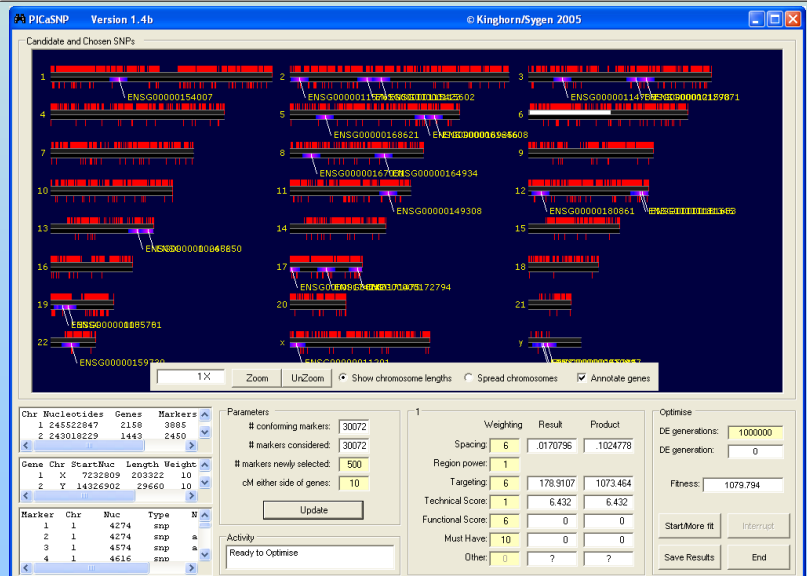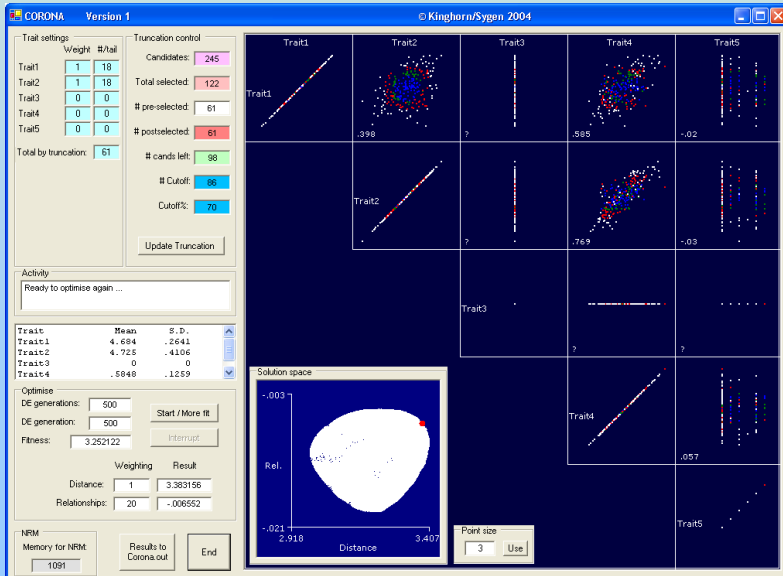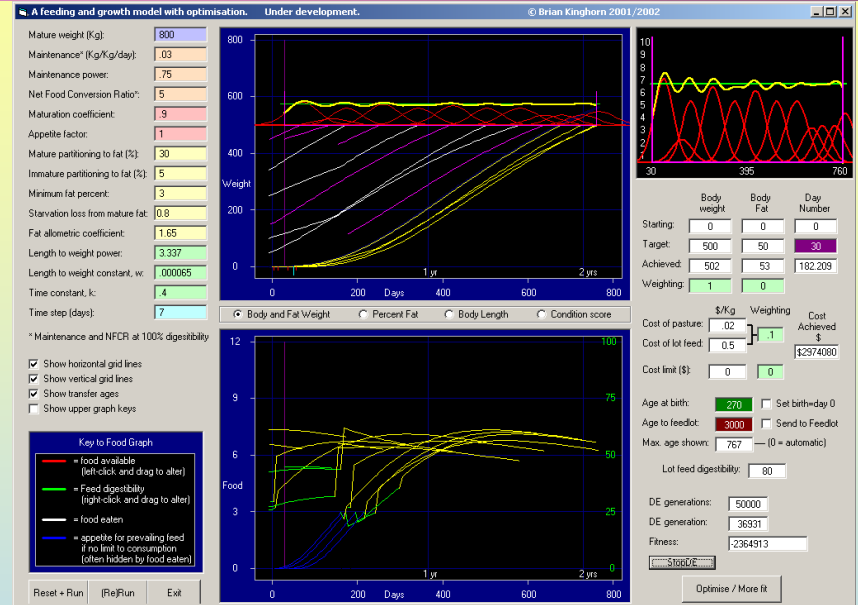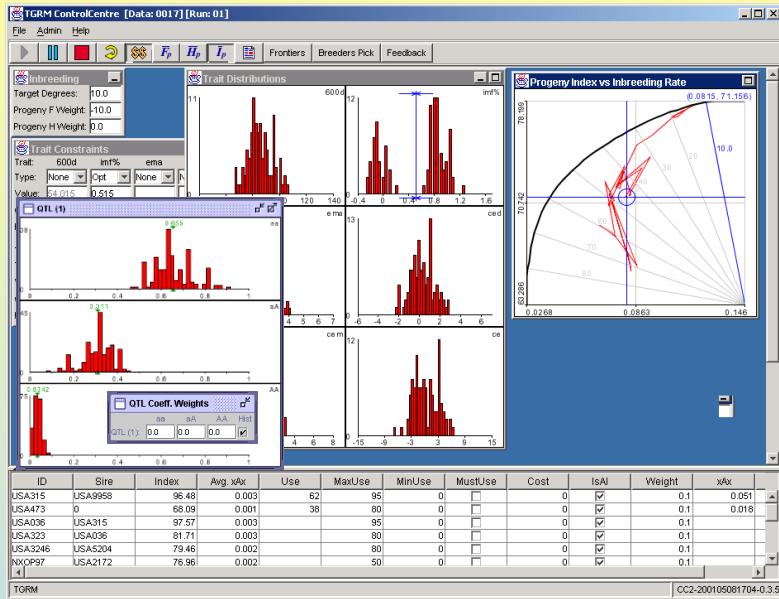# 8. Changing the goal posts

