System Administration and Sex Therapy:

The Gentle Art of Debugging

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WARNING!

1. Mature language, mature sexual situations and some audience nudity

1. Mature language, mature sexual situations

2. Attempt made to not assume hetero/gender normal(h|g|n)
3. Not presented by a provider or a consumer of sex therapy
4. This talk will be primarily about debugging

Why SysAdmin & Sex Therapy?

- Draws a crowd, no?
- Our debugging tasks are getting harder
- Debugging is not just binary
- Two fields share a few things in common:
  - complex systems without authorship or control
  - “Should just work”

Our Debugging Tasks are Getting Harder

- Tendency towards complex and distributed dependency
- Don’t control all of the parts and we haven’t written all of the software
- Source code availability increasing…but the level it helps is decreasing

Sex Should “Just Work”

1. All other couples have sexual intercourse several times a week.
2. Sex for all other couples includes orgasm on every occasion.
3. All other couples are able to obtain orgasm simultaneously.
4. If sex is not good then there must be something wrong with the relationship generally.
5. Partners should instinctively know what type of stimulation their partner needs.
6. If a partner does not respond sexually to his/her partner then he/she does not find the partner sexually attractive.

(Spence, 1991)

Sex for Men Should "Just Work"(h|g|n)

1. Physical contact *must* always lead to sex.
2. Sexual activity involves a steady and fixed path which *must* always end in orgasm.
3. Sexual activity *should always* involve intercourse.
4. The male *should* take charge and make the first moves in sex.
5. Men *should* always know instinctively how to be sexually competent and enjoyable sex *must* be natural and spontaneous.

Sex for Men Should "Just Work"(h|g|n)

6. Sex *always* requires an erection.
7. Men are no longer influenced by traditional myths about the male role regarding sex.
8. Men *must* perform successfully in sex, as in other areas of their lives. It is performance that counts.
9. Men *must* always desire sex and be capable of responding sexually.
10. Real men *should not* express certain emotions to their partners.

(Zilbergeld, 1978)

Sex for Women Should "Just Work"(h|g|n)

1. A woman should always take part in sex if her partner makes approaches.
2. A woman should not make the first sexual moves towards her partner.
3. It doesn't matter if a woman doesn't have an orgasm as it doesn't serve any reproductive purpose and/or most women don't have orgasms anyway.
4. A woman should always be capable of intercourse, even as a passive recipient.
5. A woman should not expect her partner to wait until she is sufficiently aroused before penetration begins.

Sex for Women Should "Just Work"(h|g|n)

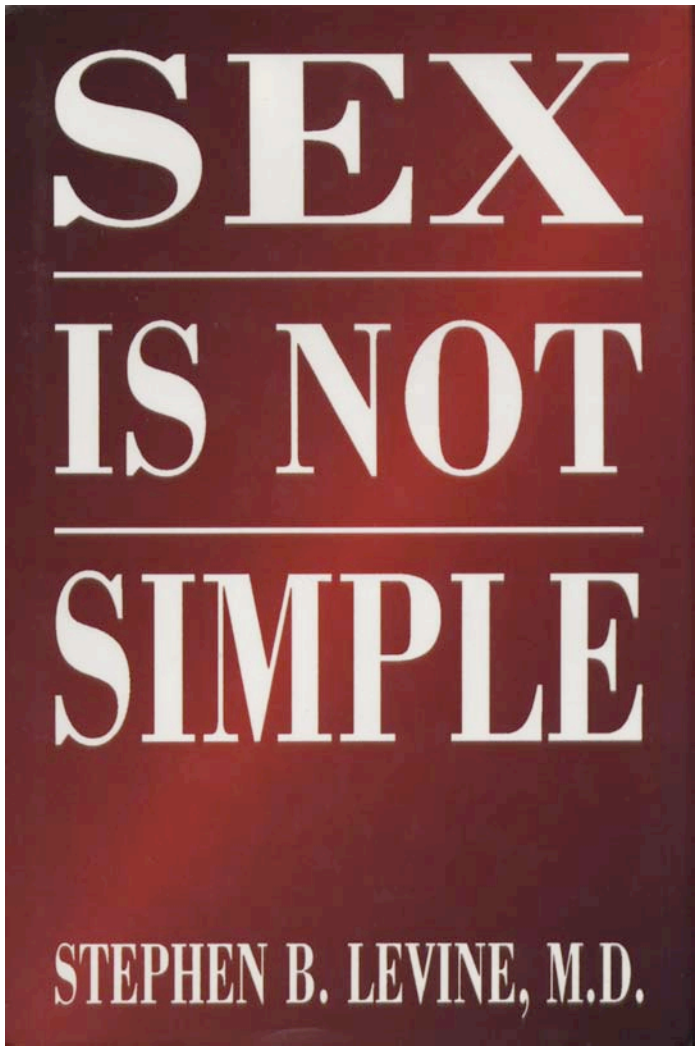
6. A woman should be capable of orgasm without requiring manual stimulation of the clitoris – intercourse should be sufficient.
7. 'Respectable' women should not demonstrate high levels of enjoyment and excitement.
8. 'Respectable' women do not communicate their sexual needs and preferences to their partners.
9. 'Respectable' women should not masturbate.
10. 'Respectable' women should not use fantasies during sexual activity with their partner.
11. 'Respectable' women should never have sexual fantasies.

