Using Clojure to provide computerized psychotherapy

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About me

‣ Psychologist and psychotherapy researcher

‣ Since 2009 I have specialized in research on computerized psychotherapy

‣ In 1999 I learned about Common Lisp

‣ In late 2014, I found Clojure

‣ Can Clojure be used for computerized psychotherapy?

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Problems

The problem

▸ Mental illness is a massive problem in the world today

▸ For example in Sweden, we found that 17.2% of the population had clinical significant levels of depression or anxiety

▸ By the year 2020, it has been estimated that depression will be the second most important cause of disability worldwide

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The Mental Health Problem

Some solutions

▸ Pharmacological treatments like antidepressants

▸ Psychological treatments like psychotherapy

▸ People prefer psychotherapy over medications

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More problems

▸ Access to psychotherapy is severly limited

▸ We simply do not have enough psychologists and psychotherapists

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The Psychotherapy Access Problem

Some potential solutions

▸ Use the Internet to provide psychotherapy

▸ Develop computerized psychotherapy

▸ One very promising approach is Internet-delivered psychotherapy in the form of guided self-help
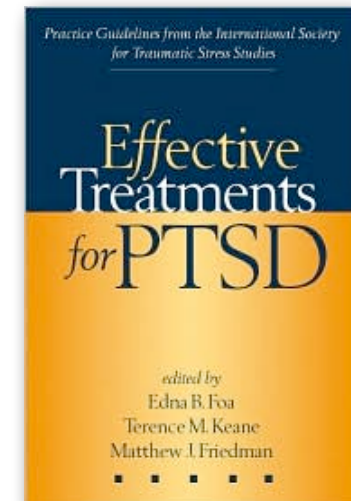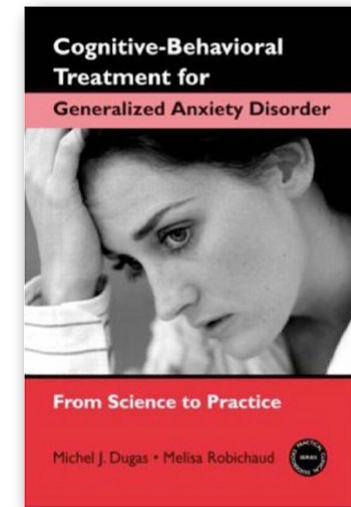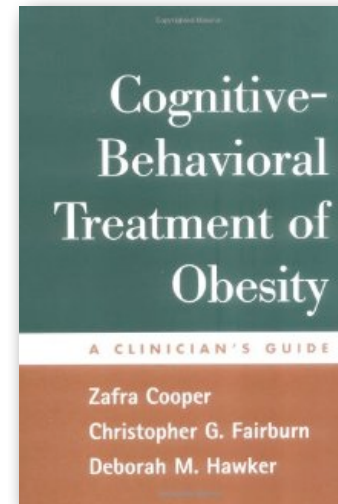
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Guided self-help

Treatment manuals
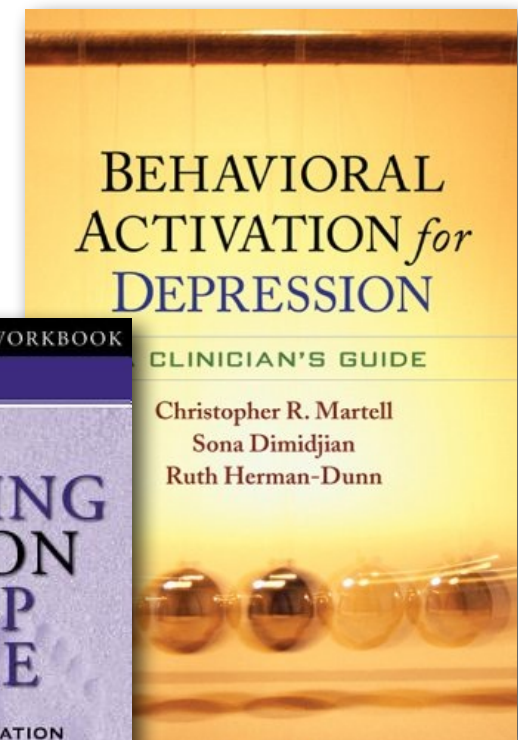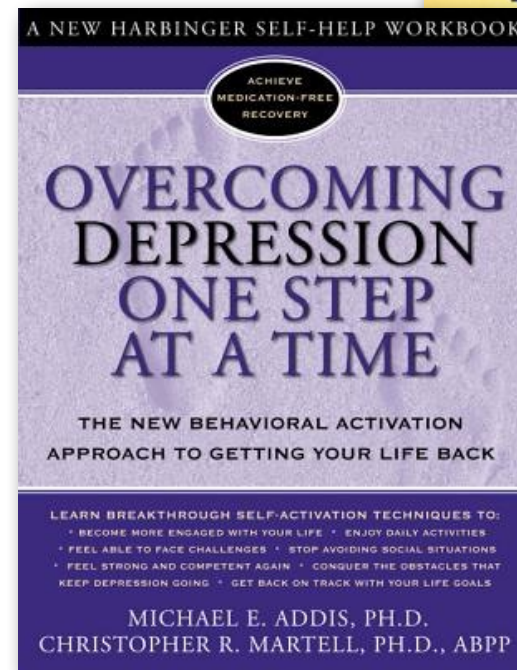
▸ Psychotherapy can be highly structured and well-specified