The best direction to take depends on how far you can go in each direction

Brian Kinghorn

University of New England

Armidale, Australia

A picture tells a thousand words

Choosing an Objective Function

- Objective Function often covers many disjointed issues ... A Subjective Function !?!

- "The best direction to take depends on how far you can go in each direction"

- Example: Desired gains selection index ...

- Even more so with more disjointed problems. Example ... Mate selection, shown later.

Surf the response surface

- This is not a question of fiddling with the objective function input parameters ...

- It is a question of "Changing the goal posts" !

Changing "on the fly"

Interrupt …
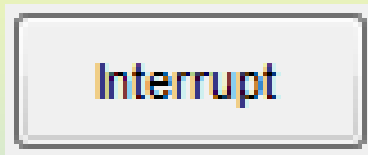
 → StopDE = 1

```
            ...
            If StopDE > 1 Then GoTo 999
        Loop ' generation

999:    DEgenText.Text = Str(generation)
        For j = 1 To loci
            allele(j) = parentallele(Best, j)
            GoodFit(j) = progenyallele(Best, j)
        Next
        Call criterion(loci, allele, 1)
            ...
```

Changing "on the fly"

… change weightings or other conditions

… and then restart …

  → Call DE()

Changing "on the fly"

Or just point and click ...
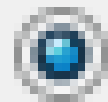
Changing "on the fly": Code

Space to store last good solution …

```
Sub DE()
    Static GoodFit() As Single   ' For reloading old solution
```

Seed the last good solution into the re-started optimisation …

```
For i = 1 To popsize
    For j = 1 To loci
        parentallele(i, j) = 0 + 10 * Rnd()
        If i = 1 Then parentallele(i, j) = GoodFit(j)
        ' Make first population member same as last good solution
```

… and note in the code that the fitness value for this "GoodFit" is recalculated using the newly set objective function.

