

Mending Broken Hearts: Specification for a productive practice app to assess and improve psychological treatments for romantic grief and other tertiary emotions

[Luc P. Beaudoin](#), Ph.D. (Cognitive Science)

Adjunct Professor of Education

Adjunct Professor of Cognitive Science

Simon Fraser University

EDB 7505, 8888 University Drive

Burnaby, BC V5A 1S6 Canada

LPB@sfu.ca

<http://sfu.ca/~lpb/>

Document available from: <http://summit.sfu.ca/node/15224>

First published: 2015-06-29

Last Revised: 2015-07-02 (See [revision history](#))

Contents

This document contains:

1. an introduction to a poster to be presented on July 8, 2015, at the ISRE-2015 (International Society for Research on Emotions) Conference in Geneva;
2. the poster itself (A0 paper format).

Introduction to the Poster

The [poster below](#) summarizes the theory, purpose and requirements (intended functionality) of an iOS® app ("RFB") being designed to help users (1) regulate a specific emotion (romantic grief), (2) instill some of the mindware of acceptance and commitment (Hayes, Strosahl & Wilson, 2011), (3) better understand and regulate their affective states after their romantic grief is resolved. The design applies principles of meta-effectiveness theory (Beaudoin, 2015a).^[1] We intend RFB also to help researchers develop and experimentally contrast emotion regulation treatments for romantic grief and other forms of perturbation (Beaudoin, 1994) by using productive practice and other components of meta-effectiveness. Other objectives are listed in the [poster below](#).

While RFB is intended to help researchers test multiple theories of emotion, study various emotions, and test therapies, I am extending, refining and applying to romantic grief the H-CogAff affective information-processing architecture (Beaudoin 2015a; Sloman, 2003) which is leveraged by meta-effectiveness theory. Romantic grief is an interesting target because it is an intense, distinct, evolutionarily significant, prototypical^[2], complex emotion

about which many people are quite interested and reflective. Most people have experienced it at least once. It is more common in teen-age years than adulthood, which offers the possibility of designing an intervention to ease its course that could have a lifelong impact on understanding and regulating emotions, well beyond romantic grief. However, it has received little attention compared to other emotions. H-CogAff architecturally distinguishes between primary, secondary and tertiary emotions (perturbance). In perturbance, internal motivators tend to disrupt executive processes (Beaudoin, 1994). Sloman, Beaudoin, & Wright (1996) have previously explained mortal grief in terms of perturbance. Whereas there is debate about the defining features of emotion in the general psychology of emotion, the number one feature of limerence (attraction) and romantic grief cited by Tennov (1999) and Fisher (2005) are attentional. The concept of perturbance provides an explanation for these features.

Harvey et al (2014) and Beaudoin (2015a, ch. 15) called for evidence-based psychological treatments leveraging cognitive principles and technology. Beaudoin (2014b, 2015a) developed the concept of productive practice: software-driven test-enhanced learning and deliberate practice. Productive practice is based on and extends *broad* cognitive science, which includes affective science.

Accordingly, this project is a continuation of my work, aiming to develop cognitively potent^[4] research-based software for testing and developing theories. For example, I previously led the software development of Phil Winne's gStudy and nStudy projects (Beaudoin & Winne, 2009) to help students learn and to enable educational psychologists to study their learning (Winne, 2006). I am co-creator of [mySleepButton®](#) and SomnoTest® apps that are used to study and treat insomnia, and to better understand sleep onset mechanisms (Beaudoin, 2013, Beaudoin, 2014; Digdon & Beaudoin, 2015).^[3] We have argued that primary insomnia is often an emotion regulation problem. mySleepButton is meant to reduce sleep onset latency partly by reducing perturbance (tertiary emotion) —i.e., it has emotion regulation functions.

The design of RFB faces many challenges in our aim to potentiate acceptance and commitment therapy (or training) (ACT)^[5] with meta-effectiveness theory and technology. Like mySleepButton, RFB is meant to be as easy to use as possible. mySleepButton satisfies this criterion. This simplicity constraint is more challenging (and tantalizing) for RFB given the large number of other requirements it must address, many of which are adumbrated in the [poster below](#). In particular, it may be difficult for an intervention to shorten a normally brief process. However, romantic grief is occasionally quite upsetting and complicated, which presents the potential for measurable short term gain. Moreover, fascination with the topic makes it a potentially interesting entry point to attract research participants and to educate and train them with respect to emotion and emotion regulation, for them to measurably experience longer term gains.

