



Work Based Learning  
at Middlesex University

# Neuroscience & metaphor: implications for e-learning

Dr Mike Howarth: Programme Adviser, Institute for  
Work Based Learning, Middlesex University

p: 01992 587292, e: [m.howarth@mdx.ac.uk](mailto:m.howarth@mdx.ac.uk), w: mhmvr.com

<http://www.mhmvr.co.uk/site/metaphor/cdeposter.html>

# Neuroscience discoveries reveal:

## **Mirror-neurons cells**

- Metaphor is the way we understand the world.
- motor pathways and mirror-neuron pathways cross.
- Motor activity and language together create more brain activity.
- Left hemisphere: language based metaphor, right hemisphere body, visuospatial metaphors
- Both linked by IPL to create cross- modal interactions and abstraction.

## **Brain structure is related to its function**

- Two hemispheres = two different realities and experience  
Left - fine detail. Right - big picture
- Asymmetry provides left-right orientation
- Central cortex structure provides vertical orientation
- Divided hemispheres: manipulation, clarity & fixity needs division.

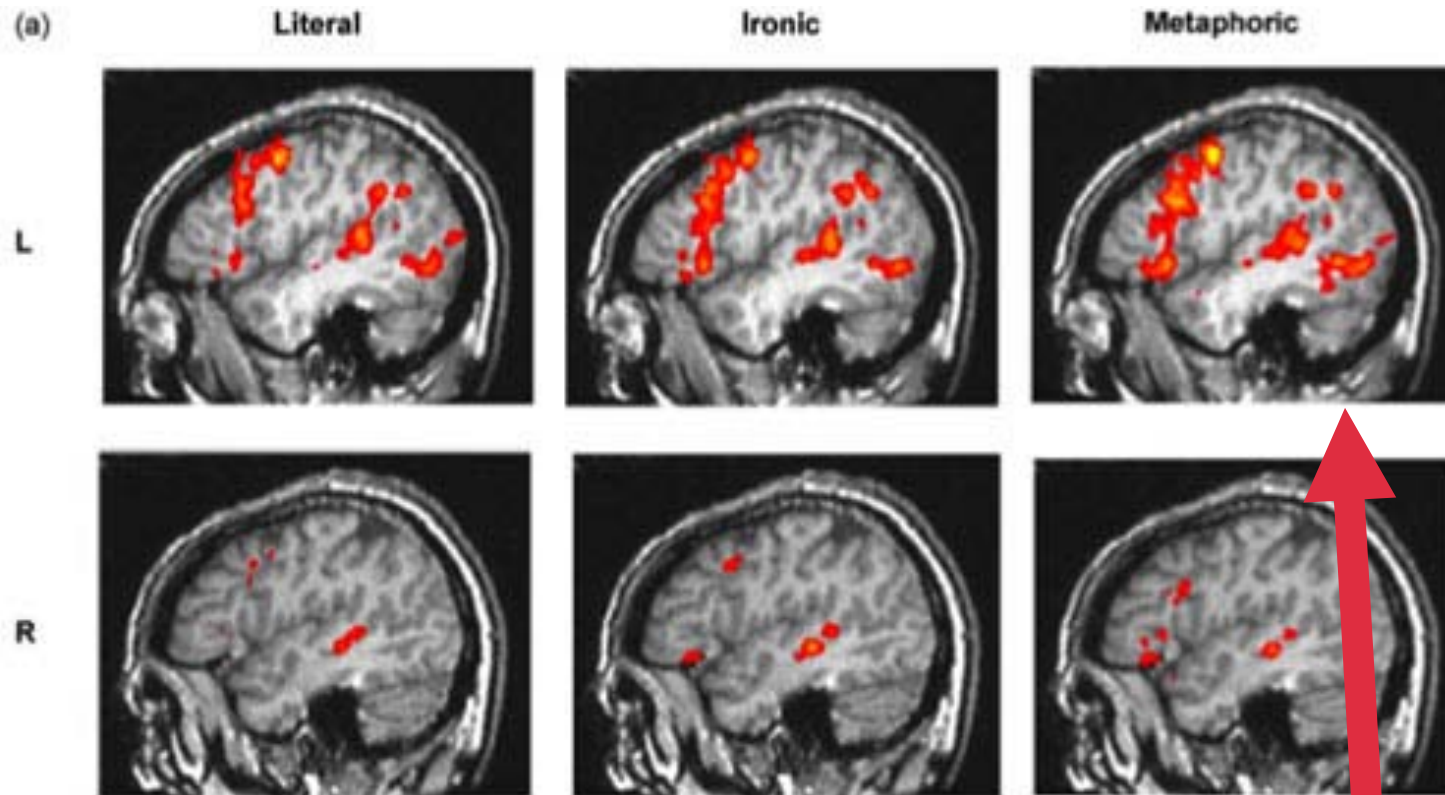
*Implications for e-learning?*

McGilchrist, I, (2009) The Master and his Emissary

# Metaphor & reflexivity references in neuroscience pubs







The brain 'lights up with metaphors'. BUT  
Crossing of pathways and the mirror-neuron system,  
not specific areas of the brain, 'create' metaphor



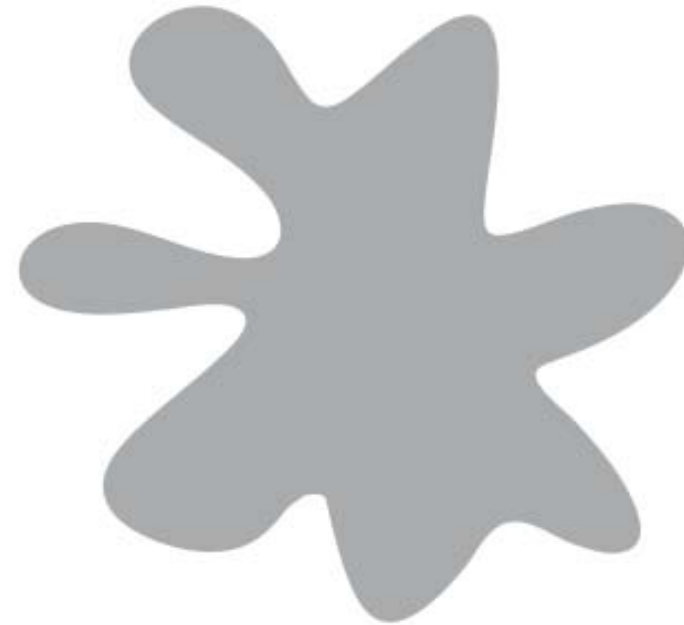
## **mirror-neurons**

- Make us wince when watching pain
- Experience empathy
- Embody learning through practice.

