

Love:

Positivity resonance as a fresh, evidence-based perspective on an age-old topic

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What is love? Humans have pondered the meaning of this splendorous phenomenon for millennia. Anything that so reliably stirs the human heart, preoccupies the mind, and ignites passionate action certainly merits this long-standing and continued inquiry. Artistic expressions of what love is and how it works abound – in poetry, books, songs, and movies. Scientific perspectives are less prevalent. Although scientific psychology began in the late 1800s, more than six decades into this collective endeavor, Harry Harlow, then president of the American Psychological Association, decried that psychologists had “failed” to advance beyond poets and novelists in understanding the “wondrous state” of love, “deep, tender, and rewarding” (Harlow, 1958, p. 673). In the nearly six decades since receiving this failing grade, two strands of psychological science have taken the love question seriously: Developmental science has investigated how love emerges between infants and their caregivers (e.g. Ainsworth, 1985; Stern, 2008), and relationship science has explored romantic love, including how early childhood attachment shapes adulthood love relationships (Hazan & Shaver, 1987; Bartholomew & Horowitz, 1991; Mikulincer, Shaver, Sapir-Lavid, & Avihou-Kanza, 2009).¹

Neighboring emotion science lags behind. Although a few emotion scientists have devoted attention to the love question over the years (e.g., Fehr & Russell, 1991; Gonzaga, Keltner, Londahl, & Smith, 2001; Shaver, Morgan, & Wu, 1996), these efforts have not germinated a thriving study of love within affective science. As long-time love scholar, Elaine Bersheid recently noted, “emotion theorists have

their own problems [in defining emotions] and are not yet in a position to help love scholars” (2010, p. 8). For emotion scientists, who by definition favor the study of momentary phenomena, love may well seem too large, too all-encompassing, if not too pop-culture.

The largeness of love is evident by the diverse set of psychological phenomena that fit under the umbrella term *love*: the preoccupying and strong *desire* for further connection, the powerful *bonds* people hold with a select few and the *intimacy* that grows between them, the *commitments* to loyalty and faithfulness. Indeed, when one person says, “I love you” to another, it can point to any or all of the above. That is, this ubiquitous utterance may reflect a strong craving for physical contact or proximity, or serve as a means to invite or secure the other person into one’s innermost circle of social ties, or it may signal a deep and abiding trust, or a commitment to be loyal. Yet, in addition to desire, bonds, intimacy, and commitment, love is an *emotion* – a phenomenon that arises to infuse both mind and body for a moment, and then dissipates.

This chapter puts forth a new perspective on love, one that emanates from emotion science. The goal is to provide a conceptual framework to support a fresh wave of empirical research on this revered emotional state. This new perspective holds that, at its core, love is a pleasant and momentary experience of connection with another person (or persons). In this framework, other constructs that are commonly taken as synonyms of “love” – such as desire, bonds, intimacy, and commitments – are cast as *products* of the accumulation of fleeting emotional states of love. As such, the range of other phenomena that go by the name “love” – in both

scientific and common language – may best be seen as part of a larger and dynamic “love system.”

The hub concept that drives this dynamic system is a potent and pleasant emotional state. Like all positive emotions, the emotional state of love obeys the ancestral logic of the broaden-and-build theory (cf. Fredrickson, 1998, 2013a). Love-the-emotion broadens mindsets by expanding people’s awareness, particularly of self-other overlap (Aron, Aron, & Smollen, 1992; Waugh & Fredrickson, 2006), creating perceptions of togetherness, connection, unity, or oneness. Love-the-emotion builds resources for survival by forging and strengthening people’s social desire, bonds, intimacy, and commitments. Each of these other concepts within the broader love system grows stronger as moments of love-the-emotion accumulate. Yet the causal arrows also run in the other direction. Each of these other concepts within the more encompassing love system – the desire, the bonds, the intimacy, the commitments – also facilitate subsequent moments of love-the-emotion, creating the dynamics of an upward spiral. Put simply, it’s far easier for two or more people to connect when their desire, bonds, intimacy, or commitments are present and strong.

Perhaps it’s no wonder that love has puzzled so many for so long. Part of the confusion is that the word “love” has been affixed to different parts of this larger, dynamic love system. A primary mission of science, however, is to peer into complex systems to discover the order therein. We are now equipped to use the lenses of emotion science to sharpen our appreciation of love. These lenses add to the understandings of love that neighboring relationship science and developmental

science have offered by drawing particular attention to the momentary nature of love, its biological bases, and by offering the framework and logic of the broaden-and-build theory of positive emotions.

