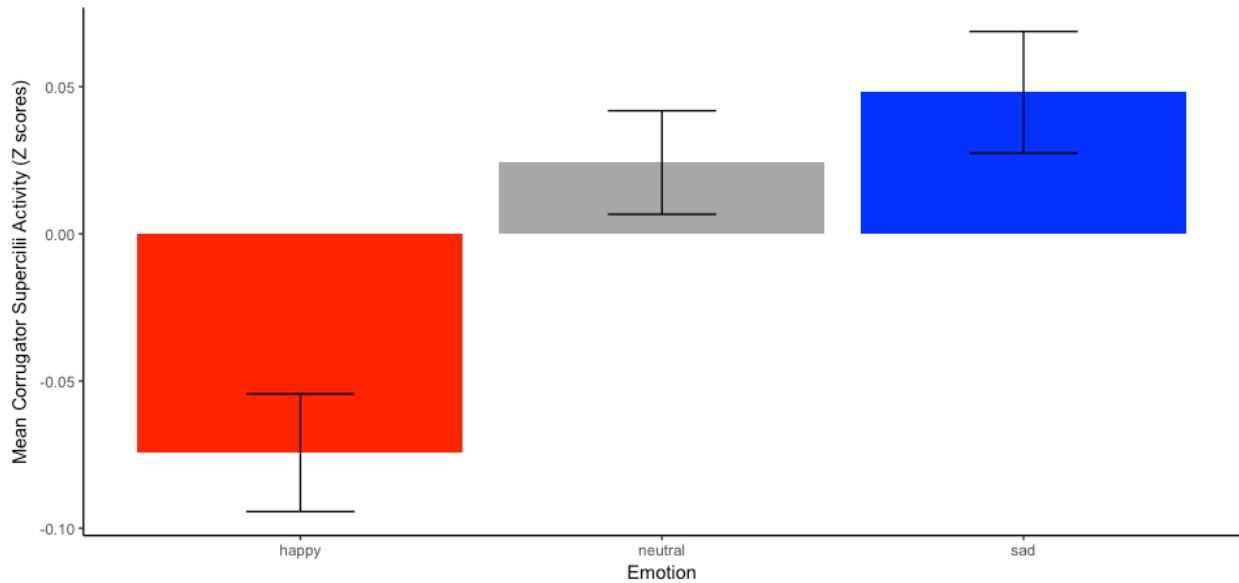


Figure IV.6. Average zygomaticus major activity during the entire period that subjects saw sad, neutral, and happy faces. The bars depict ± 1 standard error. Analyses are based on a procedure from Bourgeois & Hess (2008).

Summary of results. The purpose of the second pilot study was to make sure that the images could produce a “mimicry” effect, where subjects had greater zygomaticus activity and less corrugator activity when they saw happy vs. sad faces. The procedures of Dimberg and colleagues and Moody and colleagues found a non-significant trend for more zygomaticus activity when subjects saw happy faces than when they saw sad faces. All three procedures found less corrugator activity when subjects saw happy faces than when they saw sad faces. These results were imperfect, but they were consistent with the predictions, and they were enough to proceed with the main study, where a larger sample size would provide more power to detect these effects.

Main Study Method

The pilot studies established, first, that the videos changed how subjects backtracked from the emotion expression to the situation, and second, that subjects’ facial responses to the images of emotional faces fit the typical mimicry effect. In the

main study, I tested whether the change in backtracking from the videos would change subjects' facial responses to the emotional faces. Subjects watched the videos of Meredith expressing her joy about the two-year relationship or the one-week relationship. Then they saw images of her with happy, neutral, and sad faces while their facial muscle activity was recorded. I predicted that subjects would have more zygomaticus activity and less corrugator activity when they saw happy vs. sad faces. If the facial responses are simply mimicry, then these differences should be unaffected by the videos. But based on the backtracking hypothesis, I predicted that the differences in facial responses to the emotional faces would be smaller when subjects thought Meredith was excited about a one-week relationship, because they would infer that her happy expressions were a less reliable sign that something good happened to her.

Subjects

Subjects were 146 undergraduate students and community members who received course credit or \$10 for participating in the study. Data from another 22 subjects were excluded from analysis: eight suspected the sensors were measuring their facial expressions, four suspected that the video was fake, four were inattentive or fell asleep, two could not hear sound from the video due to a technical failure, one recognized the actress, one had poor EMG data quality, one became lightheaded during the study due to a medical phobia, and one subject who watched the one-week video reported during debriefing that he was African, and due to his cultural background he thought there was nothing unusual about someone falling in love and getting married after knowing their partner for only a week.

Procedure

Subjects were told that the study was about emotion perception. They were told that most studies about emotion perception ask people to guess the emotions of

complete strangers, but in everyday life we usually know something about the people whose emotions we're trying to understand. So in the study, subjects would watch a video of a participant who was recorded while talking about different emotional experiences. They would watch her talk about one of those experiences and then they would see images of her from other parts of the interview while she was talking about other experiences. They would guess how she felt when the images were taken. As in the mimicry pilot study, subjects were also told that sensors measured sweating on the skin. The rest of the study was identical to the mimicry pilot with three exceptions.

First, after subjects practiced the emotion perception task, they were randomly assigned to watch the one-week or two-years video.

Second, in the mimicry pilot study, many subjects would look around the room between trials during the blank screen. When the fixation cross appeared, they turned their attention back to the computer screen, which caused many behavioral artifacts in the EMG data. This was a problem because muscle activity during the fixation cross was used as a baseline in two of the methods of analysis. To attenuate this problem, a new period was added after the fixation cross, where subjects saw an image of Meredith that had her face blurred for one second (and then the emotional face appeared). The EMG data during this new period were used as the baseline.

Third, after the emotion perception task, subjects completed a survey that asked them how much they felt happy, cheerful, amused, entertained, irritated, annoyed, interested, curious, proud, grateful, sad, down, lonely, jealous, and envious while they were watching the video of Meredith at the beginning of the study (slider scale with 0 = not at all, 100 = extremely). I analyzed how happy (average of "happy" and "cheerful"), amused (average of "amused" and "entertained"), irritated (average of "irritated" and "annoyed"), and jealous (average of "jealous" and "envious") they felt. Amusement,

irritation, and jealousy were analyzed because they were emotions that subjects would plausibly feel (for example, a couple of participants laughed while they were watching the one-week video).

