

**Our society is facing
serious difficulties:
THESE DIFFICULTIES ARE
ALMOST ALL DUE TO OUR
INABILITY TO SOLVE
PROBLEMS:
SO LET'S LEARN HOW TO
SOLVE PROBLEMS**

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Some of these Difficulties

- **Congress is in gridlock**
- **Efforts to reduce deficits at any cost are making investments in the future impossible.**
- **The rich are getting richer at the expense of the rest.**

Why is this happening and what can we do about it?

Resolving these difficulties involves Problem Solving.

Using the Explainer method I will discuss today and the computer:

- I have been able to shed light on many of these problems and propose solutions.
- More research is needed to confirm these solutions.

Introduction

Examples of using computer for problem solving

- 1. Finding the cause and resolution of the economic crisis.**
- 2. Medical diagnosis**

Science is a Discipline

- **A common view today:**
 - **“Science is nothing more than the opinion of people who have the audacity to call themselves scientists. Their opinion is no better than anyone else’s.”**
- **Scientists are often wrong and tend to argue.**
- **But they have a discipline they use over time to get it right.**
- **We will discuss how a computer can be used for this discipline.**

The Explainer uses cause-and-effect knowledge

- **An effect may be the cause of another effect which may cause another effect and so on.**

Using the Computer

- **We can go into greater depth of the cause-and-effect statements than we can by hand.**
- **By using many individually simple cause-and-effect statements to represent the problem, we can consider many more interconnected issues than we could without the computer.**

Solving problems requires more than information. It also requires knowledge.

- **Knowledge consists of both information and relations between items of information.**
- **We use cause-and-effect relations.**

For example:

Headache is

Caused by: Sinus pressure

OR Caused by: Migraines

Who am I?

- **Fifty-five years developing unusual problem solving methods that have solved problems others were unable to solve.**
- **An earlier method was turned down for publication for thirteen years. When finally published I was invited as a visiting scholar at MIT. The method is now the subject of annual international workshops. 12 so far. Next will be in Kyoto, Japan in September 2012.**
- **It is still taking time for people to absorb the Explainer as a problem solving method.**

How did this come about?

- **About 20 years ago I noted that people were fairly good at collecting the dots to describe some of their complex problems. But they were abysmal at using logic to connect the dots to understand the problem and find solutions.**
- **Could a computer program do that logic?**
- **I was told that would not be possible. It would be a fool's errand.**
- **Being a fool and naïve, I tried to do it**
- **And succeeded.**
- **But people still won't take it seriously.**

What I found

- I believe that humans are only capable of dealing with about 5 considerations and about 1 or 2 levels of cause-and-effect.
- But understanding the economic crisis required about 34 considerations and about 18 levels of cause-and-effects.
- **Our problems are very much more complex than what we had thought.**
- **That's why we need a computer.**

What is taught as science today:

- **Is mostly about what science has concluded.**
- **Less about the discipline by which scientists make their conclusions.**
 - **This will be our concern today.**
 - **This will teach us how to solve problems.**
 - **Science is solving problems. So is most anything we do.**

Two of the most important things to learn in life.

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**1. To know how to
acquire
knowledge.**

**Use Search
Engines**

Two of the most important things to learn in life.

1. To know how to acquire knowledge.

2. To know how to use this knowledge to solve problems.

Use the Explainer

Top Skill Most Required Today in any Vocation We Consider is:

- **The ability to solve problems.**
- **Applicable to researchers, journalists, politicians, scientists, and most anybody.**

Now to the “GADES” Problem Solving Method

“GADES” problem solving method

- **G – Get knowledge – Collect new or Existing cause-and-effects.**
- **A – Abduction – Given behavior, find multiple plausible explanations for it.**
- **D – Deduction – For each explanation, find what it would predict.**
- **E – Examination – Examine whether the predictions of each explanation actually occur.**
- **S – Selection – Select only those explanations that predict the desired behavior and not behaviors that do not occur.**

Our knowledge may be inadequate.

Improving our Knowledge

- **S - SCENARIO**: Produces a step-by-step explanation of how the knowledge was used to develop a selected explanation.
- **R - REVISION**: Analyze the scenario to find weaknesses in the knowledge so the knowledge can be revised.

Improving Knowledge is what Science is all about.

Knowledge is More than Information

- **We are in the age of Information Technology.**
 - We are flooded with information and have search engines to access it when we need it.
- **But solving problems requires more than information. It also requires understanding the relations between various items of information**

We will use Cause-and-Effect relations.

Knowledge as Cause-and-Effect

I was prescribed a vasoconstrictor for my headaches. The headaches got worse.