The sharper appreciation for love to be developed here also illuminates the value of mild or low-intensity forms of this consequential state. Mild forms of love-the-emotion are too often eclipsed by the overwhelming intensity of select love experiences, the ones that forge life's strongest bonds, such as those between an infant and her caregivers, or between two new romantic partners just now "falling in love." The study of positive emotions, however, cautions researchers not to be blinded by intensity: Ample empirical evidence reveals that the frequency of pleasant affective states is far more consequential than the intensity of those states (Diener, Sandvik, Pavot, 1991; Folkman, 1997; Isen, 1993), and that the consequences of mild pleasant affective states for health and well-being are considerable (Cohn, Fredrickson, Brown, Mikels, & Conway, 2009; Moskowitz, 2003; Fredrickson, Cohn, Coffey, Pek & Finkel, 2008). Love-the-emotion likely follows this same pattern. Mild yet consequential forms of love can infuse everyday positive connections between and among family, friends, acquaintances – even strangers – to forge and fortify bonds, alliances, meaning, and purpose, as well as community and collective health and well-being.

Toward a Formal Definition of Love-the-Emotion

Views from Emotion Science

Emotion scientists distinguish between love experiences and love relationships (Lazarus, 1991), and direct their focus to the former, the transient

feeling states of love, rather than the latter, the long-standing social ties that are infused with, and supported by love-the-emotion. Even so, it bears underscoring that transient experiences of love are felt *toward* and *with* specific individuals (e.g., one's mother, friend, lover, or child), and are therefore contextualized by these interpersonal connections. Many theorists have pointed out that love is not actually a single emotional state, but rather comes in multiple forms, some more tender and low-key, and others more joyful and high-energy. As Rempel and Burris (2005) put it, "love seems to be reflected in multiple emotions rather than one distinct emotion" (p. 298). Supporting this view, in examining 14 pleasant emotions, Ellsworth and Smith (1988) found that love was among the least differentiated.

Whereas Rempel and Burris (2005) use love's lack of specificity to argue that love is not, in fact, an emotion, other theorists, like Izard (1977) and Fredrickson (1998) use this same observation to support a different, contextualized view of love. This alternate view holds that experiences of love can be seen as the experience of any other positive emotion when that emotion is felt in the context of a safe, often close relationship. For Izard (1977), who at the time identified only interest and joy as among the other positive emotions he considered, love was taken to be the joy and interest that people feel in connection with others. In his words, "acquaintances or friends renew your interest by revealing new aspects of themselves and the resulting increase in familiarity (deeper knowledge of the person) brings joy. In lasting friendships or love relationships this cycle is repeated endlessly" (1977, p. 243).

More recently, Fredrickson (2009) expanded on Izard's (1977) illustration to include eight additional positive emotions alongside the appraisal patterns associated with each, arguing that each of these moments might be equally described as love:

In the early stages of a relationship, tied up with your initial attraction, you're deeply *interested* in anything and everything this new person says and does. You share *amusements* and laugh together, often as a result of the awkwardness of coming together for the first time. As your relationship builds and perhaps surpasses your expectations, it brings great *joy*. You begin to share your *hopes* and dreams for your future together. As the relationship becomes more solid, you sink back into the cozy *serenity* [contentment] that comes with the security of mutual love. You're *grateful* for the joys your beloved brings into your life, as *proud* of their achievements as you are of your own, *inspired* by their good qualities, and perhaps in *awe* of the forces of the universe that brought you two together. (Fredrickson, 2009, p. 47).

Following Izard's footsteps, my earliest scholarly description of love-the-emotion took an "all of the above" approach, defining it as any positive emotion felt in the context of a safe, often close relationship (Fredrickson, 1998). Although I still hold that acknowledging the many different flavors of love-the-emotion is a vital step, for two reasons, I now see that this step isn't nearly big enough. First and foremost, this earlier conceptualization remains a one-person psychology, positioning the other person as merely the "context" for the focal person's experience of love. A richer understanding of love-the-emotion emerges when we

widen the lens to also include what the other person is, at that same moment, feeling. Stepping up to this two-person psychology,² I now more specifically position love-the-emotion as emerging any time a positive emotion is momentarily shared by two (or more) individuals. Second, I find the emphasis on established close relationships to be limiting and unjustifiable. Initial or one-time connections with novel interaction partners can also support the emergence of shared positive emotions. The differences between these connections and those that emerge within close relationships may be largely a matter of degree, rather than kind.

So, to expand the scope of past conceptualizations of love within emotion science, I posit here that one core element of love-the-emotion is shared positive emotions. To lay the foundation for two additional core elements, I outline views offered by relationship science and developmental science in turn.

