High School Science and Technology Program

Research and Innovation Center
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Creative Problem Solving

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Creative Problem Solving

- We will learn what it is.
- Learn how to do it.
- Then use it to invent.

Creative problem solving is …

solving the same problems others solve

but doing it with

different insights,

different perspectives,

different ideas,

by doing it **differently**.

Two brains are better than one! ➔

Creative problem solving is …

a two-brain exercise involving logical and intuitive thinking.

- In a flash intuition resurrects experience inspired by words and images.
- Logical reasoning sorts the relevant from the whimsical.
- Together, a solution concept is created.

Low hanging fruit. ➔

Brainstorming

Typically we think up a problem statement and immediately brainstorm it.

For example;

"My tire went flat, and the spokes are bent, and it won't run straight, and how am I going to get to band practice on time? (And what'll I tell my mom?)"

Structured Inventive Thinking (**SIT**)

1st **Construct a well-defined problem**

- Not like this …

  “My tire went flat, and the spokes are bent, and … ?)”

  There are fundamental requirements for constructing a well-defined problem. ➔

In the SIT method

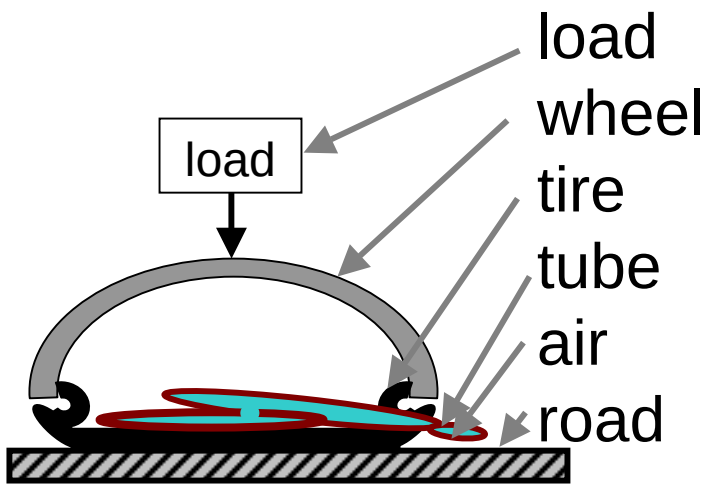
a **well-defined problem** has …

- a single unwanted effect,
- interacting objects containing the effect,
- causal properties of the effect, and
- a sketch.

Like this …➔

A well-defined problem looks like this …

"My tire went flat. It has a slit in the side wall that let the inner tube poke through and burst letting the air out and causing the tire to collapse because the inner tube provided no support."

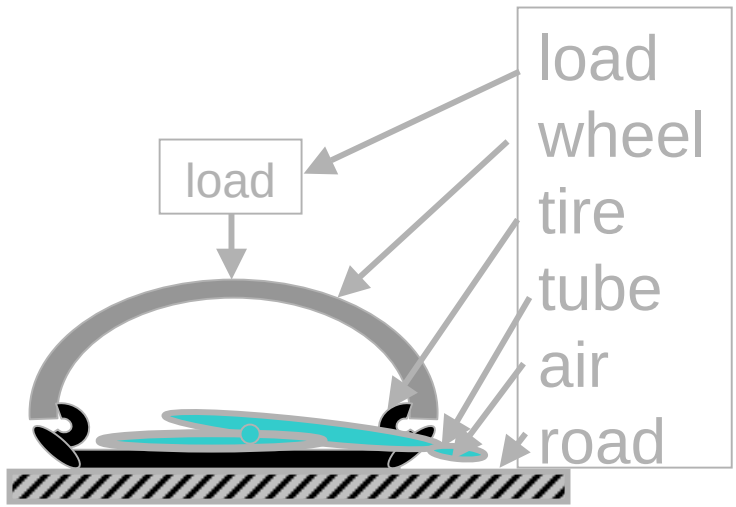


Note its makeup:

"My **tire went flat**.

It has a slit in the side wall that let the inner tube poke through and burst letting the air out and causing the tire to collapse because the inner tube provided no support."

- **one unwanted effect**
- interacting objects
- causal properties
- sketch



A Well-defined Problem

"My **tire** went flat.