Changing "on the fly": Code

After optimization is interrupted or otherwise finished, store the best solution in "GoodFit" …

```
For j = 1 To loci
    allele(j) = parentallele(Best, j)
    GoodFit(j) = progenyallele(Best, j)
Next
```

Changing "on the fly": Code

Clicking the graph:

```
Private Sub Pic1_MouseDown( ...
    If OptimiseType = "Weights" Then Exit Sub
    OptSel = e.X
    OptInb = e.Y
    If DErunning Then
        StopDE = 2 ' Stop then restart
    Else
        Call DE()
    End If
End Sub
```

At bottom of sub DE …

```
If StopDE = 2 Then Call DE() ' Restart because of a mouse click while running
```
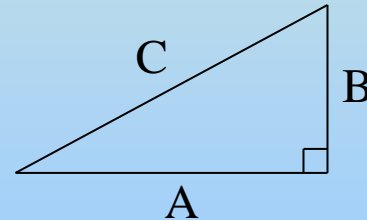
Changing "on the fly": Code

Clicking the graph:

Mouse click coordinates

```
Fitness = -(OptSel - PicX(SelectionResponse)) ^ 2 - (OptInb - PicY(Inbreeding)) ^ 2
```
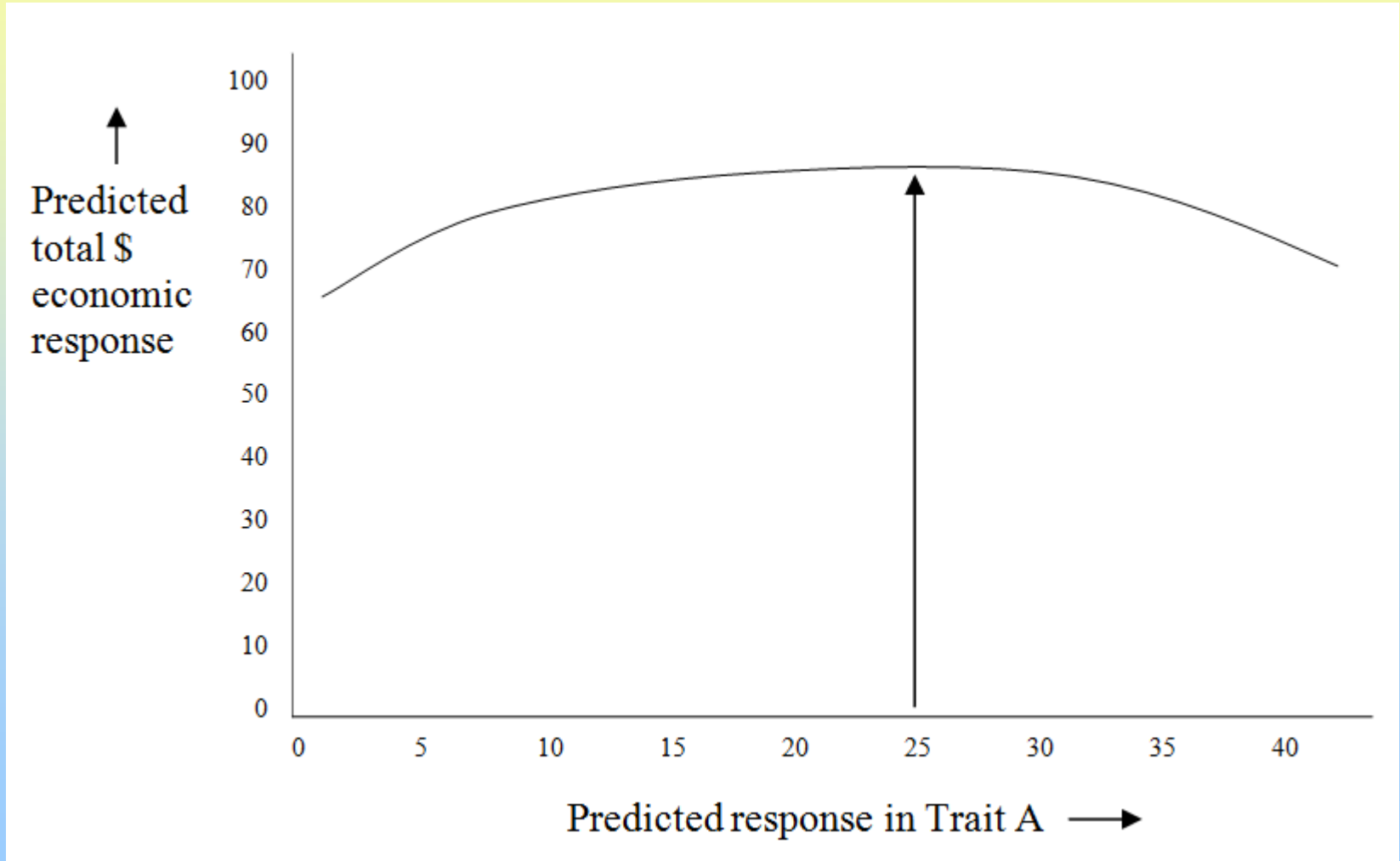
Current solution coordinates