KNOWLEDGE

- EFFECT Headache
CAUSED BY Migraine
OR
CAUSED BY Sinus Pressure
- EFFECT Migraine
CAUSED BY Dilation of Blood Vessels
- EFFECT Sinus Pressure
CAUSED BY Sinus Pressure
- EFFECT Sinus Pressure
CAUSED BY NOT Drain Sinuses
- EFFECT Drain Sinuses
CAUSED BY Constricted Blood Vessels
- EFFECT Dilation of Blood Vessels
CAUSED BY Reaction to constricted blood vessels
- EFFECT Reaction to Constricted Blood Vessels
CAUSED BY Constricted Blood Vessels
- EFFECT Constricted Blood Vessels
CAUSED BY Taking vasoconstrictor

SCENARIO SHOWING CONSEQUENCES IF THE PATIENT IS TAKING VASOCONSTRICTOR:

Headache IS TRUE
Taking Vasoconstrictor
IS TRUE

THEN THE CONSEQUENCES
ARE:

Headache IS TRUE
Taking Vasoconstrictor
IS TRUE
Constricted Blood Vessels
IS TRUE
Because: Taking
Vasoconstrictor
IS TRUE

Drain Sinuses IS TRUE
Because: Constricted
Blood Vessels
IS TRUE

Reaction to Constricted
Blood Vessels
IS TRUE
Because: Constricted
Blood Vessels
IS TRUE

Sinus Pressure
IS FALSE
Because: NOT Drain
Sinuses
IS FALSE

Dilation of Blood Vessels
IS TRUE
Because Reaction to
Constricted
Blood Vessels
IS TRUE

Migraine IS TRUE
Because: Dilation of
Blood Vessels
IS TRUE

Sinus Headache IS FALSE
Because: Sinus Pressure
IS FALSE

CONCLUSION:
**Taking Vasoconstrictor
is causing the headaches**

The Concept is Simple

- If A causes B and B causes C,
 - By substituting B causes C for the B in A causes B,
 - We can eliminate the intermediate B to get A causes C.
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- This is how we learn to solve systems of simultaneous equations in algebra class.

However, when dealing with logic, the details can be quite complicated.

Knowledge: Please tell me:

**What causes my
headache?**  **Knowledge**

Knowledge: Then tells me:

Explanation 1: Sinus Headache

Prediction: Taking vasoconstrictor
will cure
headache



Knowledge

Explanation 2: Migraine Headache

Prediction: Taking vasoconstrictor
will make
headache worse.



Conclusion?

If you want to stop your headaches, stop taking vasoconstrictors.

I did stop and I did not have any more headaches.

Some problems that can be solved with help of this program

- **Adam Smith's hidden assumption:**
 - He said that if everyone negotiated in their own self-interest, this would result in an effective allocation of resources and an efficient economy that would benefit everyone in proportion to their effort.
 - His hidden assumption was: Everyone should have full access to the information he needs to understand her self-interest.
- **The cause of the economic crisis?**
 - People making transactions did not all have access to the information they needed to judge their self-interests. By hiding this information, some could take advantage of others.
 - Some minimum regulation to assure equal access the information everyone needs in a financial transaction is a requirement of a functioning capitalist system.

Some examples of what happens when knowledge is withheld

- Sub-prime mortgage crisis
- Selling bundled mortgages rated high quality where the investors the low quality mortgages in the bundle.

Some problems that can be solved with help of this program

- **Medical Diagnoses:**
 - **Suppose that physicians had access to a medical diagnostic knowledge base that was constantly updated with the latest diagnostic knowledge and sold to physicians as subscriptions.**
 - **They could make better diagnoses using the latest developments.**
 - **They could protect themselves from medical malpractice suits with fewer unnecessary, costly tests if they showed they had used this knowledge.**

Some problems that can be solved with help of this program

- **Explains what may have happened as with:**
 - **Crime investigations**
 - **Analyzing archeological observations**
 - **Explaining history**

Explainer can also be used to make things happen

**Explanations are
composed of
assumptions:**

- 1. Explain what you
want to happen.**
- 2. Turn assumptions into
actions.**

Some farfetched problems that might be solved with help of this program

- **Designing products using cause-and-effect descriptions of the likely components to ‘explain’ the design.**
- **Emulate how the brain works by having Brainer use Explainer to learn cause-and-effects from its environment using its sensors, develop explanations, and conduct experiments using its actuators and sensors to improve its knowledge.**

The Future is the Age of Reasoning Technology

- **People don't yet believe that the computer can be used to solve these types of problems.**
- **Often we find that the future is already here. But we don't take advantage of it because people take decades to recognize its existence.**
- **In the meanwhile, we lose opportunities.**

The Explainer is caught in this dilemma. But we don't have much time left to escape our difficulties.

Conclusion

- **Unaided peoples' problem solving abilities are very shallow.**
 - **Perhaps 1 to 5 interrelated issues.**
 - **Perhaps 1 or 2 levels of depth of cause-and-effect reasoning.**
- **With the computer problem, we can consider more interrelated issues using a greater depth of reasoning.**

Would you like to work with the Explainer program to see how you can solve problems?

- **I think it can be arranged.**
- **It would be an example of teaching by inquiry.**

Some young, aspiring entrepreneurs could:

- Help me complete the Explainer program.
- Help get venture capital.
- Put the Explainer up in the cloud so people could use it to socially interact to shed light on some of the problems of the day.
- Maintain the Explainer in the cloud.
- Collect money for time used on the Explainer.
- Possibly become rich entrepreneurs
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The Future Belongs to You!

- **Learn how to solve its problems.**
- **It's up to you.**
- **Best wishes.**

Professor Donald V Steward