# The Voodoo Effect

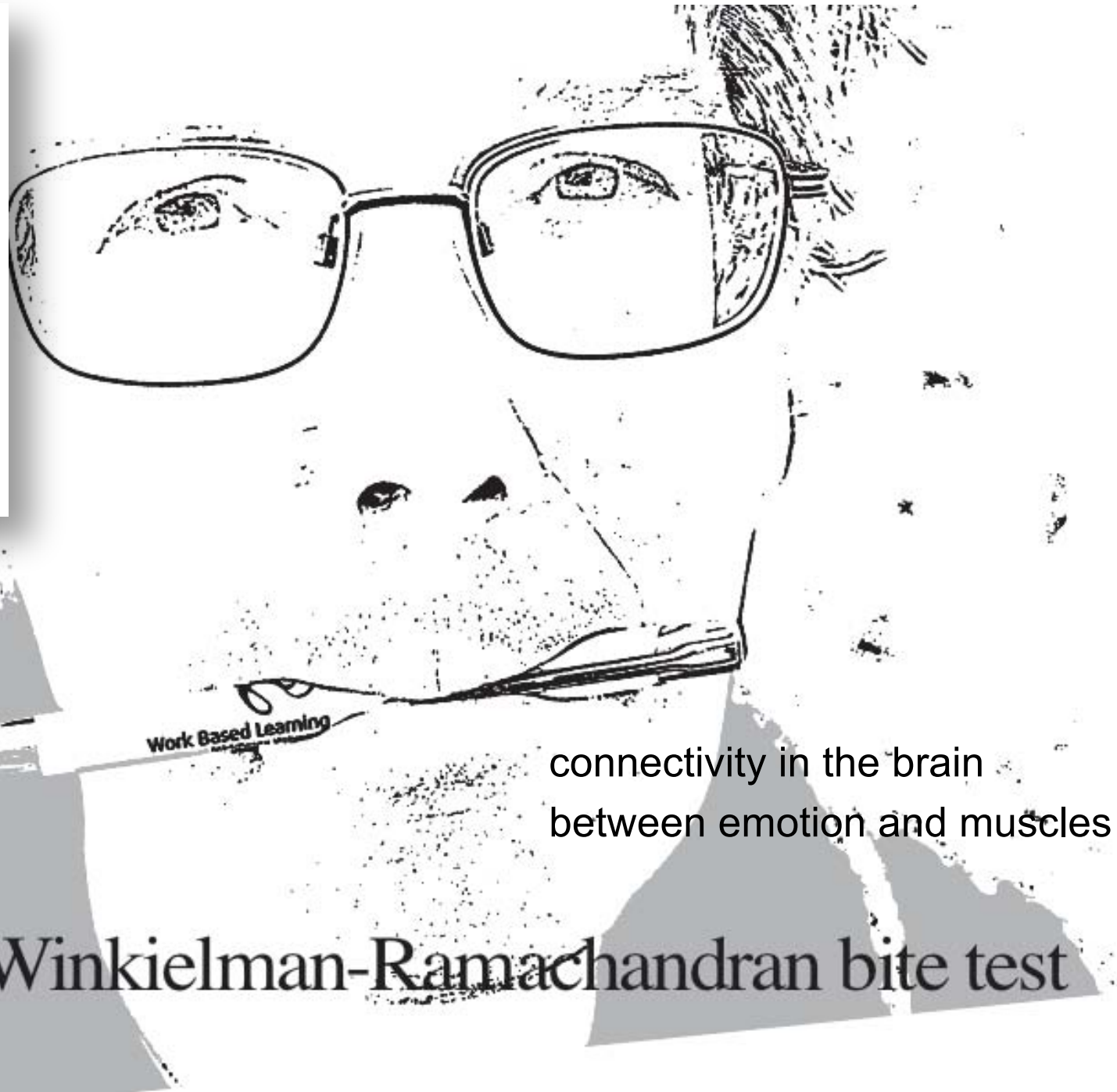
## Which is Bouba and which is Kiki?

Metaphor: sound and tongue shape cross-modal abstraction  
in the IPL      p. 109 Ramachandran, V. R. (2011). The Tell-Tale Brain



# The Bouba-Kiki Effect

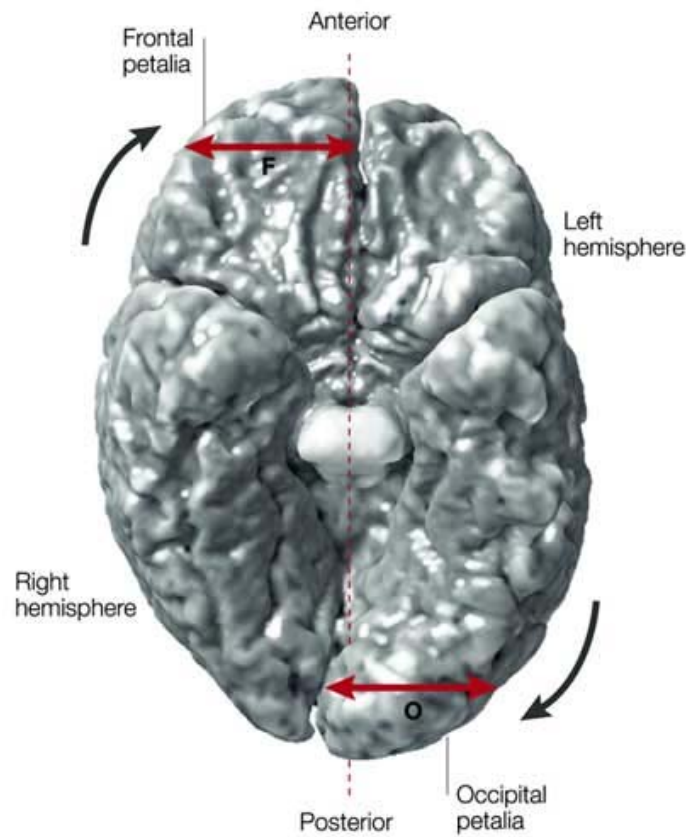
**Try this  
with a  
friend:  
Am I  
smiling?**