The meta-effectiveness framework (Beaudoin, 2015a) is a theoretical and practical framework for learning with technology that leverages and extends broad cognitive science. It aims to support deep learning and transfer (the broad application of processed knowledge). It argues that achieving transfer normally requires *affective* change (e.g., developing motive generators). Chapter 15 of Beaudoin (2015a) suggests the possibility of exploring how this framework could be used to support self-help and psychotherapy, including meta-cognitive therapy and

ACT. This (RFB) project pursues that suggestion. It is hoped that insights gained from this difficult challenge will also be helpful in understanding and promoting less patently affective learning ("mindware development").

Acknowledgements

I wish to thank Brian Shi of CogSci Apps Corp, Michel Aubé and Lisa Eisen for discussions about this project. Thanks to Carol Woodworth and Jeannine Malo for feedback on this manuscript. This project owes a great deal to [Aaron Sloman's Cognition and Affect project at the University of Birmingham, England](#), in which I participated in the 1990s. My meta-effectiveness framework also uses ideas from Sloman's meta-morphogenesis research project (e.g., the concept of architecture-based motivation).

Footnotes

[1]. For a glossary of many of the technical terms used here and introduced in Beaudoin (2015a), see "[Meta-effectiveness, Effectance, Mindware and Other Key Concepts for Understanding the Development of Adult Competence](#)".

[2]. Aubé (2004, 2009) proffered that "Emotions are viewed as a special layer of processes, wired upon needs and instincts, and dealing mainly with nurturance, social bonding and cooperative behavior, especially between kin and relatives. As every other motivational system, they operate so as to manage resources critical for survival and reproduction. The peculiar resources emotions do manage are commitments, understood as the predispositions of a given individual to help others and collaborate with them in a reciprocal manner." Whether a researcher agrees with Aubé's design proposal, the affective roles he outlines are arguably of evolutionary significance. Romantic grief clearly fits this account of affect.

[3]. mySleepButton and SomnoTest are products of CogSci Apps Corp. I am a co-founder and director of CogSci Apps Corp.

[4]. Cognitive potency (Beaudoin, 2015a) is an extension of Bratt's (2009) concept of pedagogical utility; it refers to the extent to which software enables users to comprehend and utilize information.

[5]. Given that the inventors of ACT are opposed to emotion regulation (Blackledge & Hayes, 2001), considering the latter to be a major cause of psychopathology, it may seem paradoxical (or worse) to use ACT for emotion regulation. However, while I believe ACT is a very promising therapy based on many compelling psychological tenets, it also has some conceptual weaknesses. As I argued in Beaudoin (2015a), it lacks a design-based architecture of mind and integration with computationally inspired broad (i.e., affective) cognitive science, invoking instead an anachronistic framework (behaviorism). ACT and much associated mindfulness literature use the terms *control* and *regulation* in folk psychological ways rather than in modern AI sense (Beaudoin & Digdon, manuscript in preparation; Sloman, 1993b) required to understand, explain and model mental phenomena in broad cognitive science. The term *emotion* is highly polymorphic (Ekkekakis, 2013; Izard, 2010; Read & Sloman, 1993). Emotions involves multiple design features (Scherer, 2005, 2009; Sloman, 2003). Emotion

regulation can therefore be seen more generally as a form of self-regulation. Clearly, one cannot oppose the concept of self-regulation. I concur that many forms of self-control and emotion regulation are inherently counterproductive. This has been clear in AI since before the invention of ACT (e.g., Minsky, 1985). (See chapter 4 of Beaudoin, 1994, for a design-based discussion of limitations on attentional control.) I have suggested in Beaudoin (2015a) that ACT and H-CogAff could be integrated to address their weaknesses and leverage their strengths in the development of meta-effectiveness theory. Meta-cognitive therapy provides a good example of the potential to integrate mindfulness based psychotherapies with cognitive science (Wells & Matthews, 1994). Regardless of these conceptual questions, given the large body of evidence on test-enhanced learning, deliberate practice, and related phenomena, it seems to be worth investigating productive practice as a potentiator of ACT to help clients understand and respond to affective experience such as romantic grief.