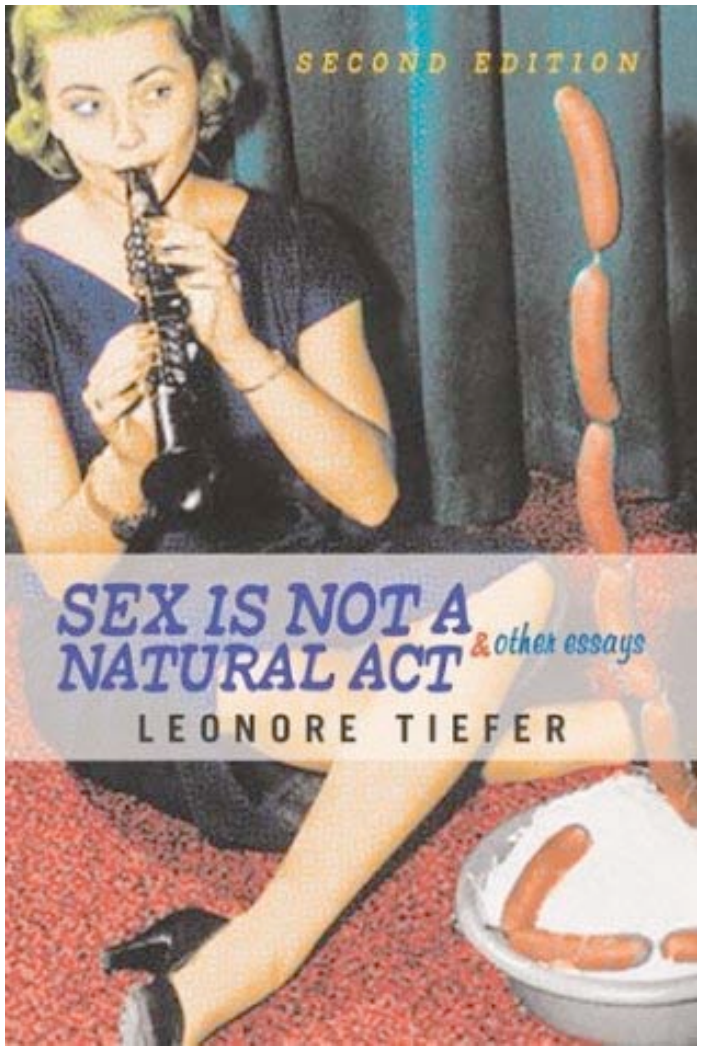
Sex for Women Should "Just Work"(h|g|n)

12. In order to be a 'modern woman' I must be able to achieve orgasm. Being able to experience orgasm is one of the most important things in life.
13. In order to be a 'modern woman' I must initiate sex with my partner.
14. In order to be a 'modern woman' I must have premarital sexual relationships.
15. In order to be a 'modern woman' I must give my partner plenty of feedback about my sexual likes and dislikes.

(Spence, 1991)

…but it doesn't

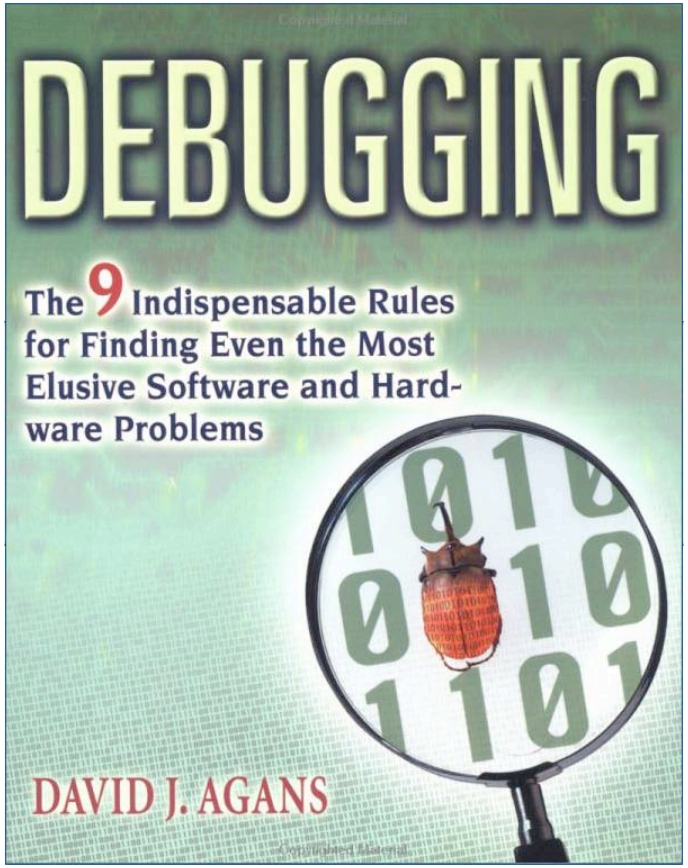


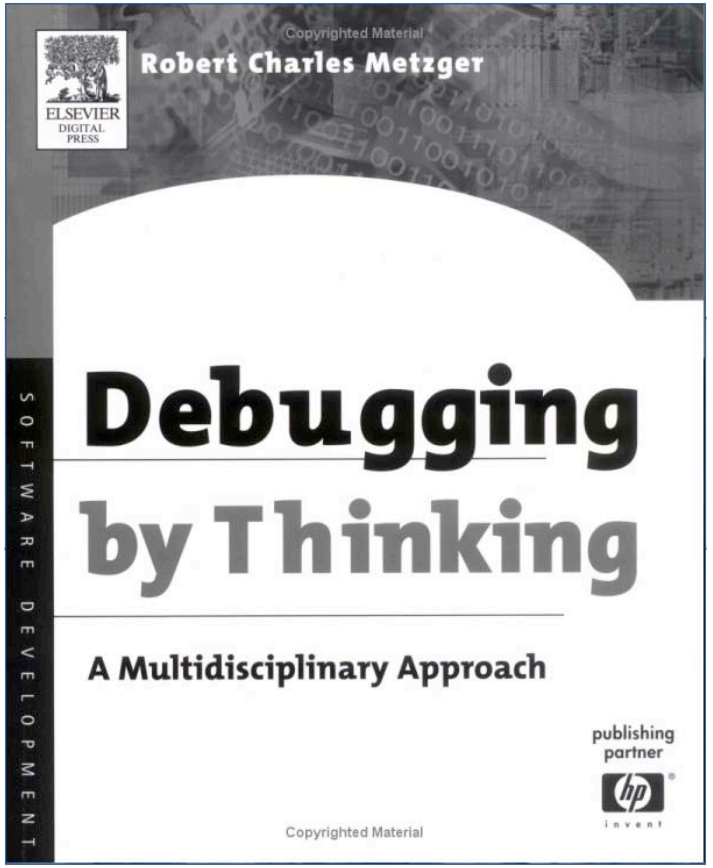


SysAdmin Should “Just Work”