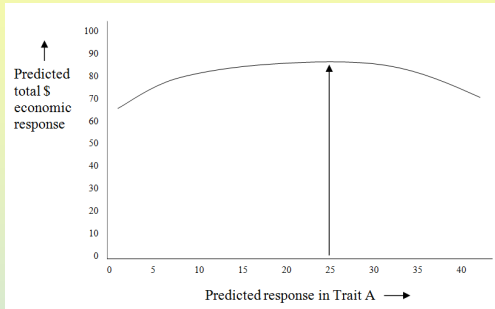-ve of: $C^2 = A^2 + B^2$

… Optimisation towards the mouse click!

Opportunity for changing direction
Eg Selection Index

Opportunity for changing direction
Why deviate? … additional information that is not available to the O.F.
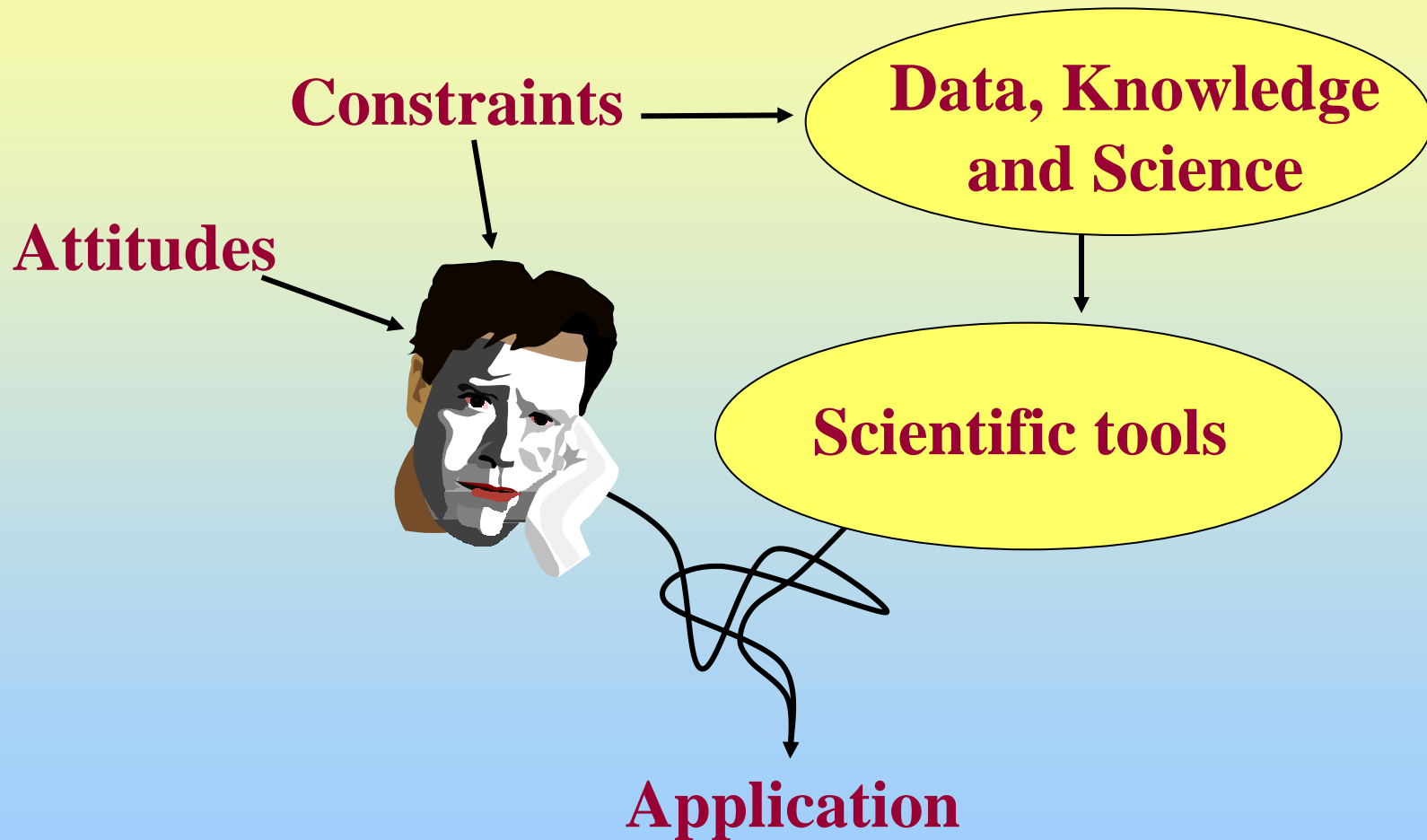