Subjects were also asked questions about their romantic relationships and their beliefs about love; these data were collected for exploratory purposes and are not discussed further in this paper.

Main Study Results

For the full study, I used the same three methods to analyze the EMG data as in the mimicry pilot study. I predicted that subjects would have more zygomaticus activity and less corrugator activity when they saw happy faces than when they saw sad faces, and that this difference would be smaller after they watched Meredith get excited about a one-week relationship than after they watched her get excited about a two-year relationship. If the facial responses are simply stimulus-driven mimicry, then they should be unaffected by the videos; however, if the facial responses are at least partially driven by backtracking, then they should be weaker for subjects in the one-week condition, who should distrust that Meredith's happy faces are a reliable sign that something good happened to her.

Analyses Based on Dimberg and Colleagues

Zygomaticus. Figure IV.7 displays subjects' average zygomaticus activity during the first second they saw the happy, neutral, and sad faces. On average, subjects had more zygomaticus activity when they saw happy faces than sad faces, $t(139) = 2.13$, $p = .04$, 95% CI [.001, .019], which occurred during the second 500ms, $t(139) = 2.44$, $p = .02$, 95% CI [.002, .017], but not during the first 500ms, $t(142) = .43$, $p = .67$, 95% CI [-.005, .007]. On average, this difference was smaller for subjects who saw Meredith get excited about a one-week relationship than for those who saw her get excited about a two-year

relationship, at least during the second 500ms, but the effect of the videos on the difference in zygomaticus activity was not statistically significant either overall, $t(139) = .25, p = .80, 95\% \text{ CI } [-.021, .016]$, or during just the second 500ms, $t(139) = .44, p = .66, 95\% \text{ CI } [-.018, .012]$.

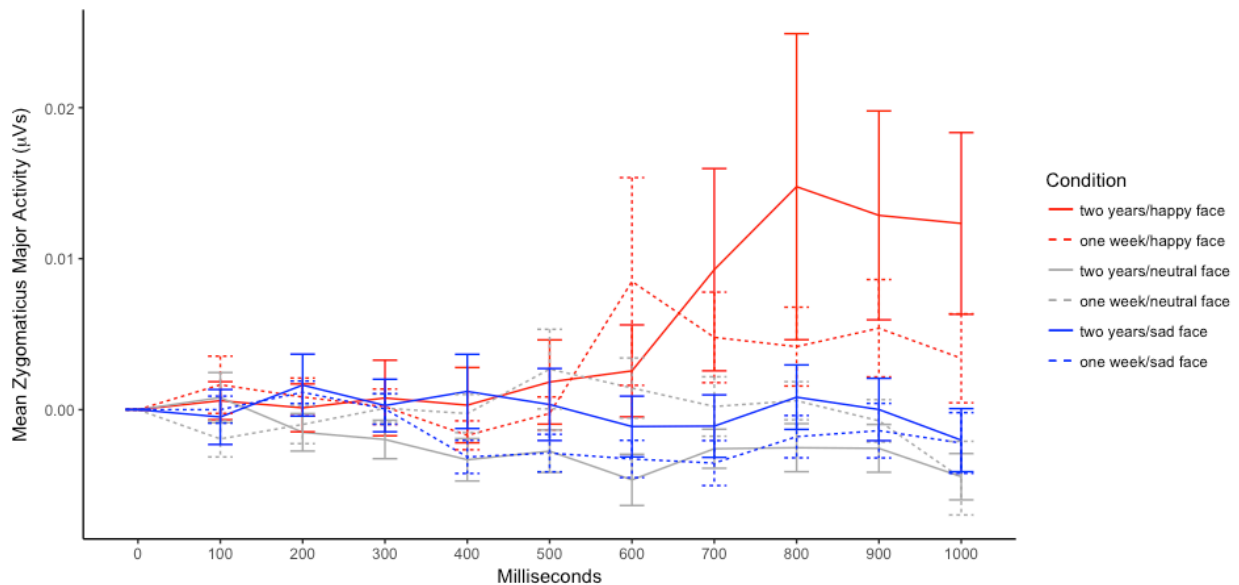


Figure IV.7. Average zygomaticus major activity during the first second that subjects saw sad, neutral, and happy faces. The bars depict ± 1 standard error. Analyses are based on a procedure from Dimberg and colleagues (e.g., Dimberg & Petterson, 2000).

Additionally, on average, subjects had more zygomaticus activity when they saw happy faces than when they saw neutral faces, $t(139) = 2.66, p = .01, 95\% \text{ CI } [.003, .019]$, which also was primarily during the second 500ms, $t(139) = 2.77, p = .01, 95\% \text{ CI } [.003, .017]$, and not during the first 500ms, $t(142) = 1.07, p = .29, 95\% \text{ CI } [-.001, .004]$. Again, on average, this difference was smaller for those who saw Meredith get excited about a one-week relationship, at least during the second 500ms, but the effect of the videos on the difference in zygomaticus activity in response to happy vs. neutral faces was not statistically significant either overall, $t(139) = 1.21, p = .23, 95\% \text{ CI } [-.027, .006]$, or during the second 500ms, $t(139) = 1.12, p = .27, 95\% \text{ CI } [-.022, .006]$.

In summary, the data supported the prediction that subjects would have more zygomaticus activity when they saw happy faces than when they saw sad faces. Although the pattern of the data was consistent with the prediction that the difference in zygomaticus activity would be smaller when subjects they saw Meredith get excited about a one-week relationship than when they saw her get excited about a two-year relationship, the effect of the video was not statistically significant.

Corrugator. Figure IV.8 displays subjects' average corrugator activity during the first second that they saw the sad, neutral, and happy faces. On average, subjects had less corrugator activity when they saw happy faces than when they saw sad faces, $t(141) = 6.78, p < .001, 95\% \text{ CI } [-.034, -.018]$, which occurred during both the first 500ms, $t(144) = 4.68, p < .001, 95\% \text{ CI } [-.007, -.003]$, and the second 500ms, $t(141) = 6.48, p < .001, 95\% \text{ CI } [-.027, -.014]$. Furthermore, this difference was smaller for subjects who watched Meredith get excited about a one-week relationship than for those who watched her get excited about a two-year relationship overall, $t(141) = 2.03, p = .04, 95\% \text{ CI } [.0004, .031]$, and during the first 500ms, $t(144) = 2.02, p = .045, 95\% \text{ CI } [.0001, .009]$, and there was a similar trend during the second 500ms, $t(141) = 1.73, p = .09, 95\% \text{ CI } [-.002, .024]$.