1. Plug and play
2. It is just <*your format/ protocol/cable spec here*>.
3. Zero administration toolkit
4. Printing
5. The Internet
6. You have the source, don’t you?
7. Others?

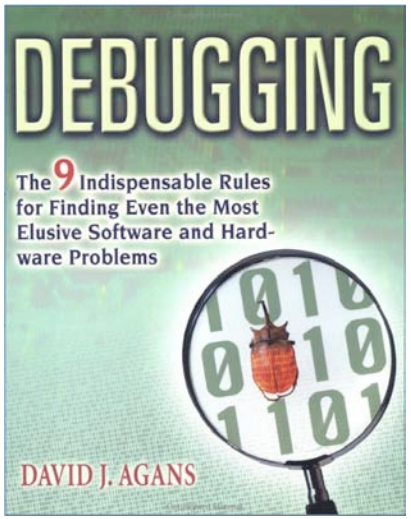
Basic Debugging Highlights





Debugging Rules (Agans, 2002)

1. Understand the System
2. Make It Fail
3. Quit Thinking and Look
4. Divide and Conquer
5. Change One Thing at a Time
6. Keep an Audit Trail
7. Check the Plug
8. Get a Fresh View
9. If You Didn't Fix It, It Ain't Fixed



2. Make It Fail

- *Stimulate* vs. *simulate* the failure

Q: How many engineers does it take to fix a lightbulb?

A: None, they all say "I can't reproduce it–the lightbulb in *my* office works fine."

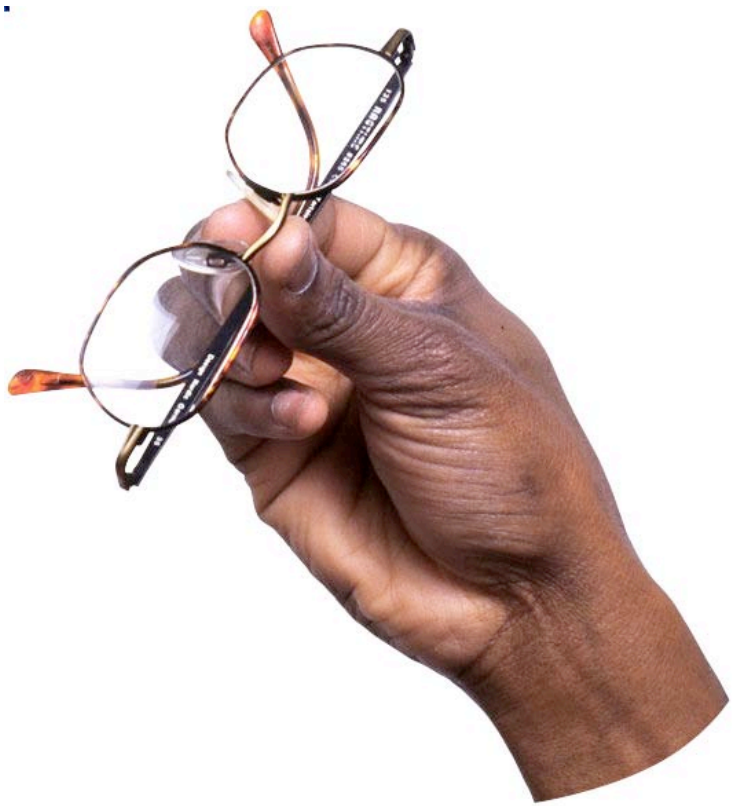
2. Make It Fail (Intermittent failures)

- Initial conditions, input data, timing, outside processes, electrical noise, temperature, vibration, network traffic, phase of the moon, sobriety of the tester (Agans)
- Look at it every time it fails, ignore good runs
- Collect information on *every* run
- http://www.cartalk.com/content/puzzler/transcripts/199714/answer.html

```
#!/bin/perl
use Astro::MoonPhase;
if (phase() == 1)){…};
```

3. Quit Thinking and Look

- Server story
- “Keep looking until the failure you can see has a limited number of possible causes to examine.”
- Instrument the system (debuggers don’t count)



4. Divide and Conquer

- Inject easy-to-spot patterns
- Fix the bugs you know about
  - (wrong?)
- Fix the noise first
  - certain kinds of bugs are likely to beget other bugs

5. Change One Thing at a Time

- Isolate the key factor
- Grab the brass bar with both hands
- Change one test at a time
- Compare it with a good one
- Determine what you changed since the last time it worked

