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?
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
The Mental Health Problem
Some solutions

- Pharmacological treatments like antidepressants
- Psychological treatments like psychotherapy
- People prefer psychotherapy over medications
More problems

- Access to psychotherapy is severely limited
- We simply do not have enough psychologists and psychotherapists
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
Guided self-help
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.
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
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
The Psychotherapy Access Problem
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
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
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
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
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
What if psychologists were full-stack developers?
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
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
Thank you!