References

Aubé, M. (2005). Beyond needs: Emotions and the commitments requirement. In D. N. Davis (Ed.), *Visions of mind: Architectures for cognition and affect* (pp. 21-44). Hershey, PA: Idea Group., Inc.

Aubé, M. (2009). Unfolding commitments management: A systemic view of emotions. In J. Vallverdú & D. Casacuberta, *Handbook of research on synthetic emotions and sociable robotics New applications in affective computing and artificial intelligence* (pp. 198-277). New York, NY: Information Science Reference.

Beaudoin, L. P. & Digdon, N. (manuscript in preparation). Towards an affective information-processing theory of sleep-onset and insomnia.

Beaudoin, L. P. (1994). *Goal processing in autonomous agents*. (Doctoral dissertation). University of Birmingham, Birmingham UK. Retrieved from http://www.sfu.ca/~lpb/tr/Luc.Beaudoin_thesis.pdf

Beaudoin, L. P. (2013). *The possibility of super-somnolent mentation: A new information-processing approach to sleep-onset acceleration and insomnia exemplified by serial diverse imagining*. Simon Fraser University Summit repository. Retrieved from <http://summit.sfu.ca/item/12143>.

Beaudoin, L. P. (2015a). *Cognitive Productivity: Using Knowledge to Become Profoundly Effective*. Retrieved from <https://leanpub.com/cognitiveproductivity/>.

Beaudoin, L. P. (2015b). Specification for a productive practice app to assess and improve psychological treatments for romantic grief and other tertiary emotions. Poster to be presented at [ISRE 2015](#) in Geneva, July 2015 (International Society for Research on Emotions).

Beaudoin, L. P. (2014a). *A design-based approach to sleep-onset and insomnia*. CogSci 2014, workshop on "Computational Modeling of Cognition-Emotion Interactions: Relevance to Mechanisms of Affective Disorders and Therapeutic Action", Québec, Canada. Retrieved from <http://www.sfu.ca/~lpb/tr/Beaudoin-2014-the-cognitive-shuffle-super-somnolent-mentation.pdf>.

Beaudoin, L. P. (2014b). Developing expertise with objective knowledge: Motive generators and productive practice. In J. Wyatt, D. Petters, & Hogg, D. (Eds.), *From robots to animals and back: Reflections on hard problems in the study of cognition* (pp. 161-190). Berlin, Germany: Springer.

Beaudoin, L. P., & Winne, P. (2009, June). *nStudy: An Internet tool to support learning, collaboration and researching learning strategies*. Paper presented at the Canadian E-learning Conference (CELC-2009). Vancouver, BC. Retrieved from (http://www.sfu.ca/~lpb/tr/2009-Luc_P_Beaudoin-Phil_Winne-nStudy.pdf)

Blackledge, J. T., & Hayes, S. C. (2001). Emotion regulation in acceptance and commitment therapy. *Journal of Clinical Psychology, 57*(2), 243–255.

Bratt, S. E. (2009). [Development of an instrument to assess pedagogical utility in e-Learning systems](#). (Unpublished doctoral dissertation) Simon Fraser University, Burnaby, Canada.

Digdon, N. & Beaudoin, L. P. (2015). A test of the somnolent mentation theory and the cognitive shuffle insomnia treatment. Poster to be presented at CogSci 2015 ([The annual meeting of the Cognitive Science Society](#)). Retrieved from <http://www.sfu.ca/~lpb/insomnia/>.

Ekkekakis, P. (2013). *The measurement of affect, mood, and emotion: A guide for health-behavioral research*. Cambridge University Press.

Ericsson, K. A., & Kintsch, W. (1995). Long-term working memory. *Psychological Review, 102*(2), 211–245.

Fisher, H. (2005). *Why we love: The nature and chemistry of romantic love*. (iBooks version). Available from <https://itunes.apple.com/ca/book/why-we-love/id569886738>

Hayes, S. C., Strosahl, K. D., & Wilson, K. G. (2011). *Acceptance and commitment therapy: The process and practice of mindful change*. New York, NY: Guilford Press.

Harvey, A. G., Lee, J., Williams, J., Hollon, S. D., Walker, M. P., Thompson, M. A., & Smith, R. (2014). Improving outcome of psychosocial treatments by enhancing memory and learning. *Perspectives on Psychological Science, 9*(2), 161–179.