Moreover, when subjects saw Meredith's happy faces, those who watched her get excited about a two-year relationship had greater decreases in corrugator activity than those who watched her get excited about a one-week relationship during the first 500ms, $t(144) = 2.08, p = .04, 95\% \text{ CI } [.0002, .006]$, but not during the second 500ms, $t(141) = .83, p = .41, 95\% \text{ CI } [-.005, .011]$, whereas there was a trend for them to have greater corrugator activity when they saw sad faces during the second 500ms, $t(141) = 1.69, p = .09, 95\% \text{ CI } [-.017, .001]$, but not during the first 500ms, $t(144) = .74, p = .46, 95\% \text{ CI } [-.004, .002]$.

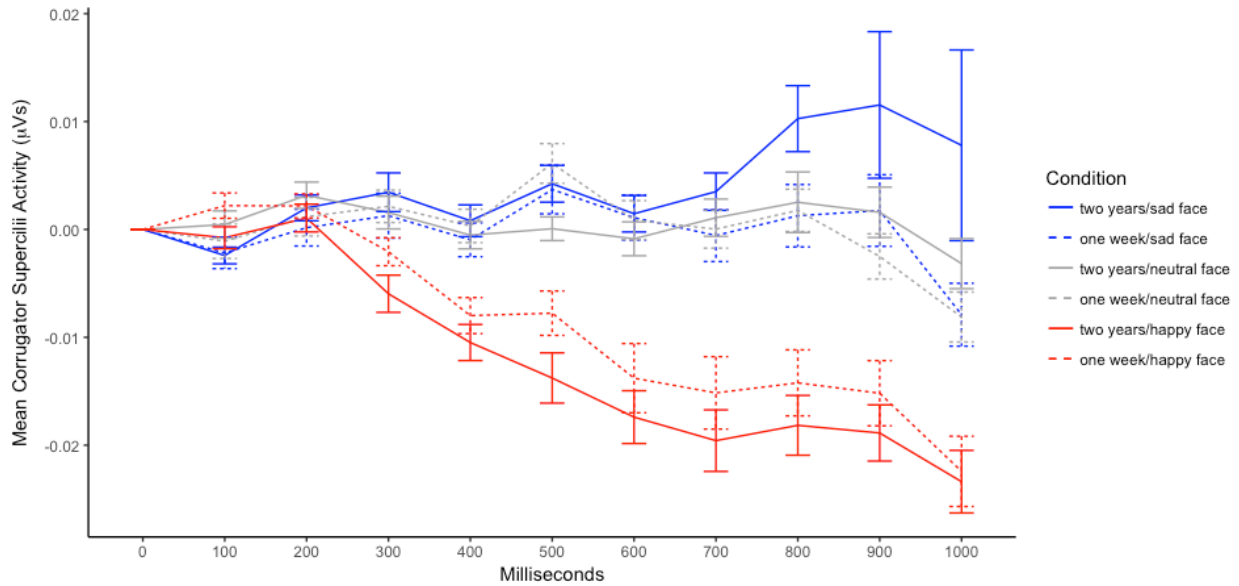


Figure IV.8. Average corrugator supercillii activity during the first second that subjects saw sad, neutral, and happy faces. The bars depict ± 1 standard error. Analyses are based on a procedure from Dimberg and colleagues (e.g., Dimberg & Petterson, 2000).

On average, there was no difference in corrugator activity when subjects saw sad faces and when they saw neutral faces, $t(141) = 1.45, p = .15, 95\% \text{ CI} [-.001, .008]$, though there was a trend for more corrugator activity during the second 500ms, $t(141) = 1.96, p = .052, 95\% \text{ CI} [-.00003, .007]$. There was a trend for the difference in corrugator activity to sad vs. neutral faces to be smaller for subjects who watched Meredith get excited about a one-week relationship than for those who watched her get excited about a two-year relationship overall, $t(141) = 1.75, p = .08, 95\% \text{ CI} [-.017, .001]$, but not during the first 500ms alone, $t(144) = 1.03, p = .30, 95\% \text{ CI} [-.006, .002]$, or during the second 500ms alone, $t(141) = 1.60, p = .11, 95\% \text{ CI} [-.013, .001]$.

In summary, the data supported the prediction that subjects would have less corrugator activity when they saw happy faces than when they saw sad faces. Furthermore, the data supported the prediction that this difference in corrugator

activity would be smaller when subjects they saw Meredith get excited about a one-week relationship than when they saw her get excited about a two-year relationship.

Analyses Based on Moody and Colleagues

Zygomaticus. Figure IV.9 displays subjects' average zygomaticus activity during the first second that they saw the happy, neutral, and sad faces. On average, subjects had more zygomaticus activity when they saw happy faces than when they saw sad faces, $t(139) = 3.21, p = .002, 95\% \text{ CI } [.014, .060]$, which occurred during the second 500ms, $t(139) = 3.54, p < .001, 95\% \text{ CI } [.014, .051]$, but not during the first 500ms, $t(139) = 1.20, p = .23, 95\% \text{ CI } [-.003, .012]$. Although this difference tended to be smaller for those who watched Meredith get excited about a one-week relationship, at least during the second 500ms, but the effect of the video on the difference in zygomaticus activity was not statistically significant either overall, $t(139) = .14, p = .89, 95\% \text{ CI } [-.049, .043]$, or during just the second 500ms, $t(139) = .26, p = .80, 95\% \text{ CI } [-.041, .032]$.