Views from Relationship Science

A dominant approach within relationship science is to demark different types of love relationships. Berscheid (2010), for instance, identifies companionate, romantic, passionate, as well as attachment love relationships (see also Hatfield & Rapson, 1993; Sternberg, 1986; Fehr, Sprecher, & Underwood 2008; Fisher, Aron, Mashek, Li, & Brown, 2002). Recent advances in understanding love, for instance, have explored the unique neural correlates of romantic versus companionate love (Acevedo, Aron, Fisher & Brown, 2012).

Whereas these various forms of love certainly differ from one another, they also share certain family resemblances. In contrast to the dominant approach of defining love as a prototype (Fehr 1988; Shaver, Schwartz, Kirson & O'Connor,

1987), recent work by Hegi and Bergner (2010) attempts to articulate a formal definition of love, one that identifies necessary and sufficient conditions for using the word love correctly across a range of love relationships. Building on work by Clark and colleagues on communal relationships (Clark & Mills, 1979; Clark & Monin, 2006), as well as work by Singer (1984) and Rempel and Burris (2005), Hegi and Bergner (2010) hypothesize that essential to a range of love relationships – companionate, romantic, compassionate, and attachment – is “investment in the well-being of the other, for his or her own sake” (Hegi & Bergner, 2010, p. 621). They draw support for their hypothesis from surveys that capture respondents’ schemas for what counts as love. Specifically, respondents consider hypothetical examples of different types of relationships in which a certain relationship characteristic is missing on the part of one individual in the relationship, and indicate the degree to which they would find it contradictory to say that this person loves the other under those circumstances. In examining relationship characteristics ranging from similarity and trust to exclusivity and enjoyment, they found that only the absence of “investment in the well-being of the other for his or her own sake” was deemed “very contradictory” to the presence of a love relationship by the vast majority of respondents (Hegi & Bergner, 2010). The authors use these data to argue that such investment is a necessary and essential feature of human love of various kinds. As such, love, by definition, conveys a caring orientation toward others.

The interpersonal counterpart to love’s caring orientation toward the other appears to be the concept of “perceived partner responsiveness to the self,” which

reflects the extent to which the other person registers that he or she is being attentively cared for (e.g., Reis, Clark, & Holmes, 2004). That is, to the extent that Person A invests in the well-being of Person B, for B's own sake, Person B may come to believe that Person A understands and values him or her, and responds supportively. Perceived partner responsiveness is positioned as "a cardinal process in closeness and intimacy" (Reis et al, 2004, p. 220; see also Laurenceau, Barrett, & Pietromonaco, 1998), particularly within communal relationships. Assessments of the degree to which another person understands, cares for, and validates you inform your overarching belief that this other person truly "gets you," and uses his or her privileged knowledge thoughtfully, for your benefit. Responsive parenting is also a cornerstone concept within attachment theory (Bowlby, 1969/1982), with studies showing that parental responsiveness to a child's needs is the root of secure attachment and the development of stable and positive internal models of self in relation to others (Bowlby, 1969/1982; Ainsworth, Blehar, Waters, & Wall, 1978), which in turn shape thoughts, emotions, and behavior throughout childhood and into adulthood (Mikulincer et al., 2009).

Research on perceived responsiveness underscores that love is not a unidirectional phenomenon, concerning one person's feelings toward another, but is instead a *bidirectional transaction*, in which each person's perceptions of the other's feelings toward the self are also vital to the emergence of intimacy. Responsiveness is known to be consequential across a range of emotional exchanges. For instance, when one member of a romantic couple thanks the other (Algoe, Fredrickson, & Gable, 2013), or reacts as the other shares some personal good fortune (Gable,

Gonzaga, & Strachman, 2006), the extent to which the other person perceives that thanks or that reaction to be responsive forecasts future relational well-being, and even the longevity of the relationship. Responsiveness may also be consequential to physical health. A national U.S. survey of individuals of married or cohabitating with a romantic partner found that high received emotional support from the partner is associated with increased mortality risk for those who rate their partners as lacking responsiveness, whereas this risk is absent among those who rate their partners as high in responsiveness (Selcuk & Ong, 2013).