- Oversimplification of the economic model - economic contours are really curved

- a negative predicted response in Trait B

- a negative selection index weight on Trait C

- With little compromise in predicted total dollar response, we might be able to keep everyone happy.
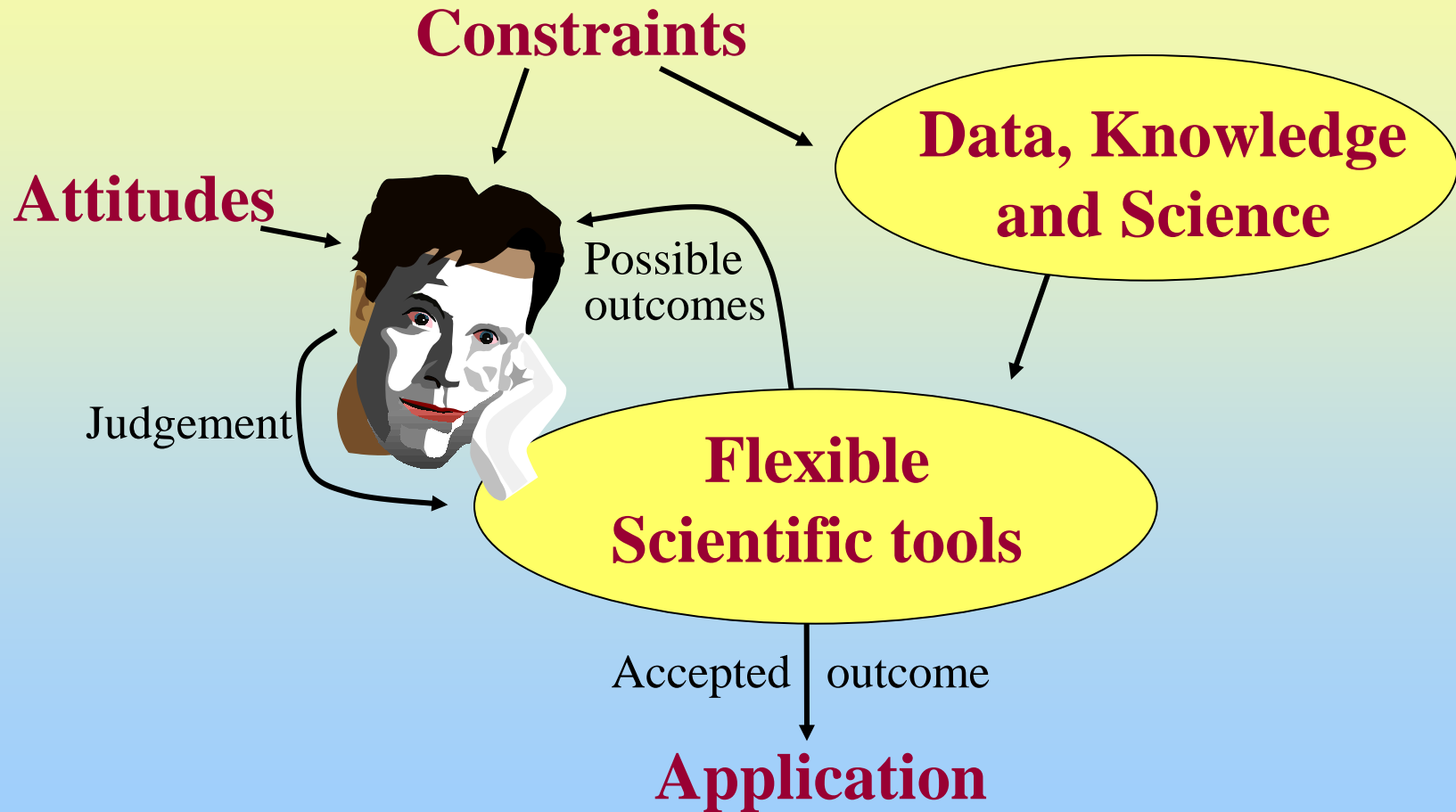
View the compromises ...

