

# **Your Chatbot: Moonshot or Low-Hanging Fruit?**

Mohan Embar - Chatbots 3.3 Conference

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(Disclaimer: These are my opinions and don't necessarily have anything to do with reality.)

## This talk is intended for:

- individual chatbot writers (or those that want to get into the head of a bot writer starting from scratch)
- who have no idea where to begin or what they're after
- who want to start from scratch, create something original and not a me-too bot created by taking an existing bot and plugging in different canned responses

## The Most Important Question

# Why are you doing this?

- Are you trying to win a competition? Which one  
*Why* are you trying to win it?
- Are you trying to build something you can commercialize?
- Are you trying to solve the problem of hard A.I. and make a program that is as smart as a human?

# My Anti- Pep Talk

- Are you trying to crack the code of AI and make a truly sentient computer that will think and feel? Unlikely you'll pull this off yourself. (Like the amateurs who thought they could solve Fermat's Last Theorem). IBM's Watson probably took man-decades of effort. Better to join a team.
- Are you trying to make something you can commercialize? Better, but then question the value of starting from scratch when there's so much free stuff available (Wallace, Wilcox, etc.). Also, question the value add above a search engine.

I'm going to intersperse these decision points with my story.

# Starting From Scratch Is Hard

Starting from scratch is very daunting. Very hard.

Took six months off at the beginning of 2008. Told my clients to go away, watched the stock market crash, my savings dwindle. Stressful times.

Worst part: thinking you have more time than you really have and not knowing what your goals are.

# My Initial Motivation

My motivation: reading through previous years' Loebner Prize Transcripts, seeing the screening questions, and wondering what it would take to answer these questions in a general way.

- What is a hammer?
- What time is it?
- Is it morning, noon, or night?
- What would I use a hammer for?
- Of what use is a taxi?
- Which is larger, a grape or a grapefruit?
- John is older than Mary, and Mary is older than Sarah. Which of them is the oldest?
- I have a friend named Harry who likes to play tennis.
- What is the name of the friend I just told you about?
- What game does Harry like to play?

Answering the above questions involves a level of understanding deeper than canned responses. Similar to SHRDLU (<http://en.wikipedia.org/wiki/SHRDLU>)

**Person:** Pick up a big red block.

**Computer:** OK.

**Person:** Grasp the pyramid.

**Computer:** I don't understand which pyramid you mean.

**Person** (*changing their mind*): Find a block which is taller than the one you are holding and put it into the box.

**Computer:** By "it", I assume you mean the block which is taller than the one I am holding.

**Computer:** OK.

**Person:** What does the box contain?

**Computer:** The blue pyramid and the blue block.

**Person:** What is the pyramid supported by?

**Computer:** The box.

**Person:** How many blocks are not in the box?

**Computer:** Four of them.

**Person:** Is at least one of them narrower than the one which I told you to pick up?

**Computer:** Yes, the red cube.

# My Assumptions (at the time)

- Programs capable of understanding and correctly the above questions required more than canned responses, and were a steppingstone towards true AI.
- Judges would realize this, be indulgent towards these programs, and vote them the winner, despite the fact that they were obviously not human. This was in line with Hugh's rejoinder to Stuart Shieber:

*"At the current state of the art I suggest that the appropriate orientation for the contest is to determine which of obviously artificial computer entries is the best entry, i.e. most human like, and nominate the authors as "winners." It should not be to determine if a particular terminal is controlled by a human or a computer. If we maintain this orientation, there should be no problems holding unrestricted tests."* - Hugh Loebner,

<http://loebner.net/Prizef/In-response.html>

- Given the above, I believed that even a SHRDLU-like entry would win, even though it would be incapable of saying what its favorite movie was or taking about its boyfriend or girlfriend.

So my goal was: create a program that could correctly respond to Loebner Screening-type questions.



# Moral of the Story

Moral of the story: you need to formulate a goal for your chatbot which gives you hints as to that goal's implementation.

"Winning the Loebner Prize Contest" is not a such a formulation.

I would argue that if winning a contest is your primary driver, you are not going to be happy either during the implementation or with the outcome. I'll even go so far as to predict that you'll abandon your effort or produce something shoddy that won't make it through the prescreening round.

(Another story for another time: Which is bigger X or Y?)

## Moral of the Story (cont'd)

If you're going to enter these contests:

- Use them as motivators for completing your research project and not the end-all.
- Don't let your emotional well-being be dependent on the outcome of them. (Detach yourself from the outcome.)
- Don't compromise your ideals.

# Chatbot Contests

A word of warning: if you're trying to win a competition, slapping together a chatbot with a truckload of canned responses won't cut it anymore.

- Many chatbots are capable of answering the Loebner Screening Questions now: Chip Vivant, Rosette, Mitsuku.

# More Than a Contest: Winning Chatbot Writers

When you look at the winning / “successful” chatbot writers in recent years, they all had a goal that was more lofty than winning a contest.

**Wallace:** AIML

**Wilcox:** Chatscript

**Carpenter:** Pattern Matching/Giant Databases

**Embar:** Deductive Reasoning/Empathy

Wallace and Wilcox even open-sourced their technology.

## Writing a Chatbot? Pick Your Camp.

Is your chatbot-writing endeavor going to be an A.I. research project or a creative writing endeavor?

Unlikely you'll win on canned responses (consider Cleverbot, ALICE, Rosette). These are all people who have put in tons of time creating canned responses. It's unlikely that you'll be able to compete with them unless you put in the same amount of time.

(I hired a contractor to author a bunch of canned responses for me because I couldn't bear to do it myself.)

# Chip Vivant

**First Goal:** Loebner Screening Questions (2008)

Cool, but soulless.

**Second Goal:** (2009 and beyond): A real conversational partner. Not someone who just answered questions, but also took an interest and cared about you.