8. Get a Fresh View

- Report symptoms, not theories

Debug…

…like a detective

…like a mathematician

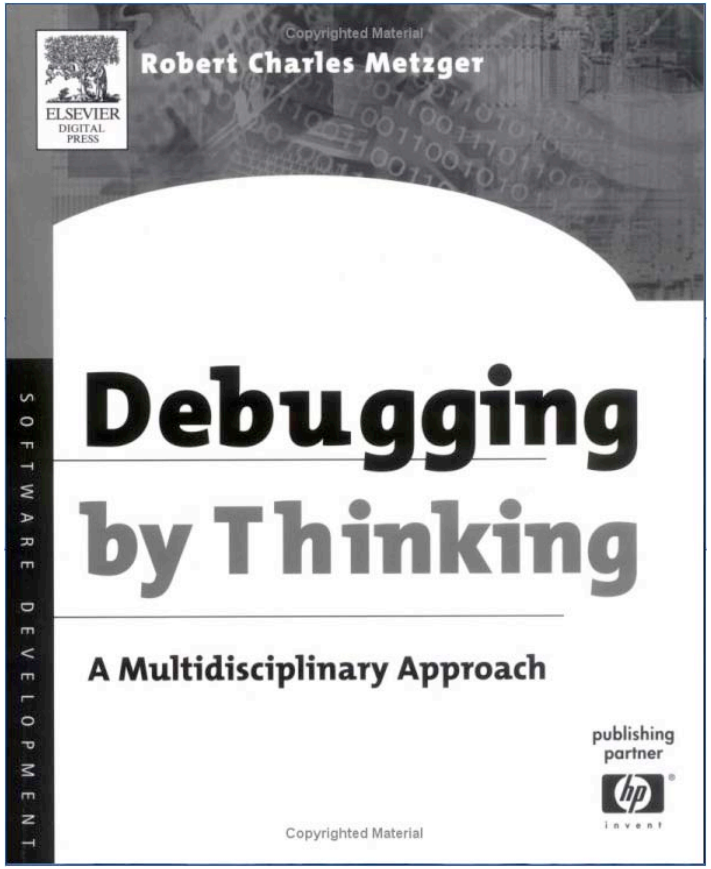
…like a safety expert

…like an Egyptian

…like a psychologist

…like an engineer

…like a computer scientist

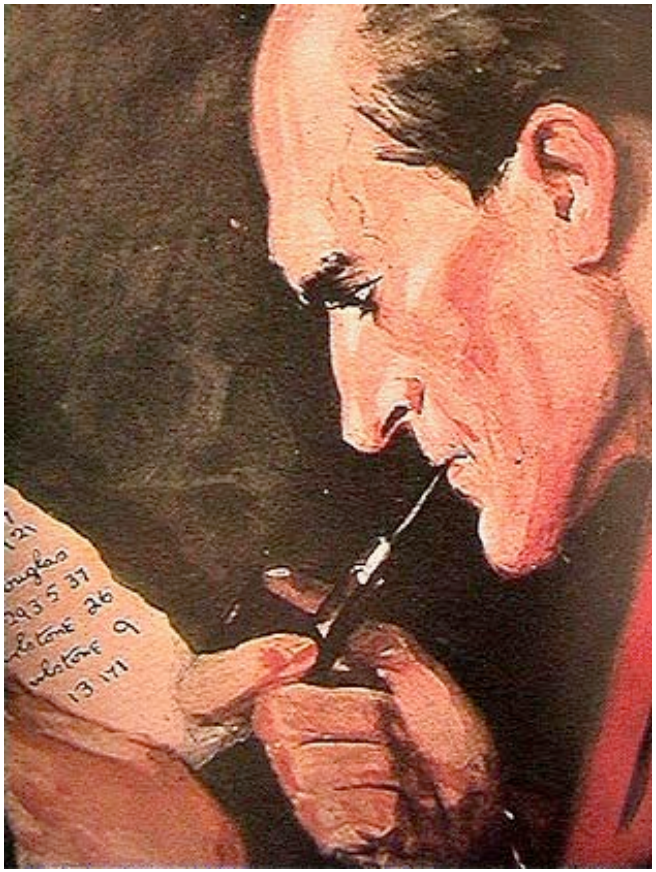


Nature of Debugging

- Debugging is cognitive, not constructive
- Debugging vs. Testing
  - **testing** is the process of determining *whether* a given set of inputs causes an unacceptable behavior in a program
  - **debugging** is the process of determining *why* a given set of inputs causes an unacceptable behavior in a program and *what* must be changed to cause the behavior to be acceptable
- Debugging by editing → …by interacting → …by repeating → …by thinking

Sherlock Holmes

- Use cross-disciplinary knowledge
- Focus on facts
- Pay attention to unusual details
- Gather facts before hypothesizing
- State the facts to someone else
- Start by observing
- Don't guess
- Exclude alternative explanations
- Reason in both directions
- Watch for red herrings