It has a slit in the side wall

that let the **inner tube**

poke through and burst

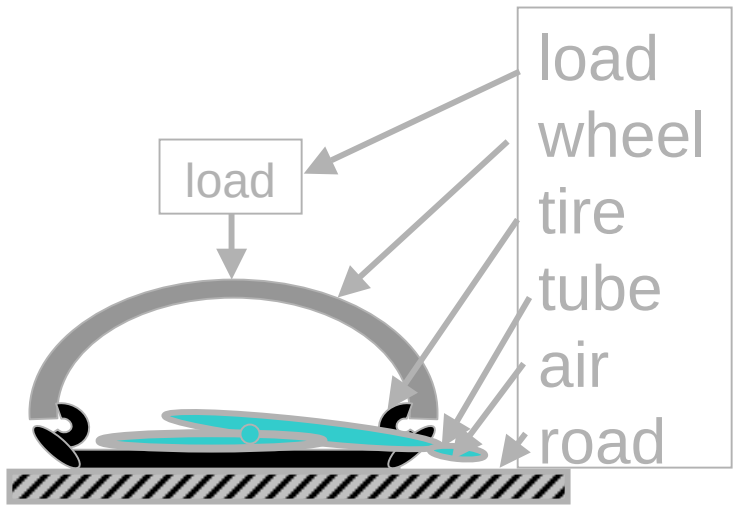
letting the **air** out and

causing the tire to collapse

because the **inner tube**

provided no support."

- one unwanted effect
- **interacting objects**
- causal properties
- sketch

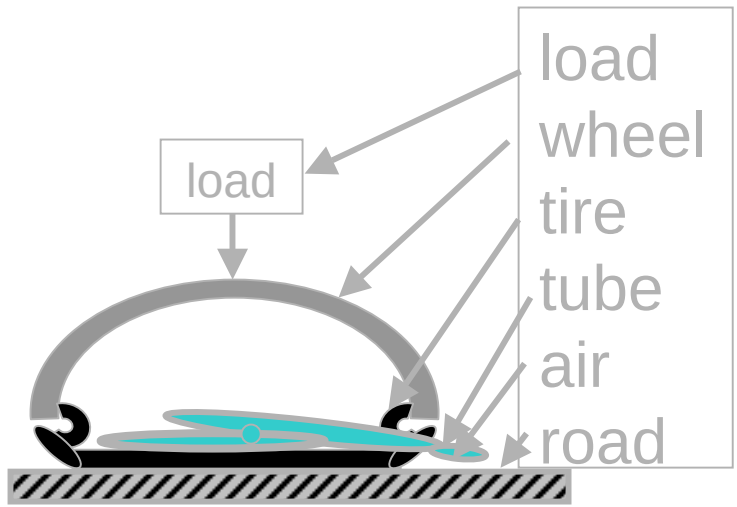


A Well-defined Problem

"My tire went flat.

It has a **slit in the side wall** that let the inner tube poke through and **burst letting the air out** and causing the tire to collapse because the inner tube provided **no support**."

- one unwanted effect
- interacting objects
- **causal properties**
- sketch



A well-defined problem:

- one unwanted effect
- interacting objects
- causal properties
- **sketch**

"My tire went flat.

It has a slit in the side wall

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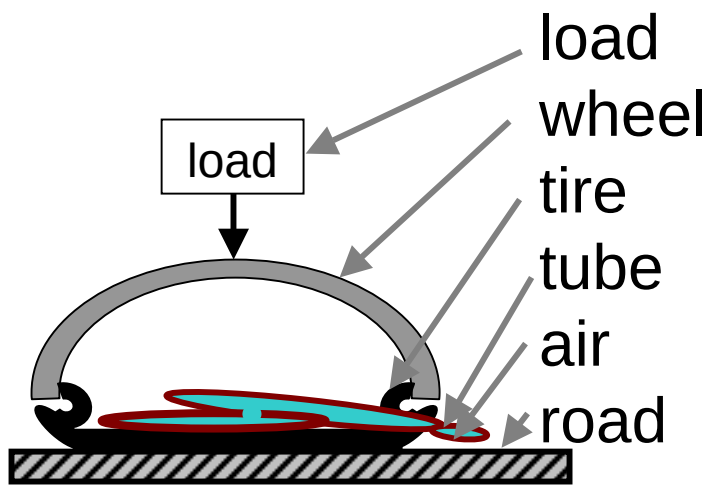


Now what? ➔

With a well-defined problem in place we

- begin to apply heuristics (thinking aids) to inspire both brains;
- such as iterate the problem statement and the sketch to create new viewpoints.