▸ Cognitive Behavior Therapy (CBT) is an example of such a therapy

▸ These specifications form a treatment manual

Cognitive-Behavioral Treatment for Generalized Anxiety Disorder
From Science to Practice
Michel J. Dugas · Melisa Robichaud

Cognitive-Behavioral Treatment of Obesity
A CLINICIAN'S GUIDE
Zafra Cooper
Christopher G. Fairburn
Deborah M. Hawker

Practice Guidelines from the International Society for Traumatic Stress Studies
Effective Treatments for PTSD
edited by
Edna B. Foa
Terence M. Keane
Matthew J. Friedman

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Manuals and self-help

▸ A manual can be translated to self-help

▸ Guided self-help is when you add for example 10 minutes of email contact with a therapist to a self-help treatment

ICBT

- Internet-based Cognitive Behavior Therapy

- Most often in the form of guided self-help

- Well beyond 100 well-made studies that support the efficacy of ICBT

- Works equally well as face-to-face therapy for lots of clinical conditions

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ICBT

- Eliminates some of the problems related to distance between patient and therapist

- Asynchronous psychotherapy fits many individuals better than synchronous

- Takes far less time

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The Psychotherapy Access Problem

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More problems

‣ ICBT works well but is very hard to access outside of research settings

‣ No solutions is based on modern web technologies

‣ No solutions exist that can scale

The ICBT Technology Problem

Problems

▸ The Mental Health Problem

▸ The Psychotherapy Access Problem

▸ The ICBT Technology Problem

Two potential solutions

I.

Platform 5

- ▸ To the ICBT Technology Problem:

- ▸ Use Clojure to write scalable web applications

- ▸ We have developed an application called "Platform 5" to have a proof of concept of this

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DEMO

Platform 5

▸ Built using the excellent Luminus framework

▸ Server-side rendering using Selmer

▸ Buddy for auth, Bouncer for validation, HugSQL for connection to Postgres database

▸ Runs on Heroku

▸ HTML Template from Creative Tim

▸ We hope to release v1.0 before the end of the year

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Future thoughts for v2.0

▸ Clear separation of server and client architecture

▸ We have started building an ICBT API using compojure-api

▸ Clojurescript based clients planned for the browser and using re-natal (React Native)

▸ Maybe Sente-based websockets communication

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The Psychotherapy Access Problem

Psychotherapy access

▸ What's the upper limit of efficacy of "non-guided" self-help, i.e. fully automatized systems?

▸ We will most likely still need people to treat people

▸ We are exploring other ideas on how to solve this problem

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What if psychologists were full-stack developers?

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Full-stack psychologists

▸ My experiences is that Clojure can be taught as a first language

▸ We have started teaching psychologists and other health professionals on how to use Clojure and how to build web applications

▸ I'm working on a text that can be used for non-programmers wanting to develop ICBT systems using Clojure

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Summary

▸ The Mental Health Problem is a massive problem

▸ Psychological treatment may solve part of the problem

▸ ICBT can help reduce the Psychotherapy Access Problem

▸ We may be able to use Clojure to solve parts of the ICBT Technology Problem

▸ The Psychotherapy Access Problem may be reduced by teaching health professionals to become full-stack developers

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Thank you!

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