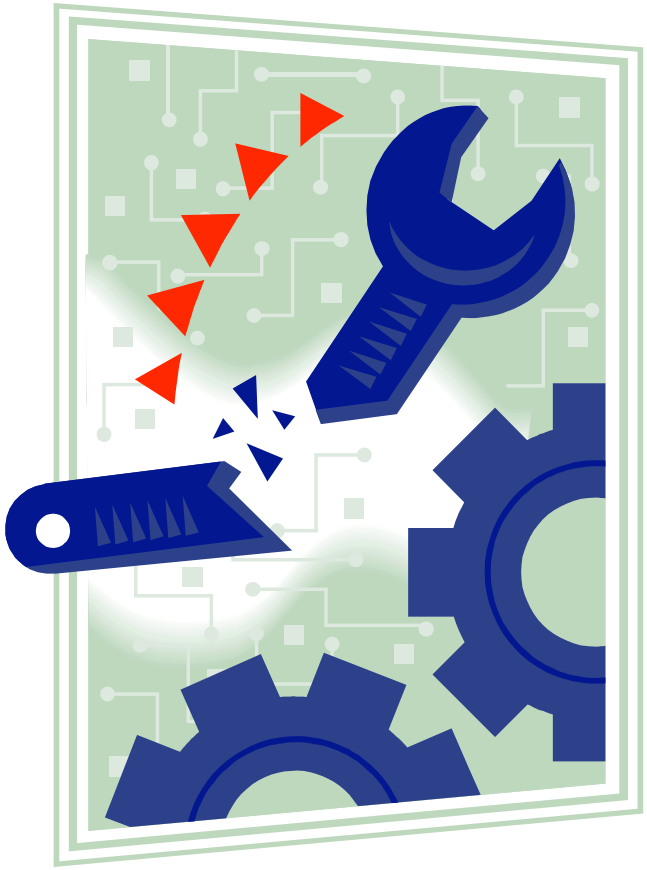


Data Collection for Debugging

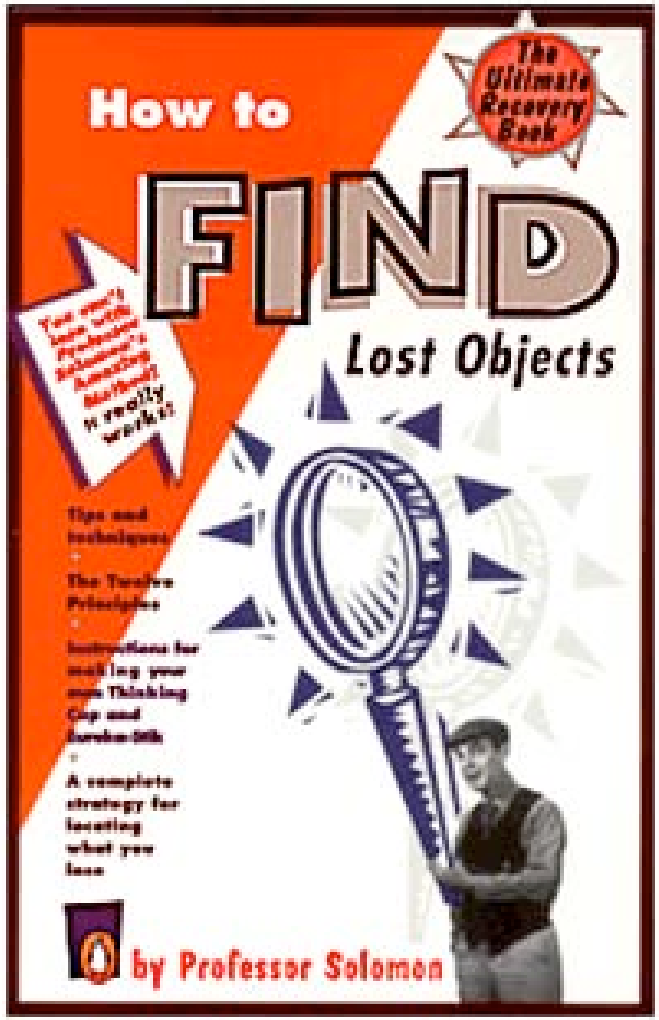
- Event-based or interval based (sampling)
- Accumulate (tracing) or summarize (reduction)
  - Event-based is precise but can take longer
  - Sampling approximate, but can take less time
  - Trace is complete, but can use more storage
  - Reduction loses details but uses less storage
- Synchronic vs. diachronic

Problem/Defect Description

- Input, output, deviance (black box method)
- Observation, hypothesis, experiment (scientific method)
- Who, what, where, when, how much, how many (reporter's method)
- Test case, reference, delta (tester's method)



Professor Solomon



Professor Solomon's Twelve Principles for Finding Lost Objects

1. Don't look for it
2. It's not lost–you are
3. Remember the three c's (comfort, calmness, confidence)
4. It's where it is supposed to be
5. Look for domestic drift
6. You're looking right at it
7. The camouflage effect
8. Think back
9. Look once, look well
10. The eureka zone
11. Tail thyself
12. It wasn't you

Polya's *How to Solve It* (1945)

1. Understand the problem.
2. Find the connection between the data and the unknown. You may be obliged to consider auxiliary problems if an immediate connection can't be found. You should eventually obtain a plan of the solution.
3. Carry out your plan.
4. Examine the solutions obtained.

Tactics, Heuristics, Strategies

- **Tactics** are programming skills that produce information
- **Heuristics** are techniques for making progress in unfamiliar problems or rules of thumb for effective problem solving.
- **Strategies** are global decisions regarding the selection and implementation of heuristics and tactics.

Debugging Strategy Working?

- Number of plausible hypotheses disproved should be increasing
- Effort required to reproduce the problem should be decreasing
- Size of the input required to reproduce the problem should be decreasing
- Amount of code excluded from consideration should be increasing