We're ready to apply creative thinking in a problem situation. ➔

Two situations use the techniques of invention:

1. a problem having a solution but in need of a better one;
2. a problem having no solution but needing an invention.

Situation 1 is treated like 2 by inventing an unwanted effect for the situation.

Now let's invent something ➔

An exercise in INVENTION

Our company makes picture frames and picture-frame hanging kits (one nail, one string, and two screw eyes – an inexpensive money maker).

Management has heard that our competition is coming out with a cheaper hanging kit.

We are assigned the task of inventing a better hanging kit.

This is a team exercise. ➔

Rules of the game – (more heuristics)

- No filtering allowed during inventive thinking.
- All concepts are acceptable and should be recorded immediately.
- No dimensions, technical specifications, costs, equations, or other limiters are allowed.
- No engineering (it comes later)

Where's the problem? ➔

To invent a better product start by assuming an unwanted effect.

Possible unwanted effects:

- picture becomes crooked
- string and nail are unsightly
- nail makes a hole in the wall
- picture rarely at viewer's height

Create problem statement ➔

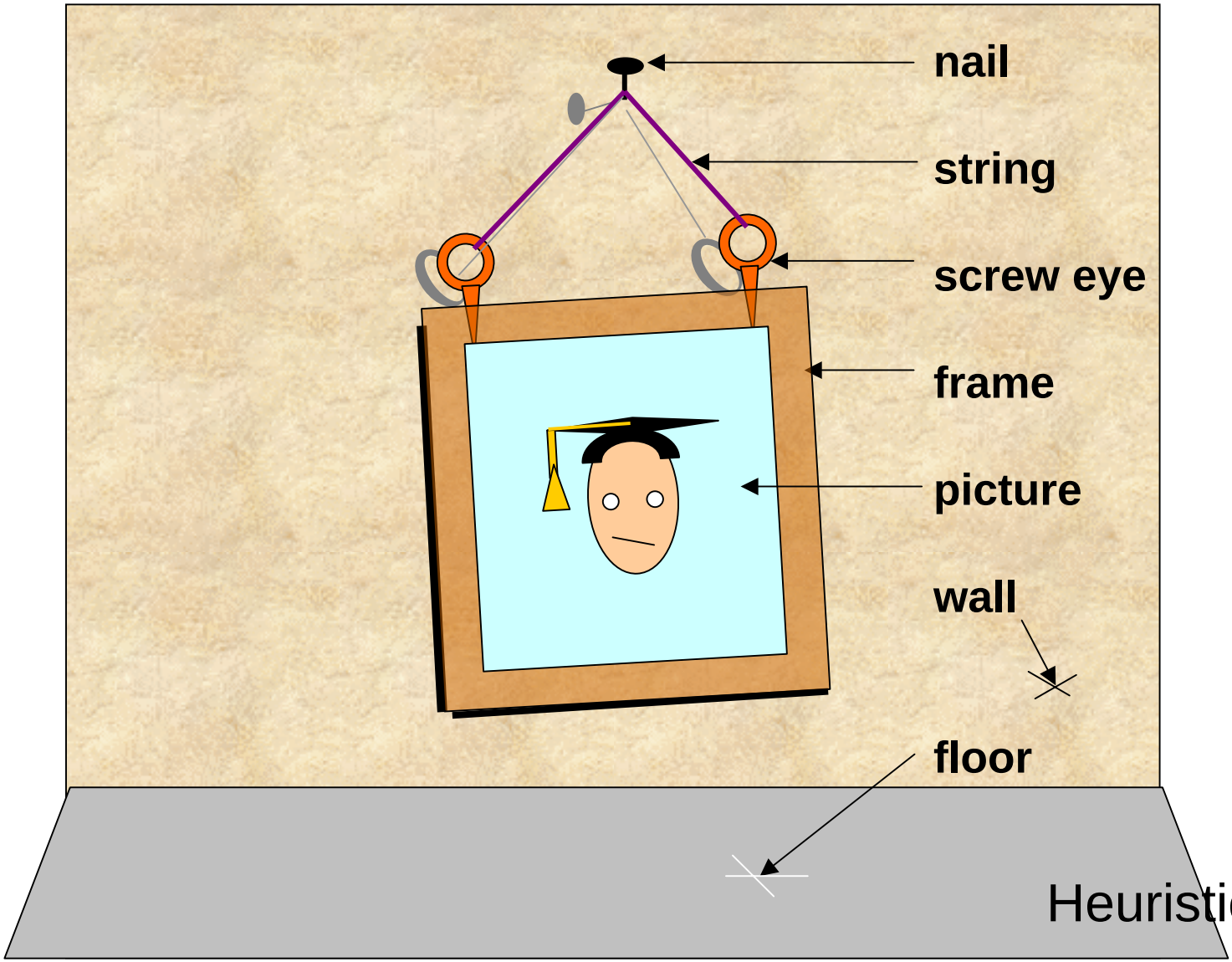
SIT Construct a well-defined problem

Our problem statement:

Invent a picture hanging kit, consisting of a nail, a string, and two screw eyes, that automatically keeps the picture frame aligned.

A sketch ➔

A ‘Closed-World Problem’



Heuristics ➔

2nd Apply heuristics (thinking aids)

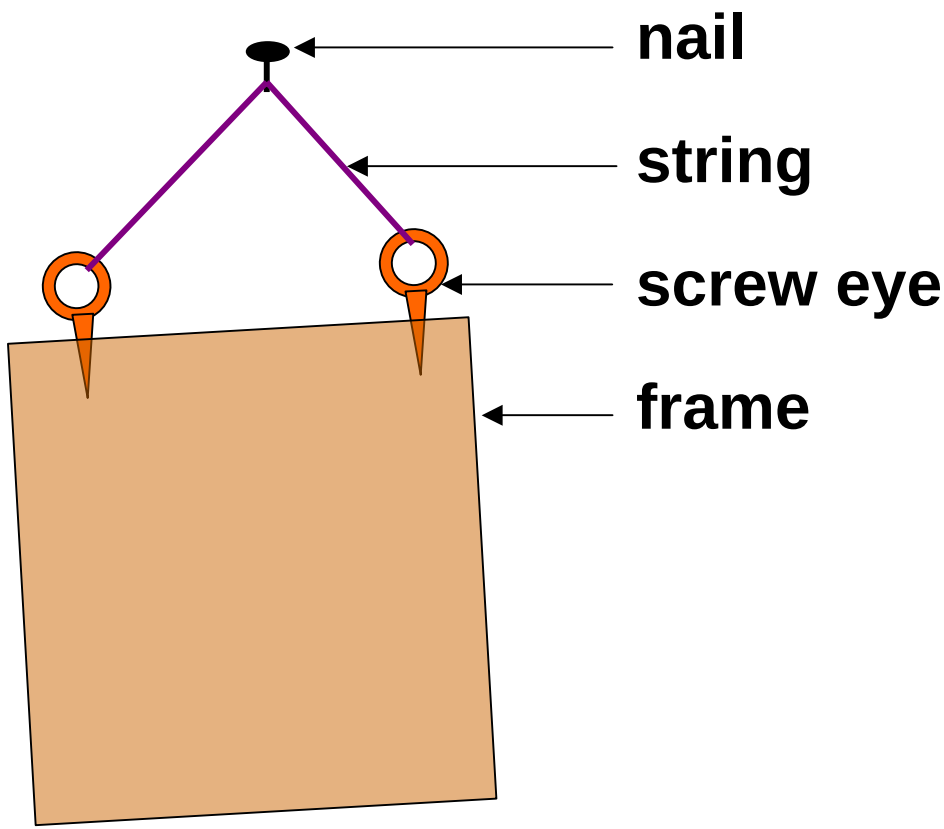
- simplify
- use generic words
- examine points of contact
- identify plausible causes
- go to extremes
- iterate problem statement