Although most studied within communal relationships, responsiveness – and the perception of it – can also characterize exchange relationships, even one-time encounters with strangers. As a traveler to an unfamiliar city, for instance, you may come to appreciate that the barista who makes your morning brew is especially attuned to your wishes and mood, eager to please and connect. As you make your economic transaction, the two of you smile and chat with ease and openness. Walking away from this exchange, you might feel more uplifted and energized than you'd felt just moments ago. Dutton and colleagues describe such encounters as *high-quality connections*, or HQCs (Stephens, Heaphy, & Dutton, 2012; see also Heaphy & Dutton, 2008). HQCs are short-term, positive interactions that are experienced as enlivening, characterized by mutual perceived responsiveness. Although these positive encounters may be part of ongoing relationships, they need not be. They can also readily emerge within one-time encounters with shopkeepers or customers, healthcare providers or patients, or any time two or more people interact.

Rapport is also commonly used to describe the sorts of positive connections that emerge between and among people who are said to “click” or have “chemistry.” Conceptually, rapport is an emergent, interpersonal phenomenon marked by mutual attentiveness, positivity, and coordination (Tickle-Degnen & Rosenthal, 1990), all the hallmarks of responsiveness. Nonverbally, rapport is embodied through mutual direct body orientation and gaze, accompanied by smiles, nods, forward leans (Tickle-Degnen & Rosenthal, 1990) as well as behavioral synchrony (Vacharkulksemsuk & Fredrickson, 2012). Whereas the concept “love,” in its traditional usage, tends to imply long-standing intimate relationships, the concept of “rapport” all but implies a lack of intimacy and history. By contrast, I hold that the concepts of “love” and “rapport” may differ primarily in degree, rather in kind, and that it may be more generative to consider them as examples of the same underlying biopsychosocial phenomenon.

For the present purposes, I denote the reciprocal combination of “investment in the well-being of the other, for his or her own sake” and “perceived partner responsiveness to the self” by the shorthand phrase *mutual care*. Although mutual care is perhaps most obvious within people’s long-standing love relationships – with, for instance, romantic partners and other family members – it is not an exclusive property of these communal relationships. In milder, perhaps less obvious forms, mutual care can also infuse more casual encounters with friends, co-workers, acquaintances, even strangers. Indeed, any time embodied rapport or high-quality connections emerge, mutual care is, by definition, present. Importantly, this care is neither heavy-handed nor role-bound, as in being a caregiver. Rather it

is as light, nonconscious, and momentary as the unbidden concern you'd feel if the person with whom you were connecting suddenly had a heavy object fall on her or his foot: you'd wince too, then quickly assess your companion's well-being. Mutual care describes a state in which each person would show this minimal level of engagement with, concern for, and investment in the well-being of the other. I posit that mutual care is a second core element of love-the-emotion.

Views from Developmental Science

If mutual care – with its hallmark mutual concern for the other's well-being and mutual perceived responsiveness – is taken as an additional core element of love-the-emotion, it might seem that encounters or relationships that involve dependence or asymmetry – as with an infant, or child (or an otherwise needy individual) with a parent or caregiver – are ruled out of such mutuality. While doting parents clearly love their newborns, can their newborns truly love them back? With their limited capacities, how can newborns muster up the selfless other-focus that defines love?

The way out of this seeming conundrum is to recognize that warmth-infused other-focus requires no mustering at all. Rather, it unfolds automatically and effortlessly, completely without higher symbolic or effortful mental processes. Indeed, developmental psychologists have argued that, from birth, infants are biologically prepared to perceive cross-modal correspondences between what they see on their interaction partners' faces and what they sense, proprioceptively, on their own faces (Meltzoff & Moore, 1989; Trevarthen, 1998). This ability is what enables infants to synchronize their movements – in form, tempo, and intensity –

with those of others, to the extent that their motor control allows (Meltzoff & Moore, 1989).

Notably, behavioral synchrony goes beyond mimicry because matching often occurs across modalities, such as when the rhythm of an infant's movements sync up with the rhythm of her mother's vocalizations. Such cross-modal analogies point to a resonance between infants and their interaction partners at the level of subjective mind states and emotions, and not merely at the level of observable behaviors. Behavioral synchrony can thus be taken to reveal an intersubjectivity (Beebe, Sorter, Rustin, & Knoblauch, 2003), or affective attunement (Stern, 1985), described as an innate form of intimacy, a way to find and show delight in communing, connecting, or being with another. Through such affective sharing, an infant "experiences being experienced" (Beebe et al., 2003, p. 786) or "feel[s] felt" by the other (Siegel, 2001, p. 78), a momentary experience akin to what relationship scientists, as described above, have termed "perceived partner responsiveness to the self." Importantly, "feeling felt" is itself a positive emotional experience (Beebe et al., 2003).