Debugging Heuristics

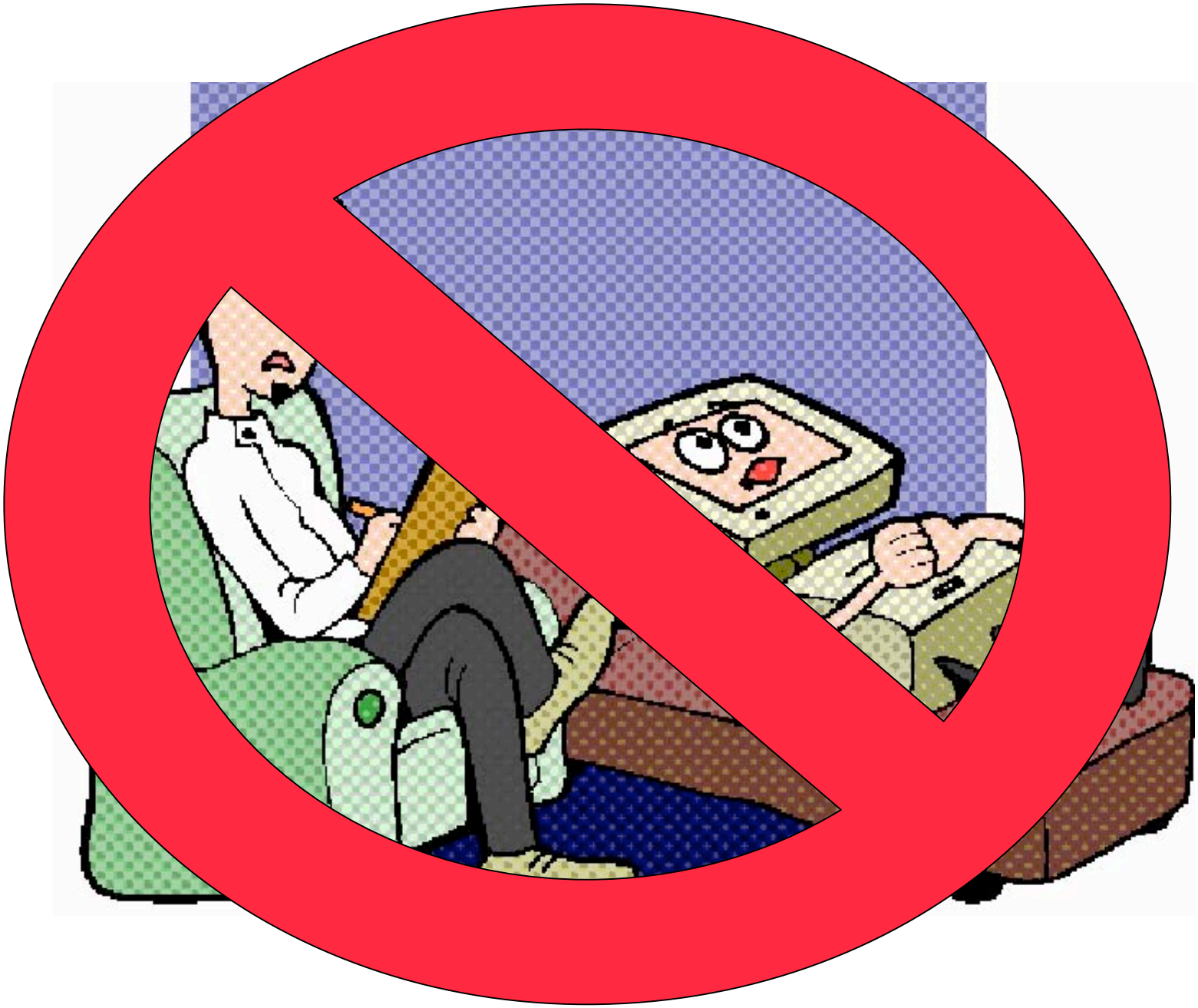
- Modify the program so that you can repeat the problem at will (stabilize the problem)
- Create a test case that will demonstrate the problem when desired
- Reduce the input required to reproduce the problem
- Categorize the problem according to a standard set of questions
- Describe the problem according to a standard methodology
- Explain the problem to someone else
- Recall a similar problem from the past
- Draw a diagram
- Choose a hypothesis from historical data

Where’s the Sex?

OLD SCARLETT, THE PETERBOROUGH SEXTON.

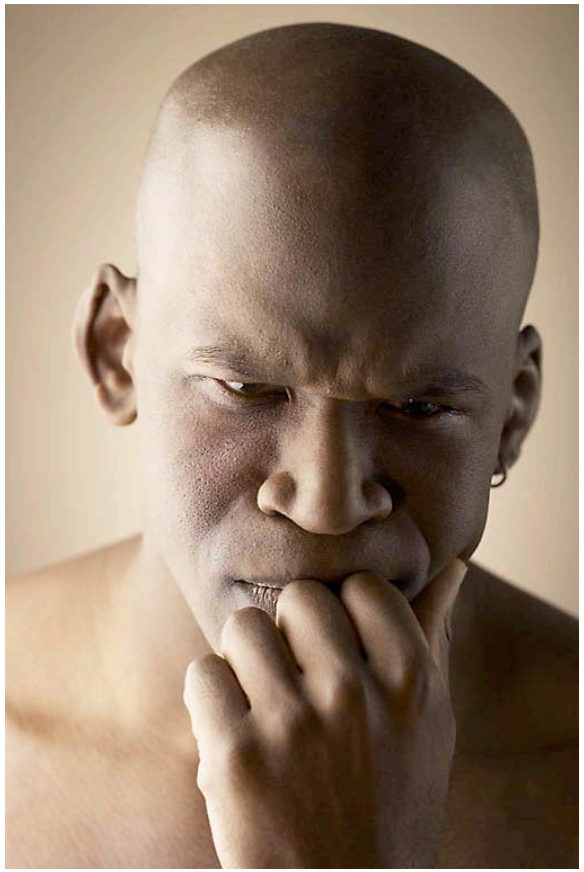
WARNING!

Let me do the driving with this analogy



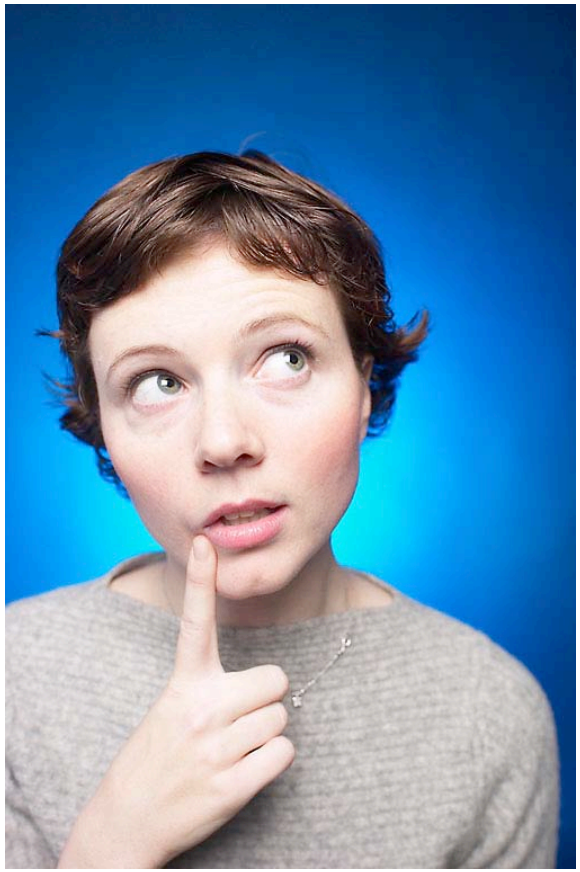
Reminder: Why Do We Care?