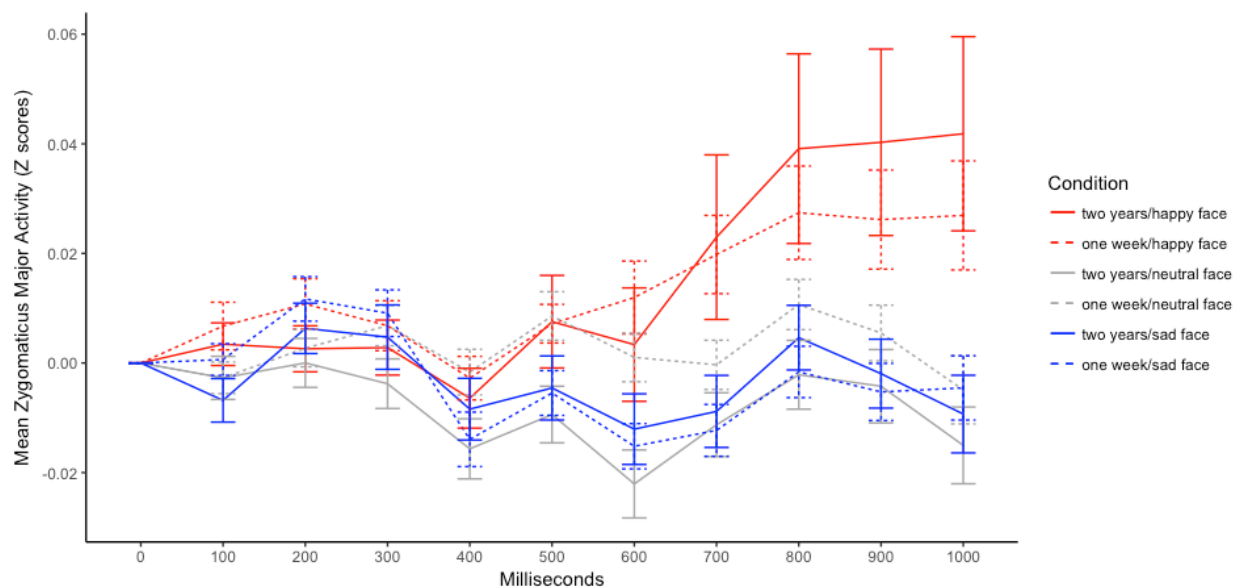


Figure IV.9. Average zygomaticus major activity during the first second that subjects saw sad, neutral, and happy faces. The bars depict ± 1 standard error. Analyses are based on a procedure from Moody et al. (2007).

Additionally, on average, subjects had more zygomaticus activity when they saw happy faces than when they saw neutral faces, $t(139) = 3.32, p = .001, 95\% \text{ CI } [.014, .057]$, which also was primarily during the second 500ms, $t(139) = 3.49, p < .001, 95\% \text{ CI } [.013, .047]$, and not during the first 500ms, $t(139) = 1.59, p = .12, 95\% \text{ CI } [-.001, .013]$. On average, this difference was smaller for subjects who watched Meredith get excited about a one-week relationship, but the effect of the video on the difference in zygomaticus activity was not statistically significant overall, $t(139) = 1.19, p = .24, 95\% \text{ CI } [-.068, .017]$, or during just the second 500ms, $t(139) = 1.18, p = .24, 95\% \text{ CI } [-.054, .014]$.

In summary, the data supported the prediction that subjects would have more zygomaticus activity when they saw happy faces than when they saw sad faces. Although the pattern of the data was consistent with the prediction that the difference in zygomaticus activity would be smaller when subjects they saw Meredith get excited about a one-week relationship than when they saw her get excited about a two-year relationship, the effect of the video was not statistically significant.

Corrugator. Figure IV.10 displays subjects' average corrugator activity during the first second that they saw the sad, neutral, and happy faces. On average, subjects had less corrugator activity when they saw happy faces than when they saw sad faces, $t(141) = 9.65, p < .001, 95\% \text{ CI } [-.128, -.085]$, which occurred during both the first 500ms, $t(144) = 6.36, p < .001, 95\% \text{ CI } [-.030, -.016]$, and the second 500ms, $t(141) = 9.75, p < .001, 95\% \text{ CI } [-.101, -.067]$. Furthermore, this difference was smaller for subjects who watched Meredith get excited about a one-week relationship than for those who watched her get excited about a two-year relationship overall, $t(141) = 1.99, p = .049, 95\% \text{ CI } [-.087, -.0002]$, with a trend for the effect during the second 500ms, $t(141) = 1.93, p = .056, 95\% \text{ CI }$

[-.067, .001], and no effect during the first 500ms, $t(144) = 1.50, p = .14, 95\% \text{ CI} [-.024, .003]$.

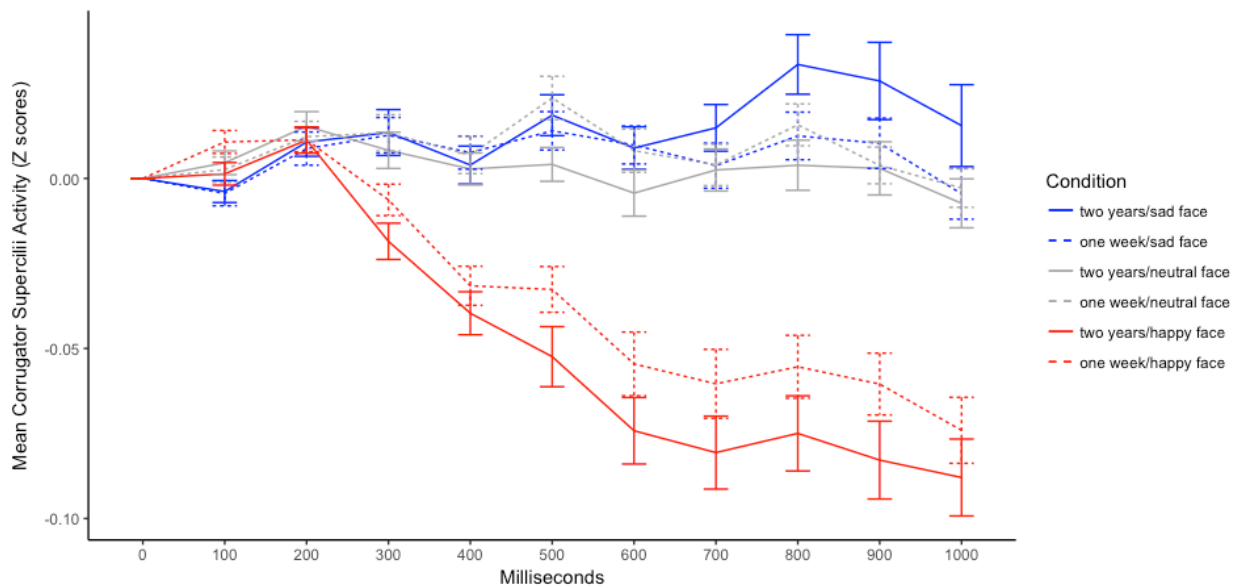


Figure IV.10. Average corrugator supercillii activity during the first second that subjects saw sad, neutral, and happy faces. The bars depict ± 1 standard error. Analyses are based on a procedure from Moody et al. (2007).