Developmental science has also shown that the attentive dance of behavioral synchrony that emerges between infants and their responsive caregivers – a dance laced with smiles, coos and other gestures of positivity – is absolutely vital to normal human development, as vital a good nutrition (Stern, 1985; Siegel, 2001). The classic "still-face paradigm," for instance, reveals how avidly infants seek it out. Researchers who use this paradigm invite parent-infant dyads to the laboratory to videotape them during typical face-to-face play, after a few minutes of which the

researchers signal the parent to adopt a still, neutral face, while maintaining eye contact with her or his infant. The parent's still face sends a mixed message to the infant: the parent's gaze signals readiness to engage, yet her or his passive face conveys unavailability. Behavioral coding of infant responses to the still-face paradigm reveals that, in the first half-minute or so, infants typically continue to gaze and smile at their parent, making "positive bids" for reengagement. These hopeful bids are destined to fail, however, because parents are instructed to maintain a passive face for two minutes. Faced with this failure, the infants' positivity typically wanes and gives way to negativity, marked by lowered brows and open-mouth cries (Ekas, Haltigan, & Messinger, 2013).

More sobering evidence for the developmental necessity of the positive intersubjectivity signaled by behavioral synchrony comes from caregivers who struggle with depression, who are far less likely to show the "dance" of behavioral synchrony with the infants in their care. Studies show that depression, which affects 10-12 percent of postpartum mothers, slows both speech and body movements, and disrupts parent-infant synchrony (Feldman, 2007). Widely viewed as a disorder of the positive emotion system (Davidson, 2000), depression stifles the emergence of intersubjectivity and shared positivity. Ample research confirms that maternal depression in infancy forecasts a child's impairments in cognitive and socio-emotional skills even decades later (for a review, see Feldman, 2007).

More recent evidence suggests that positive behavioral synchrony—the degree to which an infant and a parent (through eye contact and affectionate touch) laugh, smile, and coo together—corresponds with oxytocin synchrony. Researchers

have measured oxytocin levels in the saliva of dads, moms, and infants both before and after a videotaped, face-to-face parent-infant interaction. For infant-parent pairs who show mutual positive engagement, oxytocin levels also come into sync. Without such engagement, however, no oxytocin synchrony emerged (Feldman, Gordon, & Zagoory-Sharon, 2010).

Based on the aforementioned evidence from developmental science, I posit that biobehavioral synchrony is a third core element of love-the-emotion.

Pushing Emotion Science Further: A New Hybrid View

Distinct, albeit overlapping, views of love have emerged within the neighboring disciplines of emotion science, relationship science, and developmental science. Further integrating these views, I propose a new hybrid view that positions love as a momentary emotional phenomenon that is co-experienced by any two or more interacting people. Distilling to a formal definition, I define love-the-emotion as a *micro-moment of positivity resonance*, during which three core elements – (1) shared positive emotion, (2) mutual care, and (3) biobehavioral synchrony – emerge with temporal coherence between and among people.

Departing from relationship science, love, as conceptualized here, is not an enduring or intimate relationship. In keeping, however, with the adaptationist logic of the broaden-and-build theory of positive emotions (Fredrickson, 1998, 2013b), micro-moments of positivity resonance fertilize the growth of consequential personal and social resources, including enduring close and intimate relationships as well as mental and physical health.

Taking a cue from relationship science, I also elevate micro-moments of positivity resonance above the experiences of other positive emotions. That is, I hypothesize that positivity that resonates between and among people is particularly efficient for building consequential resources, relative to positive emotions that are experienced in isolation or absent the elements of mutual care and biobehavioral synchrony. Accordingly, I have called out love as “our supreme emotion” (Fredrickson, 2013a). This approach departs sharply from an unspoken tradition within emotion science, which implicitly take specific, discernable emotions – fear, anger, joy, and pride – as roughly equal-status categories, each holding value for human survival in its own way. Under this traditional logic, no emotion, love included, is set apart as on a different plane, or scale of importance. By contrast, relationship science unabashedly positions love relationships as distinct from other relationships and more consequential to human welfare. Likewise, for its ability to weave individuals into the social fabric of community, love-the-emotion may well be more consequential to human welfare than any other emotion.