Izard, C. E. (2010). The many meanings/aspects of emotion: Definitions, functions, activation, and regulation. *Emotion Review, 2*(4), 363–370. doi:10.1177/1754073910374661

Minsky, M. L. (1985). *The society of mind*. New York, NY: Simon & Schuster.

Norman, D., & Bobrow, D. G. (1979). Descriptions: An intermediate stage in memory retrieval. *Cognitive Psychology, 11*(1), 107–123. doi:10.1016/0010-0285(79)90006-9

Read, T., & Sloman, A. (1993). The terminological pitfalls of studying emotion, 1–8. Paper presented at the *Workshop on Architectures Underlying Motivation and Emotion - WAUME 93*, Birmingham, UK. Retrieved from

<http://www.cs.bham.ac.uk/research/projects/cogaff/81-95.html#21>

Scherer, K. R. (2005). What are emotions? And how can they be measured? *Social Science Information*, 44(4), 695–729. <http://doi.org/10.1177/0539018405058216>

Scherer, K. R. (2009). The dynamic architecture of emotion: Evidence for the component process model. *Cognition & Emotion*, 23(7), 1307–1351. <http://doi.org/10.1080/02699930902928969>

Schön, D. A. (1983). *The Reflective Practitioner*. New York, NY: Basic Books.

Sloman, A. (1987). Motives, mechanisms, and emotions. *Cognition & Emotion*, 1(3), 217–233. doi:10.1080/02699938708408049

Sloman, A. (1993a). Prospects for AI as the general science of intelligence. In A. Sloman, D. Hogg, G. Humphreys, D. Partridge, & A. Ramsay (Eds.). *Prospects for Artificial Intelligence*, (pp. 1–10). Amsterdam, Netherlands: IOS Press.

Sloman, A. (1993b). The mind as a control system. In C. Hookway & D. Peterson (Eds.), *Philosophy and the Cognitive Sciences* (pp. 69–110). Cambridge, UK: Cambridge University Press.

Sloman, A. (2003). How many separately evolved emotional beasts live within us? In R. Trappl, P. Petta, & S. Payr (Eds.), *Emotions in humans and artifacts* (pp. 35–114). Cambridge, MA: MIT Press. Retrieved from <http://www.cs.bham.ac.uk/research/projects/cogaff/00-02.html#60>.

Sloman, A. (2009). What cognitive scientists need to know about virtual machines. In N. A. Taatgen, H. van Rijn, L. Schomaker, and J. Nerbonne (Eds.) *Proceedings of the 31st annual conference of the Cognitive Science Society* (pp. 1210–1215). Retrieved from <http://csjarchive.cogsci.rpi.edu/>.

Tennov, D. (1979). *Love and Limerence*. Scarborough House.

Thayer, R. E. (2001). *Calm Energy*. Toronto, ON: Oxford University Press.

Wells, A. (2005). Detached mindfulness in cognitive therapy: A metacognitive analysis and ten techniques. *Journal of Rational-Emotive and Cognitive-Behavior Therapy*, 23(4), 337–355. doi:10.1007/s10942-005-0018-6

Wells, A. (2008). Metacognitive therapy: Cognition applied to regulating cognition. *Behavioural and Cognitive Psychotherapy*, 36(06), 651. doi:10.1017/S1352465808004803

Wells, A., & Mathews, G. (1994). *Attention and emotion: A clinical perspective*. Hillsdale, NJ: Lawrence Erlbaum Associates Publishers.

Winne, P. H. (2006). How software technologies can improve research on learning and bolster school reform. *Educational Psychologist*, 41(1), 5–17.

Wrape, E. R. (2012). Emotional and cognitive coping in relationship dissolution. (Master's thesis) Retrieved from http://digital.library.unt.edu/ark:/67531/metadc149556/m2/1/high_res_d/wrape-er.pdf

Wright, I., Sloman, A., & Beaudoin, L. P. (1996). Towards a design-based analysis of emotional episodes. *Philosophy, Psychiatry, & Psychology*, 3(2), 101–126. Retrieved from <http://www.cs.bham.ac.uk/research/projects/cogaff/96-99.html#2>.

This reference list also includes entries from the poster, below.

Revision History

Abstract history:

2014-12-31 Abstract submitted to ISRE (Beaudoin, 2015b). (Accepted 2015-03-04).

