



CENTRE FOR

bioscience



# Research-led Teaching and the Promotion of Graduates' Creative Potential

David J. Adams

Centre for Bioscience and  
Faculty of Biological Sciences

*Supporting teaching in higher education to improve student learning across the Biosciences*




# Creativity and Research-led Teaching website

Creativity

http://www.fbs.leeds.ac.uk/creativity/index.htm


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## Creativity in the Biosciences



**Workflow ...**


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- Step 2 [Inspirational Researchers](#)
- Step 3 [Creative Approaches](#)
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- Step 5 [Submitting Ideas](#)
- Step 6 [Group Sessions](#)

**group chat**

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Go to the [Introduction](#)

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# Meeting theme:

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‘Enhancing Life Scientists’ Graduate  
Attributes by Strengthening  
Research-Teaching Linkages’

# 'Whole brain thinking'



**CONVERGENT**  
or 'LEFT BRAIN'  
THINKING

Logical  
Rational  
Selection  
Evaluation

+

**DIVERGENT**  
or 'RIGHT BRAIN' or  
'KALEIDOSCOPE'  
THINKING

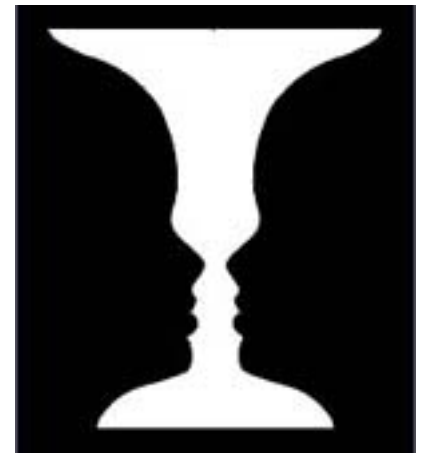
Intuition  
Imagination  
Questioning  
Re-arranging  
New perspectives



# New perspectives?



Worth 1000.com

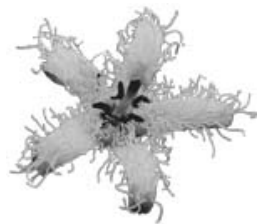




# Creativity and Research-led Teaching website

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- Cutting edge research (short films)
- Promotion of creativity in individuals
- ‘Group chat’ and ‘Fridge magnets’
- Structured group sessions



# Promoting creativity in individuals

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Analogies

Brainstorming and mind-mapping

Challenging assumptions

Clichés and proverbs

Curiosity

Google-storming

Idea dump

Importance of a fresh eye

Personal analogy

Relational words

Two words



# Curiosity/inspiration from the unusual

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**‘Chance favours only the prepared mind’  
Louis Pasteur**



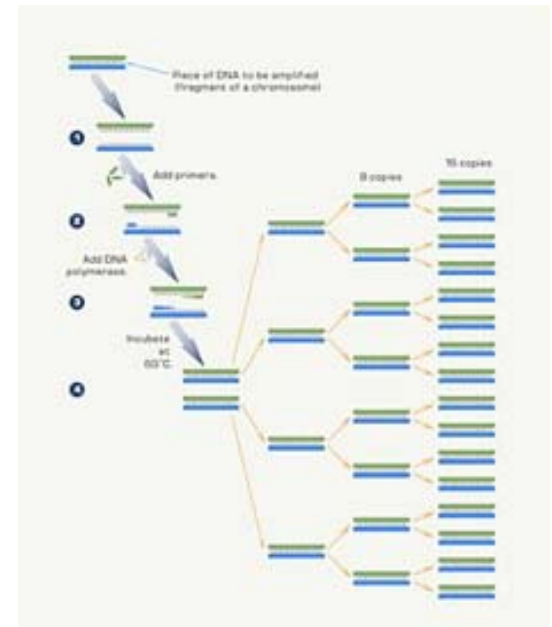
# Challenging assumptions



Dyson



iMac



Polymerase Chain Reaction



# Challenging assumptions

The screenshot shows a Safari browser window with the following content:

- Page Title:** Creativity in the Biosciences: Creative Approaches
- Section Header:** Challenging Assumptions
- Text:**

**When to use this:** Try this when you think you have exhausted your initial thoughts and ideas and feel the need to adopt a new approach to the problem.