Mileage Gained from the Concept of Positivity Resonance

Preconditions for Positivity Resonance

Micro-moments of positivity resonance between and among people do not emerge at random, regardless of conditions. In this way, love is not unconditional. (I acknowledge that I deploy the term “unconditional” in a different manner than have humanistic psychologists.) Love’s first precondition, I posit, is perceived safety. As for most positive emotions, momentary perceptions of safety appear to be an important prerequisite. When people appraise their current circumstances as

somehow threatening or dangerous, the ability to share an experience of positivity resonance becomes highly improbable. Fortunately, true threats to safety are statistically rare: Most moments are benign (Oishi, Diener, Choi, Kim-Prieto, & Choi, 2007). Yet, unfortunately, many people do not experience the safety in which their lives are embedded. Those who suffer from anxiety, depression, loneliness, or low self-esteem, for instance, perceive threats far more often than their objective circumstances warrant (e.g., Cacioppo & Hawkley, 2009). This over-alert state thwarts the emergence of all positive emotions, including love. More generally, the inability to experience safety in the company of others is a poignant obstacle to love.

Love's second precondition, I posit, is sensory connection. Neither abstract nor mediated, sensory connection is physical and unfolds in real time. It requires the co-presence of bodies, through touch, voice, or visibly synchronized postures, gestures, or facial expressions. Arguably, however, the main mode of sensory connection is eye contact (Farroni, Csibra, Simion, & Johnson, 2002). Newborns, for instance, show an immediate preference for eye contact, as well as innate skills for establishing it with the adults who come into their visual range. Eye contact is also a gateway construct within the *simulation of smiles (SIMS) model*, articulated by Niedenthal and colleagues (Niedenthal, Mermillod, Maringer, & Hess, 2010). Making eye contact with someone who smiles, according to the SIMS model, triggers a rapid and nonconscious embodied simulation of that smile – through facial mimicry and neural activation – that implicitly functions to disambiguate the meaning of that smile. In support of the SIMS model, controlled laboratory experiments confirm that mutual eye gaze, relative to averted gaze, triggers facial mimicry to dynamic

emotional stimuli (Schrammel, Pannasch, Graupner, Mojzisch, & Velichkovsky, 2009), and that facial mimicry enables more accurate decoding of the genuineness of dynamic smiles (Maringer, Krumhuber, Fischer, & Niedenthal, 2011). These processes may account infants' ability to detect inauthentic emotions (Walle & Campos, 2014). To the extent that eye contact during emotional episodes triggers embodied simulations, infants' prescient skills for making eye contact can be viewed as evolved adaptations that help infants wordlessly and accurately convey their ever-shifting emotional needs to engaged caregivers (Niedenthal et al., 2010). Through sensory connection, then, positive emotions "jump the gap" between people to become shared experiences of positivity resonance, marked biobehavioral synchrony and mutual care.

Products of Positivity Resonance

Even though micro-moments of positivity resonance are often mild and by definition fleeting, the accumulated frequency of these experiences over time builds a range of resources important to subjective, relational, and physical well-being. For instance, the experience of pleasure or "liking" precedes and lays the foundation for desire or "wanting" (Berridge, 2007). In the case of positivity resonance, the pleasure of feeling connected to a new romantic partner or "crush," assessed as self-other overlap (Aron, Aron, & Smollan, 1992), prospectively predicts the frequency of positive automatic thoughts about that person, which can serve to motivate subsequent efforts to reconnect (Rice, Schenker, & Fredrickson, 2014). Likewise experiencing positivity resonance with the same person repeatedly over time builds trust and loyalty, social attitudes vital to successful friendships and community

alliances. The recurrence of positivity resonance also seeds the motivation for secure attachments, social bonds, and more formal commitments to loyalty such as marriage (Cohn & Fredrickson, 2006; Brown & Brown, 2006). As stated previously, these enduring resources – desire, bonds, and commitments – are themselves identified as “love” in both scientific and lay writings. Increasing scientific precision, I offer positivity resonance (love-the-emotion), as the recurrent biopsychosocial mechanisms, or “tiny engines,” that drive a larger love system that also includes these more enduring products of positivity resonance.

Evidence for Positivity Resonance

A range of converging evidence inspired me to formulate the concept of positivity resonance and articulate key hypotheses about it. Within my own laboratory, the work of Tanya Vacharkulksemsuk has been foundational (Vacharkulksemsuk & Fredrickson, 2012). She and I studied pairs of previously unacquainted dyads that we had randomly assigned to complete one of two interaction tasks, which we videotaped: either a variant of Aron’s self-disclosure induction paradigm (Aron, Melinat, Aron, Vallone, & Bator, 1997), or a neutral, collaborative proof-reading task. Trained coders later viewed the muted video recordings and rated the extent of simultaneous movement, tempo similarity, and coordination and smoothness in the dyad’s nonverbal behaviors, which we then summed into an aggregate index of behavioral synchrony. We learned that the physical and dynamic property of behavioral synchrony mediated the association between self-disclosure condition and subsequent reports of embodied rapport, even when controlling for reports of positive emotion (Vacharkulksemsuk &

Fredrickson, 2012). Our evidence for the importance of naturally-occurring behavioral synchrony complements research that has manipulated behavioral synchrony to show that it breeds affiliation (Hove & Risen, 2009), cooperation (Wiltermuth & Heath, 2009), and compassion (Valdesolo & DeSteno, 2011).