2015-03-05. Title revised and accepted.

This document:

2015-06-29. First revision of combined document (introduction, poster, references).

2015-06-30. Several updates.

2015-07-02. Added footnote about ACT in relation to emotion regulation.

NB: Presentation scheduled for **2015-07-08**.

Appendix 1: The poster

Mending Broken Hearts

Specification for a productive practice app to assess and improve psychological treatments for romantic grief and other tertiary emotions

Based on Beaudoin (2015) *Cognitive Productivity: Using Knowledge to Become Profoundly Effective*

Luc P. Beaudoin, Ph.D. *



Thrive in the sea
of knowledge

A. RATIONALE AND THEORY

A1. Justification of the Approach

By trying to build an app to help regulate this archetypal emotion, romantic grief, we will exactly tax, test, debug and extend our scientific understanding of emotion and emotion regulation strategies. This combines and extends the designer stance (Sloman, 1993), knowledge building, scientific big data analytics, reflective practice (Schön, 1983), conceptual analysis, clinical psychology methods, and traditional empirical psychology. This R&D also seeks to educate/train therapists and emotion researchers in meta-effectiveness theory.

A2. Solvable Problems with Existing Psychotherapies (Ch. 14 of *Cognitive Productivity*)

1. Disregard of some critical information processing mechanisms principles, effects and facts
- E.g., test effects, test-enhanced learning, deliberate practice; cue-overload/fan effects.
2. Superficial use of cognitive science; classical (content) use of term "cognitive"; no integration with AI.
3. Lack of integration with information technology (∃ ↑ types!) Harvey et al (2014).

A3. Thesis: Meta-effectiveness Framework Applied to Romantic Grief

An expert-track educational/ training mindset, **including apt drills (PP)** can facilitate deep psychological change.

Passive approaches (talking, reading, one-off homework) to personal change are inefficient/ineffective.

An app based on the *meta-effectiveness framework* (MEF) can potentiate emotion regulation therapy and self-help based partly on **acceptance and commitment therapy** (ACT) and stoic concepts.

A4. Meta-effectiveness Framework (cf. *Cognitive Productivity: Using Knowledge to Become Profoundly Effective*)

1. Is about efficiently using knowledge with IT, targeting mindware, for user to become more effective
2. Leverages broad and diverse (e.g., affective, AI, architecture-based) cognitive science.
3. Uses concept of mindware: mental mechanisms (LTWM, monitors, motive generators, filters, executive functions, etc.)
4. Defines PP as deliberate practice + test-enhanced learning + IT, to efficiently produce/develop mindware.
5. Emphasizes review, building (Bereiter, 2002), applying and instilling knowledge.
6. Seeks to address broad/deep learning challenges (e.g., transfer & transformational learning in high IQ learners)

A5. H-CogAff and Perturbance theory of emotion (based on Sloman, 2003; Beaudoin, 1994, 2015)

- Key affective mechanisms:

1. Physiological information: bodily feelings, and mood (tension, energy)
2. Alarms (Primary emotions).
3. Motivators (monitors, motive generators). Many attributes (including insistence). Implement "concerns".
4. Meta-/Management processes (executive functions)
5. Interrupt filters (cf. insistence), meta-management routines

- Tertiary emotions = Perturbance: when a cluster of motivators is insistent, i.e., have a strong propensity to distract/maintain attention. See Beaudoin (1994), Sloman (1987, 2003).

A6. ACT Goals (Adapted)

1. Develop awareness and acceptance of some mental states.
2. Select valued direction.
3. Pursue/take action towards values

A7. Some of Our User-centred Practical Goals-

1. Reduce suffering in this episode of RG.
2. Abate future romantic grief suffering and other forms of grief-related suffering.
3. Instill ACT and meta-effectiveness mindware
4. Regulate current and future perturbation
5. Enhance motivation for valued direction.
6. Prepare user for future life challenges

A8. Limerence and "Romantic Grief". Core features

Perturbation and other features per Tennov (1979) and Fisher (2005). Cf. Wright, Sloman, Beaudoin (1996) for a design-based analysis of mortal grief in terms of perturbation.