Moreover, when subjects saw Meredith's happy faces, those who watched her get excited about a two-year relationship had a trend for greater decreases in corrugator activity than those who watched her get excited about a one-week relationship during the first 500ms, $t(141) = 1.78, p = .08, 95\% \text{ CI} [-.001, .021]$, but not during the second 500ms, $t(141) = 1.41, p = .16, 95\% \text{ CI} [-.008, .046]$, whereas when they saw her sad faces, there were no differences in corrugator activity during the first 500ms, $t(141) = .15, p = .88, 95\% \text{ CI} [-.012, .010]$, or the second 500ms, $t(141) = 1.36, p = .17, 95\% \text{ CI} [-.034, .006]$.

On average, there was no difference in corrugator activity when subjects saw sad faces and when they saw neutral faces overall, $t(141) = 1.40, p = .16, 95\% \text{ CI} [-.052, .0004]$, though they did have more corrugator activity when they saw sad faces during the second 500ms, $t(141) = 2.18, p = .03, 95\% \text{ CI} [.001, .020]$, and this difference was

smaller for those who watched Meredith get excited about a one-week relationship, $t(141) = 2.08, p = .04, 95\% \text{ CI } [-.039, -.001]$.

In summary, the data supported the prediction that subjects would have less corrugator activity when they saw happy faces than when they saw sad faces. Furthermore, the data supported the prediction that this difference in corrugator activity would be smaller when subjects they saw Meredith get excited about a one-week relationship than when they saw her get excited about a two-year relationship.

Analyses Based on Bourgeois and Hess

Zygomaticus. Figure IV.11 displays subjects' average zygomaticus activity when they saw happy, neutral, and sad faces. On average, subjects had more zygomaticus activity when they saw happy faces than when they saw sad faces, $t(139) = 4.08, p < .001, 95\% \text{ CI } [.067, .192]$, or when they saw neutral faces, $t(139) = 3.14, p = .002, 95\% \text{ CI } [.037, .165]$. Although these differences were smaller on average for subjects who saw Meredith get excited about a one-week relationship than for those who saw her get excited about a two-year relationship, the effect of the video was not statistically significant for happy vs. sad faces, $t(139) = .83, p = .41, 95\% \text{ CI } [-.178, .073]$, or for happy vs. neutral faces, $t(139) = .29, p = .77, 95\% \text{ CI } [-.146, .109]$.

These data supported the prediction that subjects would have more zygomaticus activity when they saw happy faces than when they saw sad faces. Although the pattern of the data was consistent with the prediction that this difference would be smaller when they saw Meredith get excited about a one-week relationship, the effect of the video was not statistically significant.

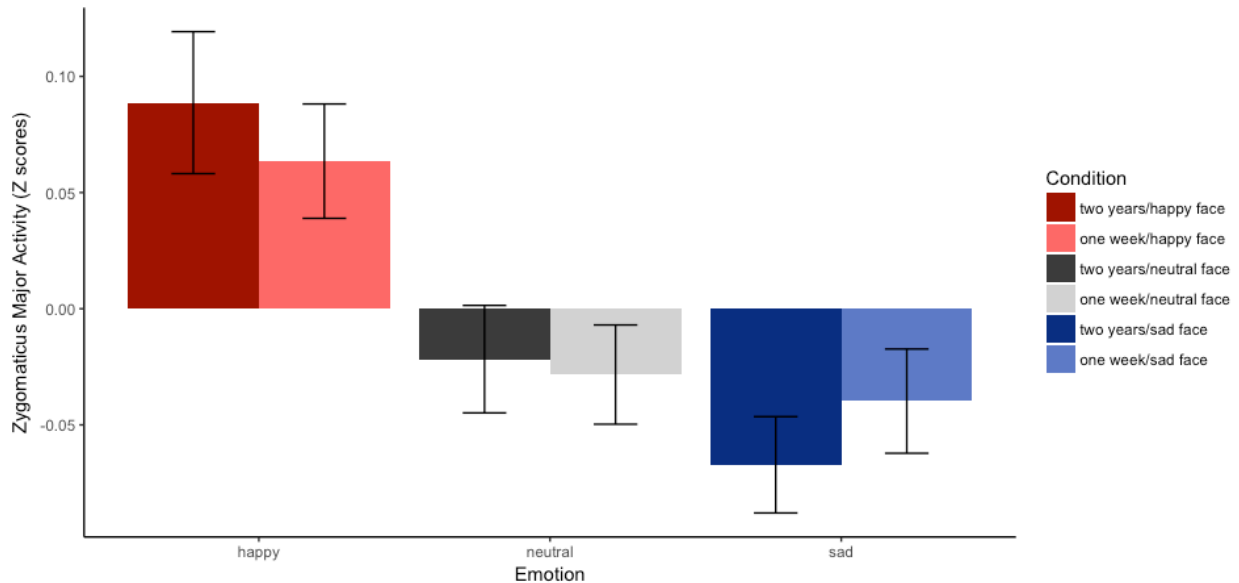


Figure IV.11. Average zygomaticus major activity during the entire period that subjects saw sad, neutral, and happy faces. The bars depict ± 1 standard error. Analyses are based on a procedure from Bourgeois & Hess (2008).

Corrugator. Figure IV.12 displays subjects' average corrugator activity when they saw sad, neutral, and happy faces. On average, subjects had less corrugator activity when they saw happy faces than when they saw sad faces, $t(141) = 10.88$, $p < .001$, 95% CI [-.443, -.307], and more corrugator activity when they saw sad faces than when they saw neutral faces, $t(141) = 3.04$, $p = .003$, 95% CI [.029, .137]. As in the previous analyses, on average these differences were smaller for subjects who saw Meredith get excited about a one-week relationship than for those who saw her get excited about a two-year relationship, but the effect of the video was not significant for happy vs. sad faces, $t(141) = .70$, $p = .49$, 95% CI [-.088, .184], or for sad vs. neutral faces, $t(141) = 1.00$, $p = .32$, 95% CI [-.053, .162].

These data supported the prediction that subjects would have less corrugator activity when they saw happy faces than when they saw sad faces, but not the prediction that this difference would be smaller when they saw Meredith get excited about a one-week relationship.