- Deal with complex systems without authorship or control
- “Should just work”
- Focus on relationships
- Focus on context



What's a Sex Therapist?

- What do they do?
  - Psychosexual dysfunction issues
  - Psychosexual reproductive health issues
- Partner work (mostly)
- Sex therapist vs. couples therapist

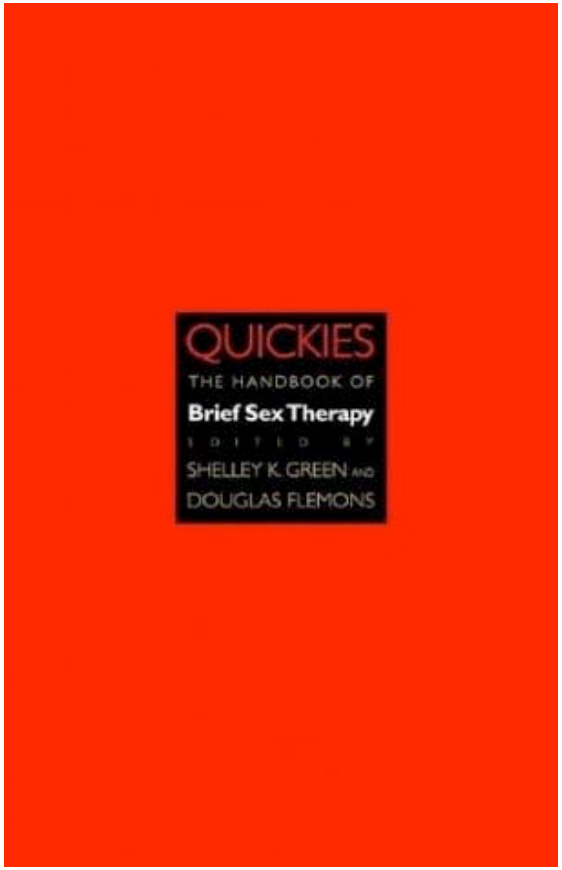


Sex Therapy Has Its Own Problems (Kleinplatz)

- No unifying theoretical base
- Therapist's assumptions are laden with sexual myths and stereotypes (e.g. gender, "normalcy")
- Current practices are based on gender-biased, phallocentric, and heterosexist assumptions (e.g. rapid ejaculation in males is seen as a serious problem, whereas rapid orgasm in females is see as a reason for celebration) (Reiss)
- Basic conception of sexuality remains biologically based, rather than offering equal attention to personal and interpersonal processes, cultural norms, and gender bias.
- Field continues to focus on body parts, rather than on the persons attached to them.
- Least successful where the greatest needs are–problems relating to desire

Brief Therapy

- Umbrella term for “the Batesonian/Ericksonian -influenced tradition of brief therapy”
- Why pick this flavor of therapy?
  - Easiest fit for sysadm timeframes
  - Provocative
  - Common factors research



Possibility Therapy (O'Hanlon)

- People are influenced, but not *determined*, by the past.
- People are influenced by their sense of what is possible for their future.
- At any moment, unless physically compelled by someone who holds power over them or unless they are prevented by physical incapacitation, people choose the actions they take.
- People are more likely to cooperate when they and their feelings and points of view are validated and respected.
- Therapists can never know the truth about people, because we are always influencing what aspects of the truth get spoken and heard. ✓

Possibility Therapy Premises, cont.

- No one knows for certain what causes behavioral, psychological, emotional or relational problems, although there is no shortage of people who claim to know.
- What we do in therapy either works or doesn't work. If it doesn't work it's best to first try something different rather than deciding the person, couple or family is unmotivated or unable to change. ✓
- There are many pathways to change. No one technique, method or philosophy works for everyone, despite many claims to the contrary. ✓
- What helps create change is not necessarily an indication of what caused the problem. ✓
- All experience is okay. Actions are either okay (ethical, safe and acceptable) or not.

Stages of Change (Miller, Donahey and Hubble)

- Prochaska:
  - "the puzzle of how people intentionally change their behavior"
  - "at different stages people apply particular processes to progress to the next stage"
- Not necessarily (or even usually) linear

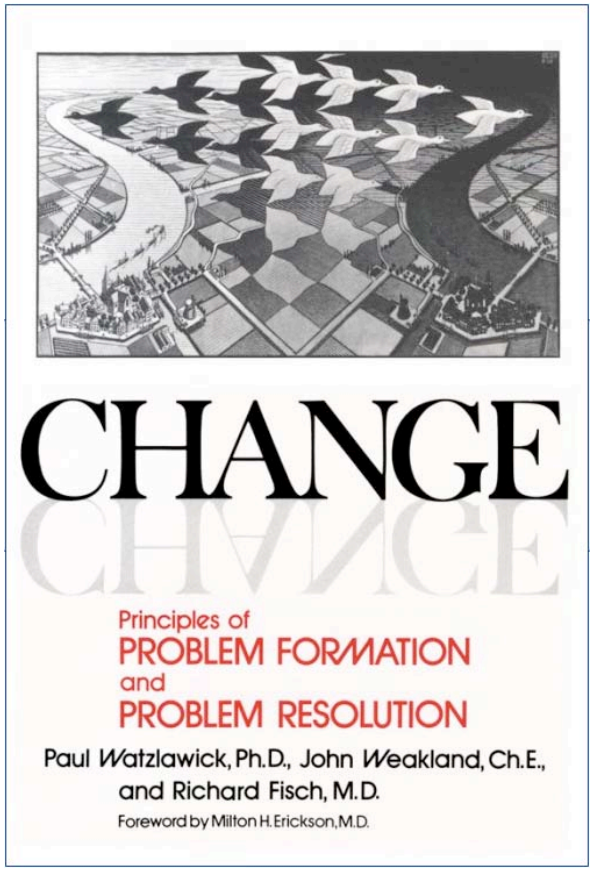
- Precontemplation
- Contemplation
- Preparation
- Action
- Maintenance
- Termination