The weird thing is that ELIZA actually fared better than a lot of these bots in this category and she was written in the 60s.

# First Goal (Loebner Screening Questions)

- Deductive Reasoning
- Knowledge Representation
- Object Sizes and Classes
- Conceptnet, Wordnet, OpenCyc

# First Goal (Loebner Screening Questions) (cont'd)

## Object Size Rules

```
compares(big, person, body_part) .
compares(big, person, footwear) .
compares(big, person, food) .

...

compares(big, transport, person) .
compares(big, social_group, person) .
compares(big, workplace, person) .
compares(big, workplace, covering) .

// General rules
compares_x(A, X, Y) :- compares(A, X, Y) .
compares_x(A, X, Y) :- compares(A, Z, Y), compares_x(A, X, Z) .

compares_i(A, X, Y) :- @genls(X, XC), @genls(Y, YC), compares_x(A, XC, YC) .

compares_ix(A, X, Y) :- compares_ic(A, X, Y) .
compares_ix(A, X, Y) :- compares_ic(A, Z, Y), compares_ix(A, X, Z) .
compares_ix(A, X, Y) :- compares_i(A, X, Y) .
compares_ix(A, X, Y) :- compares_i(A, Z, Y), compares_ix(A, X, Z) .

compares_ic(old, X, Y) :- age(X, AX), age(Y, AY), _gt(AX, AY) .
```



# Other Knowledge

```
taste(cranberry, sour) .  
taste(pomegranate, sour) .
```

```
taste(apple, sweet) .  
taste(apple juice, sweet) .
```

```
color(chili pepper, red) .  
color(strawberry, red) .
```

```
color(pig, pink) .
```

```
color(sun, orange) .  
color(sunset, orange) .
```

```
// How many  
how_many(head, person, 1) .  
how_many(eye, person, 2) .  
how_many(nose, person, 1) .
```

```
// Professions  
works_at(actor, on a set) .  
works_at(actor, on a stage) .
```

# Deductive Reasoning Rules

```
// can_one
is_food_or_drink(X) :- is_solid_food(X).
is_food_or_drink(X) :- is_drinkable_food(X).

is_solid_food(X) :- @is_solid_food(X).
is_drinkable_food(X) :- @is_drinkable_food(X).

can_one(taste,X,always) :- is_food_or_drink(X).
can_one(taste,X,always) :- is_food_or_drink(X).

// gens transitivity (try these last)
gens_t(X,Y) :- gens(X,Y).
gens_t(X,Y) :- gens(X,Z), gens_t(Z,Y).
!gens_t(X,Y) :- !gens(X,Y).
!gens_t(X,Y) :- gens(X,Z), !gens_t(Z,Y).

// Hacks to make our other rules work.
isa_x(X,Y) :- isa(X,Y).
isa_x(X,Y) :- isa(X,Z), gens_t(Z,Y).
isa_x(X,Y) :- isa(X,Z), @gens_f(Z,Y).
!isa_x(X,Y) :- isa(X,Z), !gens_t(Z,Y).
!isa_x(X,Y) :- isa(X,Z), @gens_f(Z,Y), fail.
```

## Second Goal (Worthy Conversational Partner)

1. Gary Shannon

<http://fiziwig.com/ai/chatbot/understand.html>

(He hung out at Robitron for awhile: Robitron and chatbots.org are great groups. Amazing people hang out there.)

2. My own ideas. (This is the advantage chatbot writers have over people doing a doctoral thesis.)

# Fill the Slot: Snippet of model.xml

```
<enum name="MusicalInstrument" file="instruments.dat" wiki="true">
  <!--
    This next field is a hack - it's a manually filled-in copy of the value of
    this enum
    because enums don't currently support switch statements at the top level
  -->
  <ival type="string" auto="false">
    <switch>
      <case value="piano">
        <piano_music_genre type="string" if="still_plays" useronly="true">
          <question>
            <question>What style of #x:unqualified music @@do @@x play?
          </question>
        </piano_music_genre>
        <brubeck type="string" if="still_plays" useronly="true">
          <question>
            <question>My father is a huge admirer of Dave Brubeck. Have you ever
            heard of him?</question>
          </question>
        </brubeck>
      </case>
```

```
<case value="guitar">
  <guitar_type type="string" if="still_plays" useronly="true">
    <question>
      <question>@@do @@x play an acoustic or electric guitar?</question>
    </question>
  </guitar_type>
  <guitar_music_genre type="string" if="still_plays" useronly="true">
    <question>
      <question>What style of #x:unqualified music @@do @@x play?
</question>
    </question>
  </guitar_music_genre>
</case>
```

- “my dog”, “my dogs”: assert existence of these things

# Conclusions

- Why are you doing this?
- You won't create a chatbot which fools humans by yourself.
- Solely doing this to win a contest is a hollow goal.
- Pick one or two problems which will elevate this field, focus on these, do your best, and don't let your well-being be influenced by the outcome of a contest. Detach from the outcome. (Me: Loebner Screening Questions, “What would we get if we applied today's technology to create a modern-day ELIZA?”)

- Go for the low-hanging fruit, raise awareness of the issues, elevate this field and plant the seeds for those that come after you.

This is a green field opportunity for the low-hanging fruit.

# My Current Projects

## **Chip Vivant** (<http://www.chipvivant.com>)

Described in this talk (Loebner Screening Questions, Empathetic Conversational Partner)

## **Empathy Now** (<http://www.empathynow.com>)

Achieve your life goals, overcome bad habits, feel less alone, and guide you to places that those so-called "productivity" tools never could.

## **Keep Me With You** (<http://www.keepmewithyou.com>)

More than a static biography, a living bot version of yourself which outlives you and can interact with your family, great-great-grandchildren after you're gone.