Emotions are a fundamental part of being human, yet our understanding of how emotions affect the brain is limited. One major reason is that recording brain activity during genuine emotional states is difficult to achieve in a laboratory setting. Pictures of intensely emotional or disturbing facial expressions or scenes can trigger emotional reactions, but such methods ignore the range of feeling states that pervade our everyday experience such as joy, love, compassion, awe, as well as frustration, jealousy, etc. This study attempts to discover the EEG correlates of imaginistic emotional feeling. Subjects were asked, via a voice recording, to recall and/or imagine a series of scenarios in which they had felt or would feel the suggested emotions, in each case allowing the imagery and somatic feeling sensations to become as vivid as possible. During these sessions, 256 channels of EEG data were recorded from the scalp, neck and face. We then decomposed the EEG data using Independent Component Analysis (ICA) into maximally independent time courses and associated spatial maps. We were able to blindly cluster EEG characteristics during different emotional experiences across subjects into at least two dimensions: valence (good/bad), as well as high/low activity. By multiple levels of single-trial spectral clustering from all subjects, we found that emotions shifted the EEG in various ways, sometimes in patterns according to valence, sometimes activity and other times specific emotions tended to dominate a particular spectral change. More specifically, a diffuse cluster of occipital, parietal and temporal components appeared to express more 10-11 Hz alpha during less active emotions such as sadness, compassion, love and relief. Occipital components exhibited a marked shift in alpha frequency from ~10 Hz to ~11 Hz (depending on the resting alpha frequency), during emotional contemplation which appeared to be associated with valence and/or activity dimensions of the emotions. This study demonstrates that the EEG correlates of emotion, while complicated, were decipherable using blind data clustering techniques.