- continually search new views of the problem

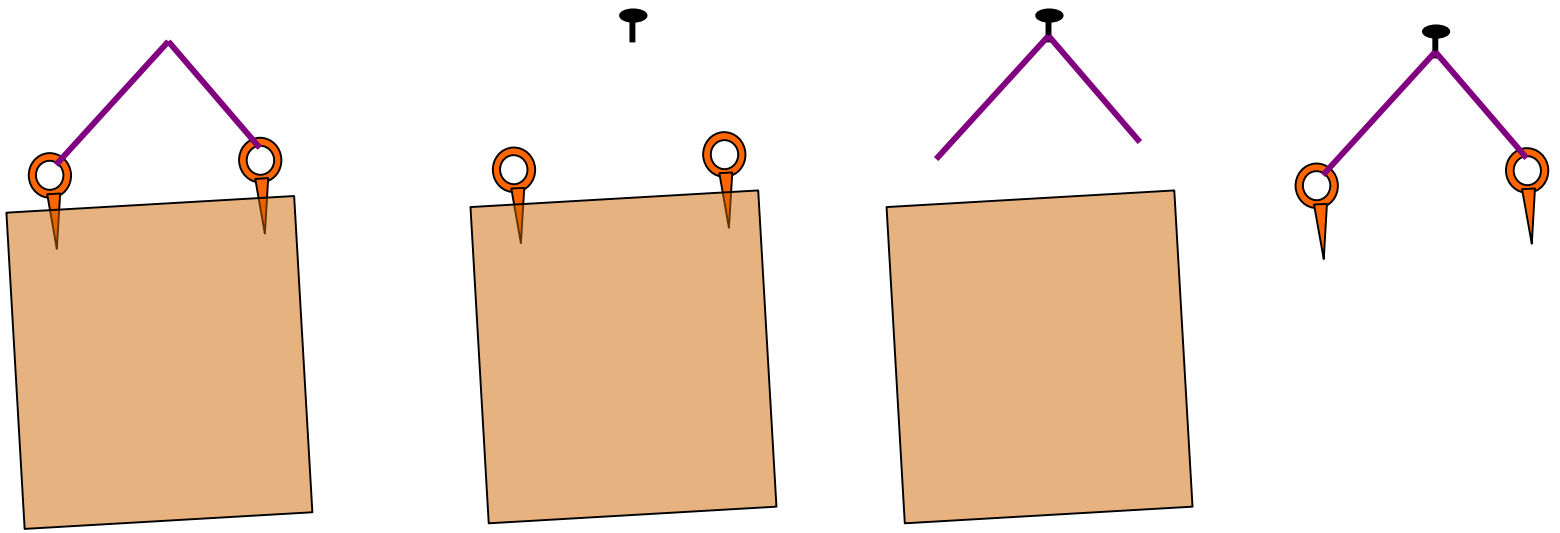
A closed world ➔

The Closed-World

Simplify by eliminating unnecessary objects arriving at ...



Simplify by eliminating objects.

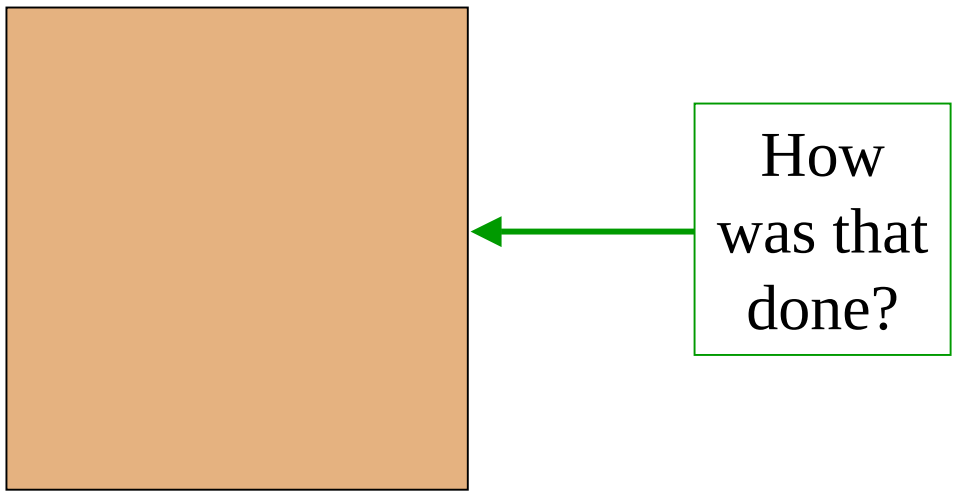


No nail No string No screw eyes No frame

Simplify by going to extremes: e.g.,

- **no hanging kit**
- **infinitely long string**,

In each case, what ideas come to mind?



Heuristic – minimize number of objects

- no nail
- no string
- no screw eye
- no frame
- no hanging kit

What ideas come to mind in each case?

Heuristic – **points of contact**

What functions occur at …

wall-to-nail

nail-to-string

string-to-hook eye

hook eye-to-frame

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