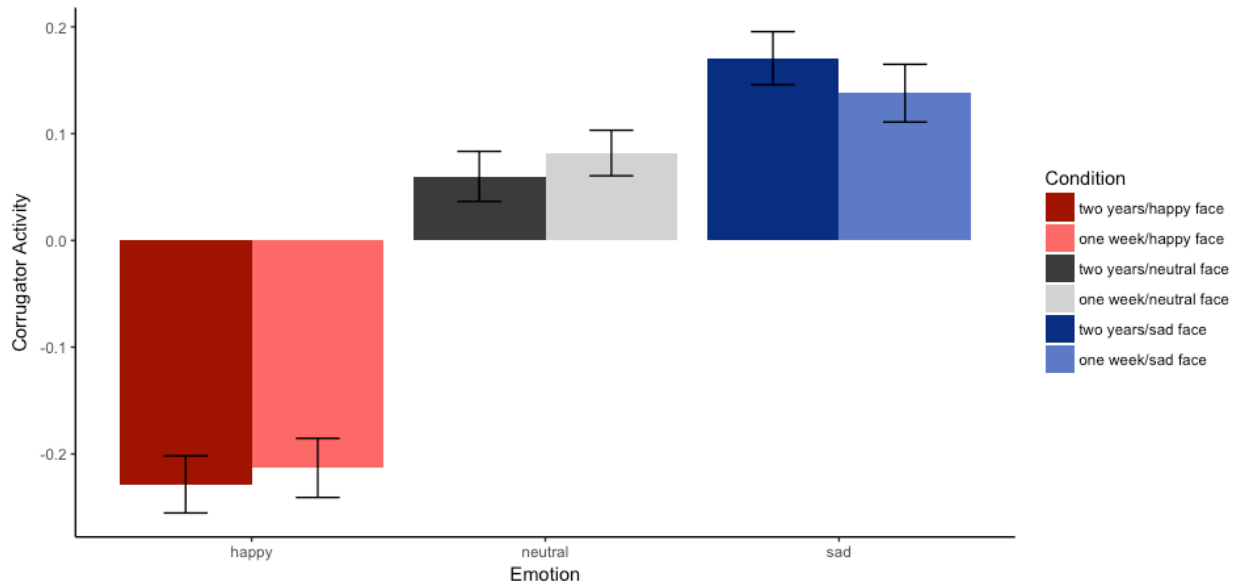


Figure IV.12. Average corrugator supercili activity during the entire period that subjects saw sad, neutral, and happy faces. The bars depict ± 1 standard error. Analyses are based on a procedure from Bourgeois & Hess (2008).

Summary of EMG Results

The results of the study supported the prediction that subjects would have more zygomaticus activity and less corrugator activity when they saw happy faces than when they saw sad faces. This is the typical “mimicry” effect that has been found in past research. All three methods of analysis found these differences in facial muscle activity in response to the emotional faces. Moreover, the differences in facial muscle activity seemed to emerge primarily after 500ms, as has been found in previous research (e.g., Dimberg & Petterson, 2000; Dimberg et al., 2000).

In addition, the results supported the backtracking hypothesis, albeit imperfectly. I predicted that subjects’ facial reactions to the emotional faces would be smaller when they saw Meredith get excited about a one-week relationship than when they saw her get excited about a two-year relationship. The pattern of the data was consistent with this hypothesis for both the corrugator and the zygomaticus, though the effect of the video was only significant for the corrugator.

For the corrugator, the methods of analysis from Dimberg and colleagues and from Moody and colleagues both found that when subjects saw happy vs. sad faces, the difference in corrugator activity was smaller when they saw Meredith get excited about a one-week relationship than when they saw her get excited about a two-year relationship. Furthermore, this was primarily due to smaller decreases in corrugator activity when subjects saw her happy faces. This relaxation of the corrugator is commonly found in studies of mimicry when subjects see happy faces (e.g., Dimberg & Petterson, 2000; Dimberg & Thunberg, 2012; Dimberg et al., 2000). The method of analysis from Bourgeois and Hess found the same pattern of results, though it was not significant. This is not surprising, considering that this method examined muscle activity during the entire eight seconds that subjects saw the faces, whereas the other two methods capture more immediate facial responses during the first second.

For the zygomaticus, although all three methods of analysis found that when subjects saw happy vs. sad faces, the difference in zygomaticus activity was smaller on average when they saw Meredith get excited about a one-week relationship, the difference was not significant. In both the pilot study and the full study, differences in zygomaticus activity were harder to detect, perhaps because there was more noise in the zygomaticus data, a point which I will return to in the discussion.

Self-Reported Emotions

After completing the emotion perception task, subjects reported how happy (average of “happy” and “cheerful”), amused (average of “amused” and “entertained”), irritated (average of “irritated” and “annoyed”), and jealous (average of “jealous” and “envious”) they felt while they were watching the video at the beginning of the study. There was no difference in how happy subjects reported feeling when they watched Meredith get excited about a two-year relationship ($M = 69.21$, $SD = 23.53$) or a one-

week relationship ($M = 64.85$, $SD = 23.82$), $t(139.98) = 1.10$, $p = .27$, 95% CI [-3.50, 12.21]. Although a couple of subjects laughed when they were watching the one-week video, on average there was no difference in how amused subjects reported feeling in the two-year condition ($M = 58.13$, $SD = 21.50$) and one-week condition ($M = 63.74$, $SD = 21.15$), $t(147.96) = 1.61$, $p = .11$, 95% CI [-12.49, 1.27]. However, subjects reported feeling more irritated in the one-week condition ($M = 25.01$, $SD = 26.58$) than in the two-years condition ($M = 14.95$, $SD = 19.07$), $t(134.32) = 2.66$, $p = .01$, 95% CI [-17.55, -2.57], whereas they reported feeling more jealous in the two-years condition ($M = 38.69$, $SD = 28.95$) than in the one-week condition ($M = 25.43$, $SD = 27.45$), $t(144.35) = 2.85$, $p = .01$, 95% CI [4.07, 22.47].

Discussion

Seeing someone express an emotion can make an observer express a similar emotion. One explanation that has been offered for this phenomenon is stimulus-driven mimicry, where the presence of the other's emotion expression automatically causes the observer to make the same expression. In this study, I tested another possibility, backtracking, where observers make sense of what caused another's emotion expression, and they make an appraisal. If the observer sees someone smile and appraises that something good happened, the observer will smile back, and if the observer sees the smile and appraises that something more trivial happened, the observer will smile back less.