- "Gosh – if I relax my desires a bit on this aspect over here, look how much more I can make on these aspects over there!"

- All done on the basis of the exact prevailing scenario

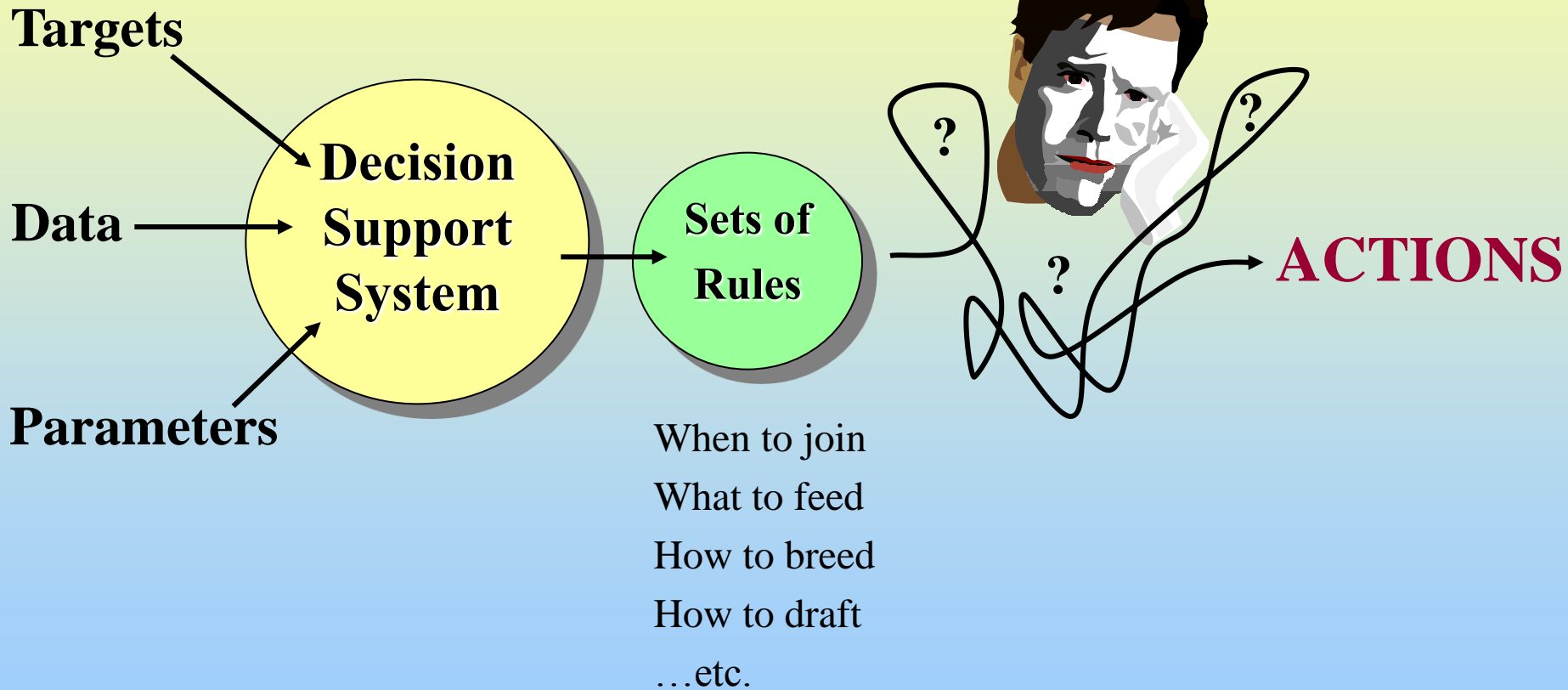- Very educational.

- Ownership of the solution ...

A classic decision system

Constraints → **Data, Knowledge and Science**

Attitudes

Scientific tools

Application

A Dynamic Tactical Decision System

Constraints

Data, Knowledge and Science

Attitudes

Possible outcomes

Judgement

Flexible Scientific tools

Accepted outcome

Application

Classic decision systems

Targets

Data

Parameters

Decision Support System

Sets of Rules

When to join

What to feed

How to breed

How to draft

…etc.