connectivity in the brain  
between emotion and muscles

Oberman-Winkielman-Ramachandran bite test

# Brain structure = function 1

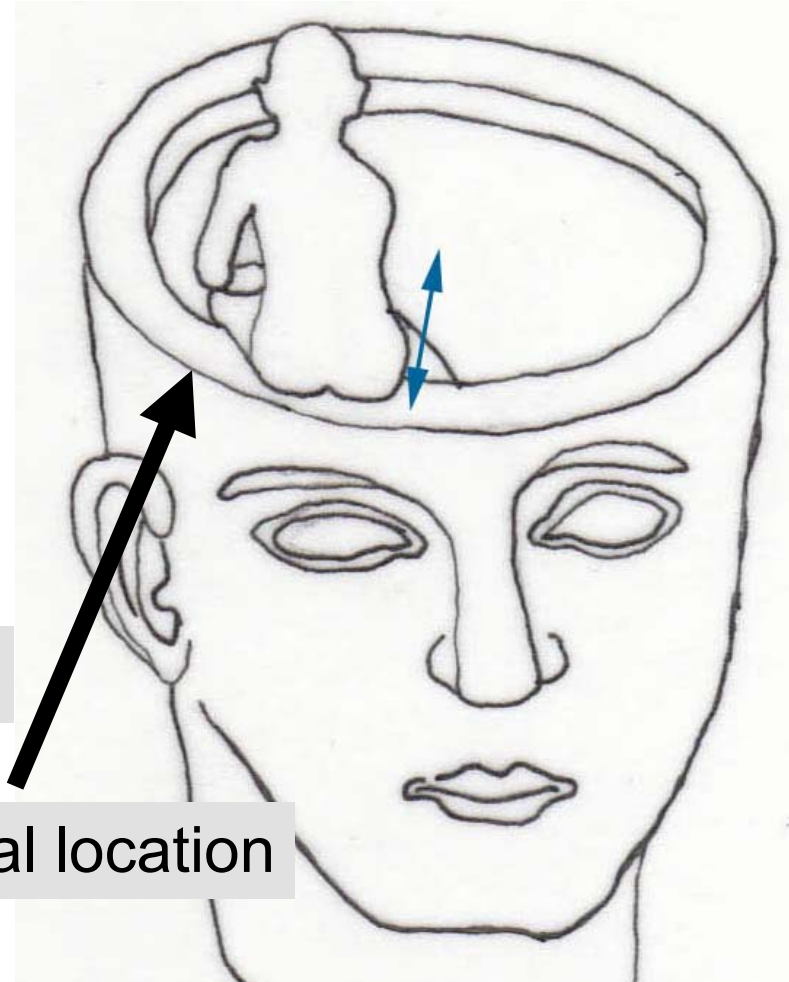


**Yakovlevian torque**  
gives us orientation  
In the world

# Brain structure = function: 2



1: Reflection - the superficial



2: Reflection - the actual location

**3: Reflection** is created by the physical distance delay in mirror-neuron messages from cortex to frontal lobe

# The power of metaphor

## Example: Sailor's Ropework

- Rope culture 200 years ago
  - navy, industry, ropewalks
- Non-literate culture

