Use of EEG Technology for Assessment of Love Regulation Techniques

Jocelyn Wynnychuk

Love can evoke a number of emotions, ranging from feelings of euphoria, all the way to feelings of depression (Langeslag & Van Strien, 2016). Because of this, love deeply impacts an individual's life, and has a profound impact on well-being and mental state (Langeslag & Van Strien, 2016). For these reasons, it is important that love is studied scientifically. Oftentimes, love refers to a secure attachment, meaning it can occur in many different forms. Romantic love, however, is typically characterized as feelings of both attachment and infatuation (Langeslag & Surti, 2022). Infatuation is typically thought to be an intense amorous feeling, whereas attachment tends to refer to a deep sense of comfort and bonding with an individual (Langeslag et al., 2013). Typically, infatuation tends to be at its highest levels in the beginning stage of a relationship, and decreases quickly, whereas attachment tends to increase as the relationship progresses, but may still decrease with time in long-term relationships (Langeslag et al., 2013). There is debate around the conceptualization of love, with some considering love itself to be an emotion (Fehr & Russell, 1991), while others argue that love is more complex and involves a wide range of emotions (Langeslag & Sanchez, 2017). For many reasons, Langeslag and Sanchez (2017) argue that love is conceptually different from our understanding of emotion. They argue this because of the many different types of love, including romantic love and its many facets, as previously addressed. Additionally, Langeslag and Sanchez (2017) argue this because the same type of love can elicit different emotions depending on the context. For example, love consisting of high levels of infatuation may evoke feelings of euphoria if the love is reciprocated, but it may also elicit the emotion of sadness if it is unreciprocated. Additionally, emotions tend to be short-lived, whereas infatuation

and attachment can last for months or years, respectively, as previously mentioned. For these reasons, Langeslag and Sanchez (2017) argue that love should instead be considered an attitude, and that love more closely resembles a motivation (similar to hunger or thirst). The term *love feelings* is used in relevant studies in place of the word love, as love has no plural form and love feelings more accurately refers to the different types of love, however, it is important to note that here, the word feelings is not synonymous with emotions. (Langeslag and Sanchez, 2017).

The question arises then, how can individuals increase their feelings of love if they so desire to? Many individuals have the preconceived notion that people do not have control over their feelings of love (Langeslag & Van Strien, 2016). Langeslag and Van Strein (2016) conducted a study in which the participants were individuals in long-term, committed relationships, as well as participants who had recently gone through a breakup, but who had all reported being in love. The study involved participants first completing two questionnaires that assessed their feelings of love. These questionnaires were the Passionate Love Scale (PLS) and the Infatuation and Attachment Scale (IAS). The participants then answered 17 questions that assessed their perceived control over their own and other people's love feelings. It was found that participants tended to feel that feelings of love were neither controllable, nor uncontrollable. Although the results were not significantly different from neutral, responses did lean towards the uncontrollable side of the scale, indicating that, if anything, participants felt as though love feelings were uncontrollable (Langeslag & Van Strien, 2016). Being able to control feelings of love would have positive impacts for a variety of reasons. Being able to increase feelings of love may save relationships that are affected by declining feelings of love, which is a common reason for divorce (Langeslag & Surti, 2022). Inversely, being able to decrease feelings of love may aid individuals attempting to recover from heartbreak (Langeslag & Sanchez, 2017).

Although Langeslag and van Strien (2016) do not conceptualize love to be an emotion, they do apply emotion regulation techniques to love. Emotion regulation can look like many different things, but one common method is cognitive reappraisal which involves reframing the thought process regarding a certain situation to better deal with the emotions associated with that situation (Langeslag and Sanchez, 2017). Similar techniques can be used to regulate motivations, such as the desire to smoke a cigarette (Littel & Franken, 2011), and therefore using cognitive reappraisal regarding love feelings aligns with the conceptualization of love as a motivation while allowing the idea that cognitive reappraisal may be used to regulate love feelings.