**Why:** In our initial consideration of a problem we make a number of assumptions about the nature of the task facing us. When attempting creative approaches to problem solving it frequently helps to challenge these assumptions. This strategy has proved highly successful in creative companies like Dyson. Disappointed by the inefficiency of the conventional vacuum cleaner, James Dyson questioned the assumption that these machines should suck air through bags and filters that rapidly become blocked. As an alternative he designed the highly original and efficient dual cyclone machine that spins dust out of the airstream in transparent bins that allow the user to see when the container is full. Clearly, when assumptions are cast aside, new ideas can begin to emerge.
- Activity:**

**Before moving on try a small test that highlights how we can cling to assumptions**

9 Dots

Here is a pattern of dots. Your task is to link up all nine dots using no more than four straight lines and without lifting pen from paper or retracing the lines.

Use the mouse to draw.
- Right Sidebar:**
  - Workflow ...**
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  - [group chat](#)
  - There are currently 1 [active users](#).
  - Creative Approaches**
    - [Analogies](#)
    - [Brainstorming & Mindmapping](#)
    - [Challenging Assumptions](#)
    - [Cliches and Proverbs](#)
    - [Curiosity](#)
    - [Googlestorming](#)
    - [Idea Dump](#)
    - [Importance of a Fresh Eye](#)
    - [Personal Analogy](#)
    - [Relational Words](#)
    - [Two Words](#)
  - My Notes**



# Challenging assumptions

## ‘THINKING OUTSIDE THE BOX’

**Challenging Assumptions**

**When to use this:** Try this when you think you have exhausted your initial thoughts and ideas and feel the need to adopt a new approach to the problem.

**Why:** In our initial consideration of a problem we make a number of assumptions about the nature of the task facing us. When attempting creative approaches to problem solving it frequently helps to challenge these assumptions. This strategy has proved highly successful in creative companies like Dyson. Disappointed by the inefficiency of the conventional vacuum cleaner, James Dyson questioned the assumption that these machines should suck air through bags and filters that rapidly become blocked. As an alternative he designed the highly original and efficient dual cyclone machine that spins dust out of the airstream in transparent bins that allow the user to see when the container is full. Clearly, when assumptions are cast aside, new ideas can begin to emerge.

**Before moving on try a small test that highlights how we can cling to assumptions**

9 Dots

Most people assume that the lines must not extend beyond the boundaries set by the outer dots. However, this assumption was not part of the original problem! If one discards the assumption, then the problem may be solved in a number of ways

Show me Clear

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**Creative Approaches**

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[Importance of a Fresh Eye](#)  
[Personal Analogy](#)  
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[Two Words](#)