Solution Focused Brief Therapy (Nelson)

- Away from problem-solving and towards solution-building (de Shazer).
- SFBT therapists assume problems are not always present (or present in the same way).
- SFBT therapists look for absence, lowered intensity, times when present but not a problem.
- If improved, EARS (DeJong & Berg):
  - Elicit what is better
  - Amplify the change
  - Reinforce the change
  - Start over

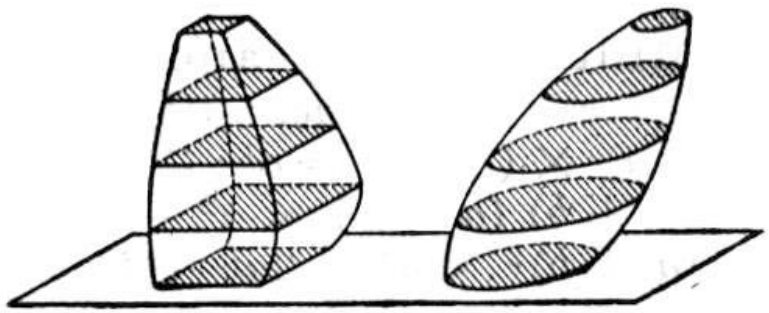
Mental Research Institute (Bobele)

- Disengage the problem from its attempted solutions
- Includes changing the meaning ascribed to the problem so that a different class of solutions becomes possible.
- Miracle question
- Interventions:
  - Do less of the solution behavior
  - Do more of the solution behavior
  - Do the solution behavior differently
- Context creation (reframing)



Relational Approach (Flemons & Green)

- Focused on shifting relationship between things (e.g. clients, clients and their problems)
- Efforts at negation only serve to heighten [a problem's] significance, problems are not localizable or transformable *things* in a particular person/part
- Relationships are most viable when the *relata* are free to change or stay stable *in coordination* with each other



Catalytic Approach (Fraser and Solovey)

- Introduce a small but significant shift in the relationship interactions or descriptions around a problem, then amplify the subsequent ripples in the system to foster change.
- **First-order**: change within the normal definitions, understandings, premises, rules, practices of a given system (e.g. change in frequency, intensity, location, duration, etc. of a practice or action).
- **Second-order**: change of premises, definitions, assumptions, practices, traditions of a given system of relationships.

Catalytic Approach, cont.

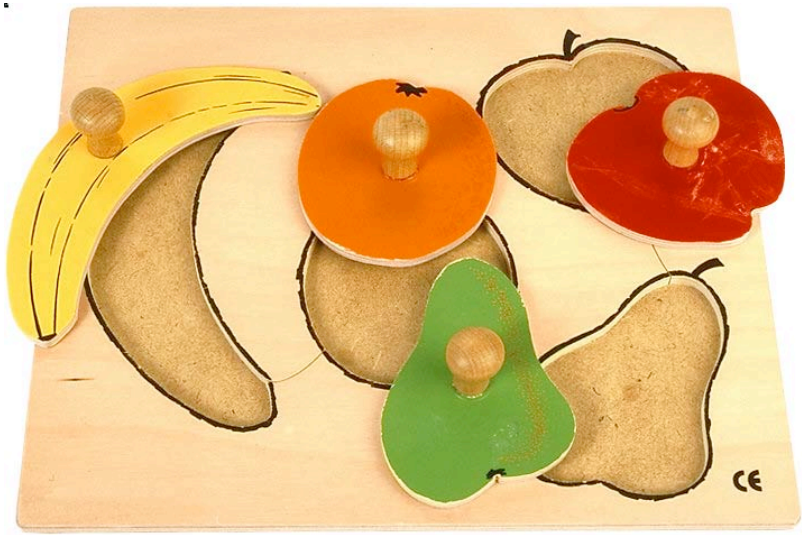
- Identify vicious cycle pattern around problem
- Initiate new action by redirecting solution attempts/reframing problem
- Identify and amplify already-occurring exceptions to the problem pattern
- Build on exceptions to support change

General Sex Therapy Gleanings

- Multi-contextual
- Needs vs. Wants
- May need to give one partner more control
- You do not ask someone with an eating disorder to stop eating
- Sex addiction lessons
- Staircase wit
- Equilibrium
- Asking a lot of questions…

Let's Put the Pieces Together

- Need to make basic debugging better and then take it to the next level (systemic/relational)
- Here are some of the ideas we can steal to do it:
  - Third party and systemic truths
  - Focus on solutions, not problems
  - Relational freedom
  - Stages of change and rhythm
  - Miracle question (signs of change)
  - Second-order debugging
  - The role of exceptions



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- …to Cindy Blank-Edelman for letting me prattle on about this topic without too much eye-rolling (plus helpful feedback).
- …to SAGE, USENIX, the LISA ‘04 PC and you for letting me give wacky talks like this.

Questions? Comments?

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