The present study replicated the typical findings in studies of mimicry. When subjects saw someone with a happy face vs. a sad face, they had more activity in the zygomaticus major, the muscle that pulls the lips back in a smile, and less activity in the corrugator supercillii, the muscle that pulls the eyebrows together in a frown. If the facial responses were simply mimicry, that would be the end of the story. But in

support of the backtracking hypothesis, these differences were smaller when subjects thought the other person could get excited about something trivial like a one-week romantic relationship, and therefore, they had reason to distrust that her smiles meant something truly good happened to her.

The effect of the relationship length on subjects' muscle activity was stronger for the corrugator. In research on facial mimicry, it's not uncommon to see large decreases in corrugator activity when happy faces appear rather than increases in corrugator activity when negative faces appear (e.g., Dimberg & Petterson, 2000; Dimberg & Thunberg, 2012; Dimberg et al., 2000). This can happen when subjects are concentrating as they prepare for the face to appear, because the corrugator is active not only during expressions of sadness, anger, and fear, but also during expressions of concentration or mental effort (Hess, Philippot, & Blairy, 1998; C. A. Smith, 1989). When a happy face appears, they relax the brow and contract the cheeks.

The effect of relationship length on zygomaticus activity was in the predicted direction, but it was not significant. This might have been due to a smaller signal-to-noise ratio in the zygomaticus data. During the study, subjects were surreptitiously video-recorded so behavioral artifacts that were unrelated to the phenomenon of interest could be coded and excluded from analyses. Indeed, in the videos of the subjects, it was easy to see that they often moved their mouths in ways that were unrelated to smiling or mimicry. They bit and smacked their lips, pressed their lips together, and yawned, all of which added noise to the zygomaticus, but not to the corrugator. Attempts were made to code these behaviors to reduce their influence on the data, but the coding might not have done enough, and the sample size might have been too small to detect the signal. In the mimicry pilot study, there was more activity in the corrugator when subjects saw sad faces, but not more activity in the zygomaticus

when they saw happy faces; in the main study, with a larger sample, the difference in zygomaticus activity appeared. In the main study, relationship length affected activity in the corrugator, but not activity in the zygomaticus; perhaps with a larger sample, the effect of relationship length on the zygomaticus would also have appeared.

There was no difference in subjects' self-reports of how happy they felt as they watched the videos. These results are at odds with two other studies, not reported here, that used the same videos and found that subjects felt much less happy for Meredith when she was in a one-week relationship than when she is in a two-year relationship. The self-reports in the present study might be less reliable because they were collected at the end of the study, about 8-10 minutes after subjects watched the videos, and after they participated in another task. Nevertheless, there was some evidence that subjects found her situation less emotionally compelling when she was in a one-week relationship. They felt more irritated, perhaps because she was overly excited, and less jealous, because there was nothing to be jealous of.

The analysis of EMG data can be inconsistent between labs and studies. I analyzed the data from the present study using three procedures from different labs. Although these procedures showed the same general pattern, there were differences, most notably when comparing the methods that focused on muscle activity during the first second to the method that focused on muscle activity during the entire eight seconds. Specifically, the procedure that used the entire period was less likely to find significant results. Theoretically, stimulus-driven mimicry should occur quickly, and so facial activity during the first second of exposure should be more important than activity occurring later, when subjects might inhibit their facial responses, make other expressions, or simply stop paying attention to the emotional faces. Importantly, the experimental condition had the biggest effect during this early period, which supports

the notion that backtracking can occur rapidly and modify early facial responses to emotional faces.

The focus of the present study was backtracking, but other researchers have offered ways that emotion expressions can influence an observer's affective response. In social referencing, children look to their parents' emotion expressions to decide whether it is safe to cross a visual cliff (Klinnert, Emde, Butterfield, & Campos, 1986; Mumme, Fernald, & Herrera, 1996). In social appraisal theory, which generalizes social referencing to adults, people use others' emotion expressions to inform appraisals of their own situations (Parkinson, 2011; Parkinson, Phiri, & Simons, 2012). Others have argued that emotion mimicry depends on the meaning of others' emotion expressions for affiliation (Hess & Fischer, 2013, 2014). But the backtracking hypothesis emphasizes vicarious emotions, and that mimicry is not the only way that emotion expressions can influence an observer's vicarious emotions. Instead, subjects can use the expression to infer what kind of situation must have caused it, which is enough for them to at least appraise it as good or bad.

The backtracking hypothesis is rooted in an appraisal theory of empathy and other vicarious emotions (Wondra & Ellsworth, 2015). According to the theory, if an observer appraises someone else's emotional situation, the observer will feel a vicarious emotion for the other person. The results of the present research suggest that the observer doesn't need to know all the details of the situation to empathize. Instead, as Adam Smith suggested, observers can use others' emotion expressions to infer whether something good or bad happened, and this backtracking is a viable route to empathy.

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CHAPTER V

Conclusion

This work introduced an appraisal theory of empathy and other vicarious emotional experiences. According to the theory, empathy is caused by an observer's appraisal of a target's situation. The observer appraises the target's situation along the same dimensions that have been identified in appraisal theories of emotion. If the observer appraises the target's situation similarly to how the target appraises it, then the two will feel similar emotions and the observer will experience what we call empathy. If the observer appraises the target's situation differently from how the target appraises it, then the observer will feel a different emotion, or will feel relatively unemotional.

In Chapter II, I described the appraisal theory of empathy and how it addresses limitations of other theories. The greatest benefits of the theory are its parsimony—that it accounts for empathy with normal emotional processes rather than with special explanations—and its ability to explain phenomena that are not explained well by other theories, most notably how people can feel vicarious emotions that others do not feel.

In Chapter III, I presented the first empirical research that tested the theory. In this research, I tested the hypothesis that changing an observer's appraisal of a target's situation could make the observer feel a vicarious emotion that the target did not feel. I found that changing subjects' appraisals of other-agency made them feel vicarious anger that the target did not feel.

In Chapter IV, I tested whether a specific kind of vicarious emotional behavior, emotional facial mimicry, is at least partially due to observers' beliefs that others' emotion expressions signal that something good or bad happened. If so, then empirical results that have typically been attributed to emotion-matching processes, such as mimicry, might be alternatively explained by appraisal theory. I found that when a target's happy expression was not a reliable sign that something good happened, subjects "mimicked" the target's expressions less.