* Affiliations and disclosure. **Adjunct Professor** of Cognitive Science and Education, Simon Fraser University. **President**, Director and shareholder, CogSci Apps Corp.. **President** and owner, CogZest. Prospective shareholder of PHEMI Systems. **Author:** *Cognitive Productivity: Using Knowledge to Become Profoundly Effective.*

A9. Why study/treat regulation of romantic grief?

1. RG is an **intense**, distinct, evolutionarily significant, prototypical, complex emotion about which many are ↑ interested and reflective; ↑ popular literature has been written about it, but ∃ ↓ direct empirical, theoretical, IP research. Almost universal yet relatively infrequent.
2. Entry point for young people to better understand themselves, develop emotion regulation, acceptance, and meta-effectiveness.
- 3 Help prevent limerence/RG and other emotional problems in the future.

A10. Big Data Research Potential

1. Manipulate independent variables (e.g., cognitive defusion techniques, various treatments).
2. Record interactions (if consent).
3. Measure effectiveness of interventions, test hypotheses.

B. REQUIREMENTS SPECIFICATION

B1. General Requirements

1. Ease of use, elegance of design (cf. mySleepButton®)
2. Adaptable to user's despondency, RG stage, meta-effectiveness (acceptance, etc.), willingness, and goals.
3. Configurable by end-user, therapist and researchers (subject to user consent).
4. Allow consenting users' data to be sent to a central repository.
5. Integration with PHEMI Systems for confidentiality and access rights management.
6. User to become independent from the app (self-reliance)
7. Productivity: Efficiency and effectiveness, and all other requirements from Column A (left side of this poster).

B2. Train Users to

1. Understand, explain and identify: episodes of limerence/RG (manifold components); mental states; value (attitudes, norms, goals, values); motivators; primary emotions; perturbation; moods; feelings; cognitive fusion, cognitive distance, and other core ACT, limerence and meta-effectiveness concepts;
2. Remove/avoid LO cues (songs, locations, etc.); not to contact LO (if possible.)
3. Enhance mood via exercise, sleep, sunlight and nutrition. (Cf. Thayer's "calm energy").
4. Transition: to resignation, acceptance; develop willingness, equanimity, flexibility, balance. pursuit of values.
5. Welcome, favor, savor and leverage separation from LO
6. Shift their meta-cognitive stance. Cognitive defusion.
7. Challenge components of limerence/RG (e.g., idea that LO is special).
8. Redirect from LOM (gather and train with multiple cues/routes). (RD Cue)
9. Reconnect with their values (document and instill purposes, mission, plan, goals)

B3. Example candidate features

1. Exercises, instillers, videos, readings; games.
2. Affective body mentation. E.g., challenges to identify tension areas. Body scan, observe, breath, surf, expand. (Assistance and training).
3. Mnemonics. E.g., JISM, "AW BOSE Dr. Engage", ACT FEAR, "Insane roped door is ½ full."
4. Undermining the Aristophanes "Other-half" myth. (Cognitive defusion)
5. Instilling and applying metaphors. E.g., "drop the rope", "Magnets and Maggots LOM" redirection.
6. Challenges (instillers): "Name your LOM story." "Imagine [an LOM], what is your response?" "Imagine the pursuit of your values in the domain of [...]." "What are your values in domain [...]?"

B4. Ethical Considerations

1. Avoid triggering anger and angry behavior.
2. Detect anger and promote anger-management if detected.
3. Consider suicidality.
4. Privacy/access control.
5. Not a replacement for therapy.

B5. Glossary of acronyms

AI: Artificial Intelligence (Sloman, 1993)
 ACT: acceptance and commitment therapy
 IP: information processing
 JISMs: judgments, images, stories and motivators
 LO: Limerent object (Tennov, 1979)
 LOM: LO mentation
 LTWM: long-term working memory (Ericsson & Kintsch, 1995)
 PP: productive practice (Beaudoin, 2015)
 RD Cue mnemonic: reconstructable, discriminative cue mnemonic (Beaudoin, 2015; Norman & Bobrow, 1979)
 RG: romantic grief

References

References and further information:
 from <http://www.sfu.ca/~lpb/romantic-grief> Email: lpb@sfu.ca
 Meta-effectiveness book: <https://leanpub.com/cognitiveproductivity/>

Luc P. Beaudoin



Related app

A CogSci Apps Invention
 Based on Cognitive Science
<http://mySleepButton.com>