**My Notes**



# Analogy



Hubble telescope



Showerhead

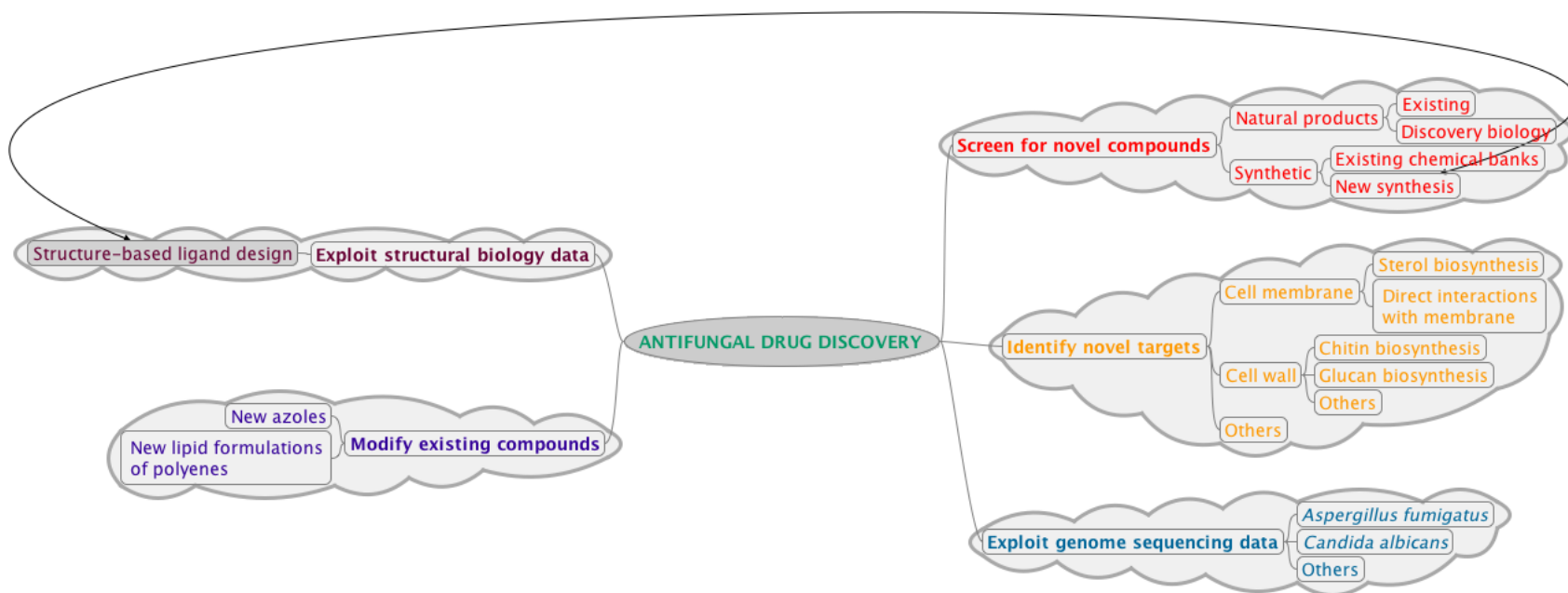
# Analogy: bio-inspiration

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# Brainstorming and mindmapping





# Incubate and communicate

Creativity  
http://www.fbs.leeds.ac.uk/creativity/incubation.htm

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### Creativity in the Biosciences: Idea Incubation

- Research scientists and other problem-solvers frequently begin to identify solutions to problems at times and locations remote from those normally associated with the laboratory and workplace. Periods of 'relaxed attention' in the shower, during sports or other recreational activities, or even during sleep appear invaluable in allowing individuals to sub-consciously consider the problem in hand.

- Try thinking about your problem as you drift off to sleep; solutions may occur to you during the night or in the morning. Whenever possible, it's also worth leaving a gap of a few days between the occasion when you were first made aware of a task and the next session when you will consider the problem, perhaps as a member of a group or team. Inspiration may arrive at any time, day or night so be sure to carry a

#### Workflow ...

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#### My Notes





# Group chat and 'Fridge magnets'

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## Creativity in the Biosciences: Idea Incubation

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**Workflow ...**

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Grid | Randomize

- test idea for feasibility
- Creativity and postgraduates
- Collaboration with school teachers
- Cross-link between artists and scientists
- Creativity and industry
- Integrate 'intergral' exercises



# Submitting ideas/ 'Fridge magnets'

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# Promoting creativity in groups

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- Group brainstorming
- Lotus blossom
- Six Thinking Hats



# Promoting creativity in groups: Six Thinking Hats

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Creativity  
http://www.fbs.leeds.ac.uk/creativity/groupSessions/sixHats.htm

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## Creativity in the Biosciences: Group Sessions

### Six Hats


In group sessions, confrontations inevitably arise as individuals with different thinking styles discuss how they wish to approach a particular problem. The 'Six Thinking Hats' method is a 'parallel thinking' process that minimises conflict by ensuring that everyone is focused in the same direction. Furthermore it ensures that each team member considers a problem from a wide range of perspectives and encourages the participation of otherwise reticent members of the group. With the exception of the group leader/chair person (see below), each member of the team wears the same colour of metaphorical thinking hat at the same time:




**Red Hat Thinking**  
Allow your heart and hunches to lead. Do you 'feel' your approach will work?




**White Hat Thinking**  
Take an objective look at the data as they are presented. Focus on facts and fill-in any gaps.




**Black Hat Thinking**  
The hat of caution and criticism. Take the 'devil's advocate' view.



**Yellow Hat Thinking**  
Look logically at the



**Green Hat Thinking**  
Take a creative and novel



**Blue Hat Thinking**  
Thinking about thinking:

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**group chat**

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### Group Sessions

- [Brainstorming](#)
- [Lotus Blossom](#)
- [Six Hats](#)

### My Notes



# Creativity and Research-led Teaching website

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- Applications in other disciplines
- Inter-disciplinary collaborations

**THE SITE IS AVAILABLE TO USERS OUTSIDE LEEDS:**

**<http://www.fbs.leeds.ac.uk/creativity/>**



# Acknowledgements

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Many thanks to:

**Paul Grimshaw**

**Steve Paxton**