These studies provide initial support for the appraisal theory of empathy and other vicarious emotional experiences. The core idea of the appraisal theory of vicarious emotions is that people feel emotions for others when they appraise their situation, using the same appraisal criteria that have been found to be important in firsthand emotions. Figure V.1 displays a model of the appraisal theory. An observer who attends to a target's emotional experience uses cues from the target's situation and emotion expression to appraise the target's situation, and the observer's appraisal determines how the observer feels for the target. The research from Chapter III tested the appraisal theory by changing cues from the target's situation to alter subjects' appraisals, whereas the research from Chapter IV tested the theory by changing how subjects used cues from the emotion expression to inform their appraisals.

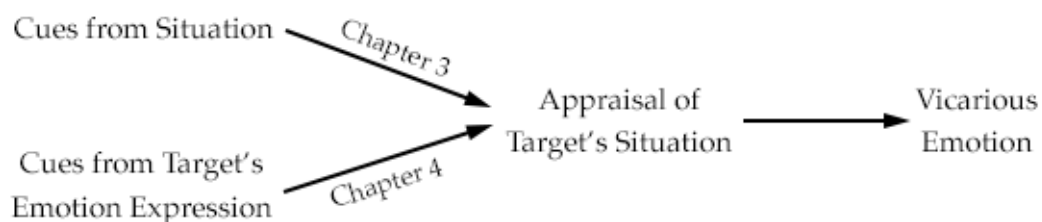


Figure V.1. Model of the appraisal theory of vicarious emotions.

I will conclude this work by offering some directions for future research.

Directions for Future Research

The appraisal theory offers many directions for empathy research by shifting the focus from the target's emotion to the target's situation. Here are three that should take high priority.

Testing the Theory with Other Appraisals

Chapter III explicitly tested how changing appraisals of agency for another's misfortune could lead an observer to feel vicarious anger, but there are more appraisals to be tested. In other research, I have found that changing appraisals of pleasantness, so that someone else's emotional situation is more pleasant or unpleasant, can increase vicarious positive and negative emotions. Future research could examine whether changing appraisals of controllability, so that someone else's misfortune seems uncontrollable, can increase vicarious sadness and sympathy. There is some evidence that changing the *target of empathy*, so that they seem more vulnerable (e.g., they have more childlike features), can increase feelings of sympathy (Dijker, 2001; Lishner, Batson, & Huss, 2011). This might be because when someone seems vulnerable, observers tend to think they lack control across many different situations. Sympathy might also increase when someone does not seem vulnerable in general, but who seems to lack control in a specific situation. Additionally, future research could examine whether changing appraisals of certainty distinguishes vicarious sadness from vicarious fear (Ellsworth & Smith, 1988).

Testing the Different States Hypothesis in the Same Situation

In Chapter II, I offered two broad hypotheses about how observers' appraisals might lead them to feel a vicarious emotion that the target does not feel. The first was the different information hypothesis, where the observer knows something about the

target's situation that the target doesn't know, or the target knows something the observer doesn't know; this hypothesis was tested in Chapter III, where subjects felt vicarious anger when they knew that the target's friend had sabotaged him, but the target didn't know this. The second was the different states hypothesis, where the observer and target have access to the same information, but they appraise it differently due to differences in their psychological states. In some sense, this hypothesis was tested in Chapter IV, where the woman in the video seemed to think a one-week relationship was wonderful, but subjects thought it was trivial.

In both studies, subjects' appraisals were manipulated by changing the targets' situations, and not by changing their perceptions of the same situations. This makes the present research like most studies of appraisal and emotion, where subjects are asked to recall different situations and report their emotions and appraisals (e.g., Smith & Ellsworth, 1985), or where their situations are experimentally changed in ways that target specific appraisals (e.g. Gentsch, Grandjean, & Scherer, 2015). But appraisal theory predicts that when people make different appraisals of the same situations, they will feel different emotions. Thus, the different states hypothesis predicts that observers would feel different vicarious emotions if their psychological states lead them to appraise a target's situation differently, even if that situation stays the same.

Appraisals must rely on whatever information is accessible in the moment, whether it is cues from the situation, cues from one's past experiences, cues from the target's emotion expression, or something else. Insights from social cognition, and judgment and decision-making, could be used to manipulate how subjects use accessible information to appraise the situation. This should have consequences for their vicarious emotions. For example, judgments of self-efficacy are subject to anchoring (Cervone & Peake, 1986) and the ease with which one can come up with

factors that help or hinder performance (Cervone, 1989). Similarly, appraisals of someone else's misfortune might be manipulated by changing the ease with which observers can come up with factors that place the situation in or out of the target's control, which should have consequences for their vicarious emotions.

How Do Observers Integrate the Emotion Expression and the Situation?

One understudied area in empathy research is how observers integrate different cues from the target's emotion expression and the target's situation to empathize. Although this topic has received attention in research on emotion perception (e.g., Carroll & Russell, 1996; Munn, 1940), it has received little empirical attention in research on how observers actually feel emotions for others, which is how I have defined empathy in the present work. In most studies of empathy, the expression and situation communicate similar information. The targets of empathy are emotional about things that most people agree are good or bad, such as getting engaged (Morelli, Rameson, & Lieberman, 2014), or their parents dying (Coke, Batson, & McDavis, 1978). Chapter IV found evidence that when the target's emotion expression is excessive, it can reduce the observer's vicarious response. But what if the target's emotion expression is too weak? For example, how would an observer react to a target who seemed only mildly upset about his mother dying? Would the observer feel sad because the situation seems severe? Would the observer use the target's expression to reappraise the situation, and perhaps assume that the target was estranged from his mother, so it's not as bad? Or would the observer get mad at the target for caring too little about something so serious? How observers integrate cues from the expression and situation to empathize is a question that is ripe for future research.

Conclusion

This work introduced an appraisal theory of empathy and other vicarious emotional experiences, where an observer feels an emotion for a target when the observer appraises the target's situation. If the observer appraises the situation the same way the target appraises it, then the observer will feel the same emotion as the target and experience what we call empathy. If the observer appraises the situation differently, then the observer will feel some other vicarious emotion, or will feel relatively unemotional. According to the theory, the proximate cause of vicarious emotions is the observer's appraisal of the target's situation, not the observer's perception of the target's emotions. The theory explains vicarious emotions with the same appraisal process that is involved in normal, firsthand emotional experiences.

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