? ? ?

ACTIONS

A tactical decision system
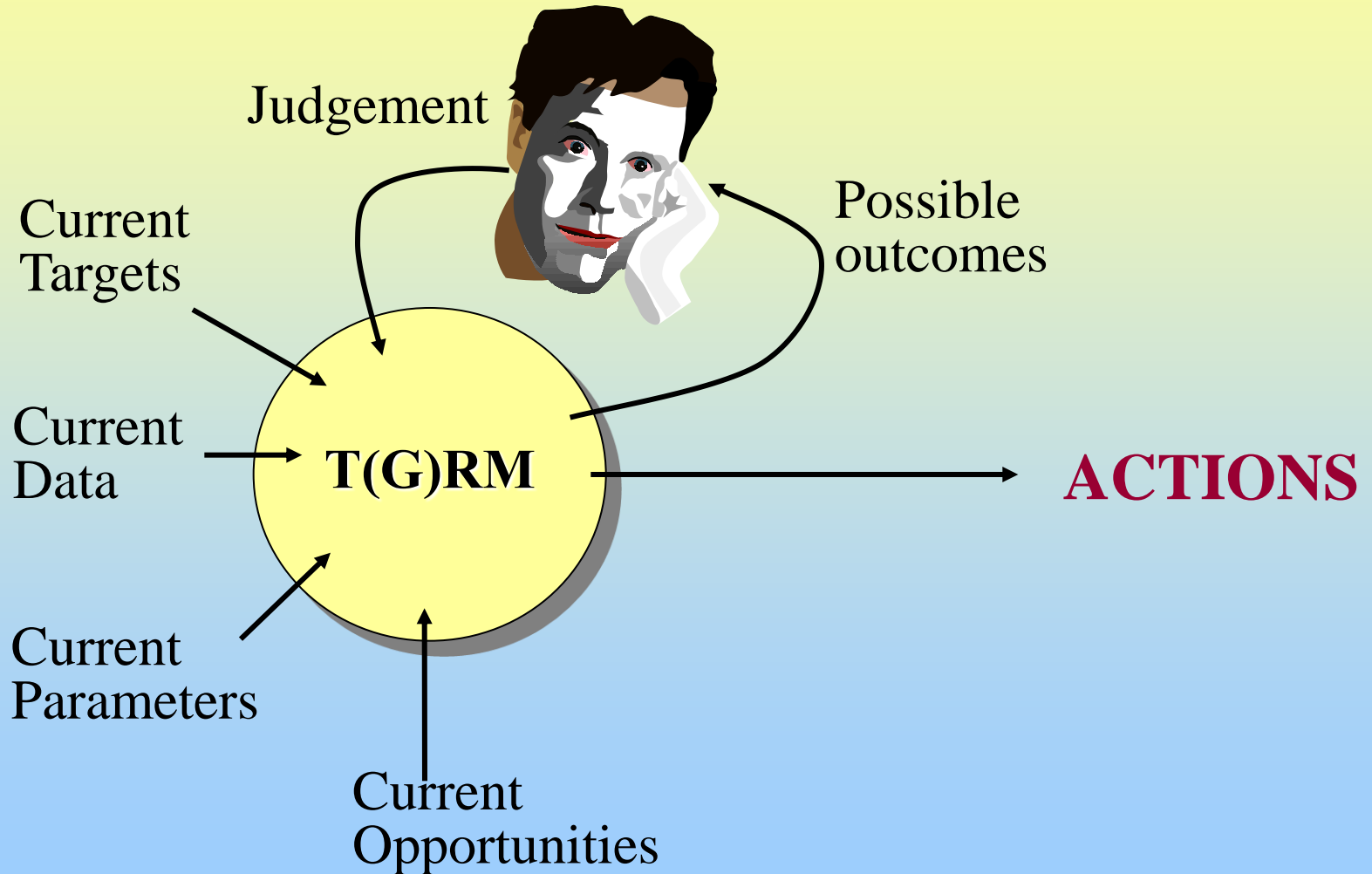
Bringing science into practice

- Scientific components mould' themselves optimally around practical constraints, maximising their impact.

- The alternative is to mix science and practice in a somewhat arbitrary manner, which all too often leaves science both misunderstood and ineffective.

The End