Going beyond behavioral synchrony – and unseen within ordinary interactions – is the biological synchrony that emerges when two or more people share a positive emotional state. As previously mentioned, oxytocin synchrony arises during positive interactions within parent-infant dyads (Feldman et al., 2010). More compelling still is evidence from recent neuroimaging studies that show widespread neural synchrony within dyads and groups sharing a positive emotional experience (Hasson, 2010; Hasson, Nir, Levy, Fuhrmann, & Malach, 2004; Stephens, Silbert, Hasson, 2010). It appears, then, that when people share a positive emotional state, they also share gestural, biochemical, and neural patterns. This momentary biobehavioral synchrony unifies the interacting individuals within a shared experience of positive resonance.

Two additional streams of evidence also contributed to my theorizing on love. First, a long-standing body of prospective studies shows that having diverse and rewarding social relationships robustly forecasts better physical health and greater longevity. For instance, a recent meta-analysis of 148 studies concludes that the influence of social integration on mortality risk is on par with that of other, well-established health risk factors, including smoking, excessive alcohol intake, obesity, and lack of physical exercise (Holt-Lunstad, Smith, & Layton, 2010). Second, conspicuously similar prospective evidence links the frequent experience of positive

emotions to living longer and healthier lives (for meta-analytic reviews, see Chida & Steptoe, 2008, and Howell, Kern, & Lyubomirsky, 2007). Uniting these two streams of evidence, recent work from my laboratory shows that perceived positive social connections – a proxy measure of positivity resonance – accounts for the relationship between positive emotions and physical health (Kok, Coffey, Cohn, Catalino, Vacharkulksemsuk, Algoe, Brantley, & Fredrickson, 2013). Specifically, people’s daily experiences of feeling “close” and “in tune” with their social interaction partners mediated the effect of an experimental intervention that taught study participants how to self-generate positive emotions (via loving-kindness meditation, see also Fredrickson et al., 2008) on improvements in cardiac vagal tone, a proxy measure of physical health. Thus, it appears that when people’s efforts to cultivate positive emotions culminate in experiences of day-to-day positivity resonance with others, they incur particular boosts to their physical health. Much like our day-to-day habits of being physically active and eating nutritious foods, our day-to-day habits of cultivating positivity resonance with others may well function as positive health behaviors.

Research Agenda

Research on the concept of positivity resonance remains scant, to be sure. As such, opportunities abound to test and refine this new definition of love. Key to the success of this work will be the development of valid and reliable measures of positivity resonance that honor its momentary and multifaceted nature. Although self-report measures may capture the phenomenological aspects of positivity resonance, nonverbal behavioral and biological measures with appropriate

temporal resolution gathered from interacting dyads will also be essential. In addition, longitudinal research will be needed to test the claim that positivity resonance merits elevation above other positive emotions in its ability to augment well-being and physical health. Longitudinal and dynamic statistical modeling may be especially relevant tools as this research area matures.

Theoretical Implications

What good is a smile? What's it for? Although a range of past theorists have addressed these questions, the new concept of positivity resonance offers a fresh take on the evolved adaptive function of spontaneous and genuine smiles – what have been termed Duchenne smiles in the research literature. Following Charles Darwin (1872/1998), Ekman and colleagues contend that such smiles evolved as an outward expression or readout of a person's otherwise unseen inner subjective state (Ekman, Davidson, & Friesen, 1990). An opposing view shifts the focus onto the recipient of a smile, and proposes that smiles evolved not because they provided readouts of positive emotional states, but instead because they evoked positive emotions in those who meet a smiling person's gaze (Owren & Bachorowski, 2003; see also Gervais & Wilson, 2005). Maintaining the focus on the person who meets the smiler's gaze, the embodied cognition perspective of the SIMS model suggests that, through neural simulation, smiles tune an observer toward a better understanding the smiler's subjective experience and motives, so that the perceiver can, for instance, disambiguate sincere affiliative bids from domineering or self-absorbed smiles (Niedenthal et al., 2010). Each of these accounts of the function of genuine smiles seems viable, albeit each remains incomplete by remaining anchored

too exclusively within a one-person psychology (focused *either* on the one person who smiles *or* the one person who witnesses a smile).