Although people feel as though feelings of love are neither controllable nor uncontrollable, Langeslag and van Strien (2016) demonstrated that similarly to how we are able to regulate our emotions, we may be able to regulate our love feelings. In this study, techniques similar to emotion regulation were used to regulate the feelings of love, now referred to as love regulation. Techniques to increase love feelings (referred to as up-regulation), as well as techniques used to decrease love feelings (referred to as down-regulation) were used. Here, love regulation was defined as "the use of behavioural or cognitive strategies to change the intensity of current feelings of romantic love" (Langeslag & Van Strien, 2016, p. 2). Langeslag and Van Strien measured participants who reported being in love using an electroencephalogram (EEG) and had participants gaze at an image of their beloved passively, and then viewed the image while employing a love regulation technique. The love up-regulation technique was reappraisal by way of thinking of either positive aspects of the partner, the relationship, or future scenarios. The same technique was used for the down-regulation condition, but instead used negative reappraisal. Here, the researchers analyzed the participants' Late Positive Potential (LPP) response. The LPP is an event related potential (ERP) which "reflects multiple, overlapping positivities over the posterior scalp beginning around 300 ms after

stimulus onset" (Langeslag & Surti, 2022, p. 200). The LPP is modulated by both positive, and negative emotionally arousing stimuli when compared to neutral stimuli (Langeslag & Surti, 2022). It was found that participants had an enhanced LPP while employing the love regulation techniques "[indicating] that love up-regulation enhances the affective and motivational significance of, and the resulting motivated attention to the [partner]" (Langeslag & van Strien, 2016, p. 23). Previous studies that similarly measure LPP in response to images of beloved partners controlled for familiarity by using images of close friends of the participants and controlled for objective beauty by using images of beautiful strangers. These studies found an increased LPP response to images of beloved partners in comparison to the other images, demonstrating that the enhanced emotional response is not due to familiarity or objective beauty (Langeslag, 2022).

As demonstrated by Langeslag and Van Strien (2016), love regulation is feasible. However, their study only demonstrated the short-term effects of love regulation and did not address the ability to use love regulation as a technique to provide a sustained increase in love feelings, even when not actively employing the love regulation techniques. Future research should be conducted to determine if these techniques can be used to provide individuals with a continual increase in love feelings. Providing research can demonstrate this, the techniques used by Langeslag and Van Strien may then be implemented as a therapeutic practice for couples experiencing decreasing feelings of love.

References

Fehr, B., & Russell, J. A. (1991). The concept of love viewed from a prototype perspective. *Journal of Personality and Social Psychology*, *60*(3), 425–438. https://doi.org/10.1037/0022-3514.60.3.425

Langeslag, S. (2022). Electrophysiological correlates of romantic love: A review of EEG and ERP studies with beloved-related stimuli. *Brain Sciences*, *12*(5), 551. https://doi.org/10.3390/brainsci12050551

Langeslag, S. J., & Sanchez, M. E. (2018). Down-regulation of Love feelings after a romantic break-up: Self-report and electrophysiological data. *Journal of Experimental Psychology: General*, *147*(5), 720–733. https://doi.org/10.1037/xge0000360

Langeslag, S. J., & Surti, K. (2022). Increasing love feelings, marital satisfaction, and motivated attention to the spouse. *Journal of Psychophysiology*, *36*(4), 199–214. https://doi.org/10.1027/0269-8803/a000294

Langeslag, S. J., Muris, P., & Franken, I. H. (2013). Measuring romantic love: Psychometric properties of the infatuation and attachment scales. *Journal of Sex Research*, *50*(8), 739–747. https://doi.org/10.1080/00224499.2012.714011

Langeslag, S. & Van Strien, J. W. (2016). Regulation of romantic love feelings: Preconceptions, strategies, and feasibility. *PLoS ONE*, *11*(8), e0161087. https://doi.org/10.1371/journal.pone.0161087

Littel, M., & Franken, I. H. (2011). Intentional modulation of the late positive potential in response to smoking cues by cognitive strategies in smokers. *PLoS ONE*, *6*(11). https://doi.org/10.1371/journal.pone.0027519