Stepping up to a two-person psychology, in which both the smiling individual and the smile recipient play equal and important roles, I propose that the function of at least a subset of Duchenne smiles is “all of the above” and then some. Specifically, the adaptive significance of a genuine, affiliative smile may be to create a momentarily unified mindset between two people, or intersubjectivity, that is characterized by positivity resonance, as reflected by the trio of love’s features: a now shared positive emotion, biobehavioral synchrony, and an orientation toward mutual care. Research documents that a smile draws our eye more than other facial expression (Becker, Anderson, Mortensen, Neufeld, & Neel, 2011). As we’ve seen, eye contact nonconsciously triggers facial mimicry (Schrammel et al., 2009), which in turn triggers neural simulation (Niedenthal et al., 2010). When the original smile emanates from a sincere affiliative bid, the momentary intersubjectivity created by neural synchrony will include orientations toward mutual care and responsiveness. In short, the evolved adaptive significance of genuine affiliative smiles may be to seed states of positivity resonance. Harkening back to the broaden-and-build theory (Fredrickson, 1998, 2013b), to the extent that positivity resonance builds consequential personal and social resources, genuine affiliative smiles may have evolved to spur positive psychosocial development and improved physical health in individuals, relationships, and indeed whole communities. Casting love as a micro-moment of positivity resonance, then, offers a detailed evolutionary perspective on

how genuine smiles can seed the life-enhancing states of positivity resonance and thus do good, both within the body and within society.

Conclusions

Love, defined as micro-moments of positivity resonance, may thus be the most generative and consequential of all positive emotions. By virtue of being a single state, distributed across and reverberating between two or more brains and bodies at once, love's ability to broaden mindsets and build resources may have substantially greater reach. Love, then, is not simply another positive emotion. Rather, it's the momentary phenomenon through which we feel and become part of something larger than ourselves. Meaning in life may thus emerge not from the grand and unrealistic utopian ideals of "happily-ever-after" love, but from what art historian Nicholas Bourriaud (1998) calls the "day-to-day micro-utopias" of shared positivity.

Seeing love as positivity resonance also blurs the boundaries that surround the concept of emotion. Many, if not most, scientific descriptions of emotions locate these affective phenomena within individuals, confined within one person's mind and skin. By contrast, the concept of positivity resonance aligns with perspectives offered within cultural psychology that position emotions as unfolding between and among people as they interact (e.g., Mesquita, 2001). Seeing emotions as properties of individuals may indeed be a myopic by-product of the Western tendency to perceptually extract focal objects from their contextual surround (e.g., Masuda & Nisbett, 2001). By contrast, positioning love as a dynamic process that unfurls

across and unifies two or more interacting individuals offers parsimony to accounts of the social and societal functions of positive emotions.

Seeing love as positivity resonance also holds practical implications for how people might strengthen their relationships, families and communities. Striving to improve these directly can be like telling a complete stranger “trust me” in the absence of any trustworthy actions. By contrast, knowing that relationships, families, and communities grow stronger to the extent that positivity resonates between and among people reveals the value of planning for and prioritizing positivity. Creating activities and safe contexts that allow real-time sensory connection and support the emergence of shared positive emotions becomes the pathway to build social bonds and community. This guidance may be especially valuable within contemporary urban cultures that propel people toward multi-tasking and technology-mediated social connections. As novelist Ursula Le Guin (1971) put it: “Love doesn’t just sit there, like a stone; it has to be made, like bread; remade all the time, made new.”

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¹ Even so, scientific investigations of love have been stifled by controversy. It took courage and creativity, for instance, for social psychologists Ellen Berscheid and Elaine Hatfield to sustain their pioneering efforts to study romantic love in the face of what's come to be called "l'affaire Proxmire" (Reis, 2012) This refers to the 1974 debacle in which Wisconsin Senator William Proxmire singled out Berscheid and Hatfield's NSF-sponsored research on love for his first of many Golden Fleece Awards, bestowed to highlight what he deemed to be outrageous and shamefully wasteful uses of federal tax dollars.

² For simplicity I've describe love-the-emotion as a property of dyads. Importantly, I see it as equally able to account for communal experiences of shared positivity, or what Haidt and colleagues refer to as an innate *hive psychology* which periodically propels humans to lose themselves enjoyably in a much larger social organism, like the crowd at a football game, music festival, or religious revival (Haidt, Seder, & Kesebir, 2008). Through physical co-presence and behavioral synchrony, love-the-emotion can thus also spread from dyads to whole crowds or communities (e.g., Fowler & Christakis, 2008).