**Learning by doing**

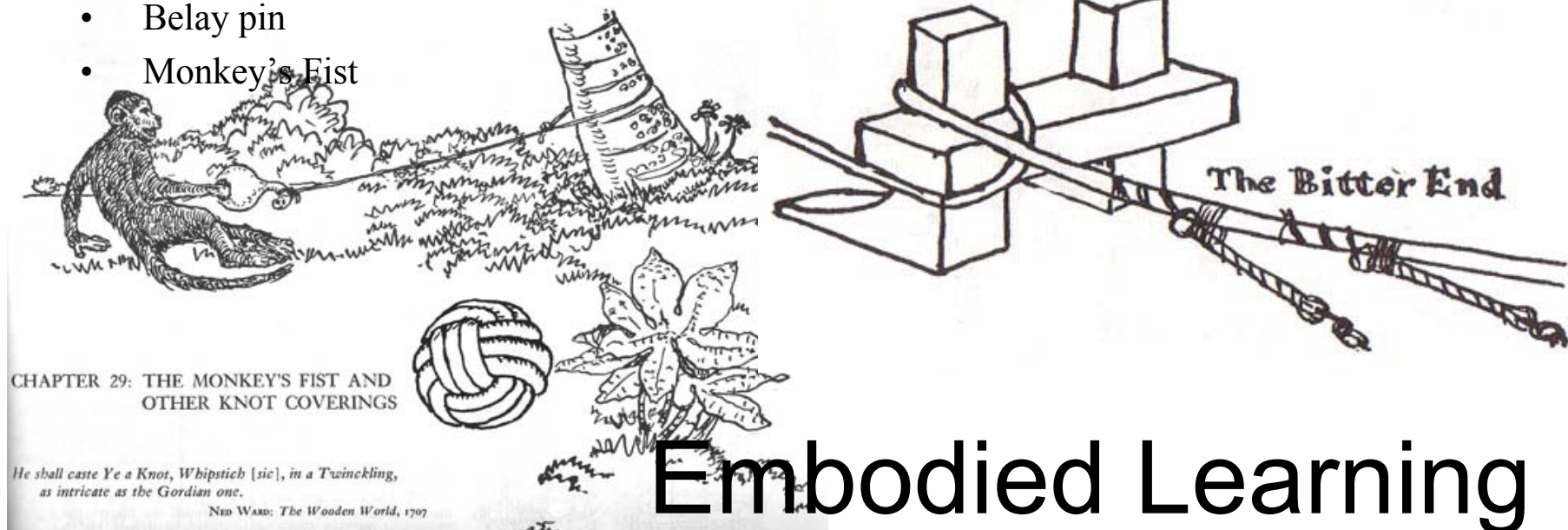


- Ashley Book of Knots:
  - 3, 854 diagrams, 450 knot types.

# Rope metaphors

- Turk's Head
- Dead Eye
- Bentinck
- Grommet
- Starter
- Bitter End
- Nipper
- Toeing the Line
- Becket
- Belay pin
- Monkey's Fist

- Bit, bight
- Cutting the knot
- Get knotted
- Money for old rope
- Give a man enough rope and he'll hang himself
- I got roped in
- At the end of his rope
- Learn the ropes, know the ropes, on the ropes



## Embodied Learning

# The metaphor - Turk's Head



The name "TURK'S-HEAD" first appears in Darcy Lever's *The Sheet Anchor* (1808), but the knot is much older. I have a powder horn dated 1676 which has several TURK'S-HEADS carved around it, and Leonardo da Vinci (1452-1519) shows a number in disk form, in a drawing that is reproduced by Ohrvall in *Om Knutar* (1916).

In discussing the SINGLE-STRAND TURK'S-HEAD the use of the word *strand* will be avoided as it is ambiguous. *Cord* or *line* will designate the material of the knot and the word *lead* will designate a single circuit of the cord around the cylinder or barrel. The size of a knot is designated by the number of its leads and bights. Bights are the scallops or coves formed by the cord where it changes direction at the rims. The total number of leads denotes the width of a knot along the cylinder, and the total number of bights denotes the length of a knot around the barrel or cylinder.

Each reappearance of the *cord* or *lead* on the surface will be termed a *part*. Only one part, the upper one, is in evidence at each crossing in the finished knot. To *follow* a cord or lead is to parallel it with identical over-and-under sequence, which alternates in the common TURK'S-HEAD. When a lead has been followed throughout a whole knot, the knot is said to have been *doubled*.

The sailor interprets the word *double* in his own way. When a finished knot consists of two parallel cords the sailor describes it as having been *doubled twice* when it exhibits three parallel cords throughout, it has been *doubled three times*.

A knot that is doubled three times is said by sailors to have three lays. It is also called a THREE-PLY KNOT.

*Tucking over a cord* is the same as *passing* or *crossing over*. A sailor may *tuck* either under and over, or over and under.

1303, 1305. Ordinarily the sailor ties a TURK'S-HEAD directly around his fingers. When it has been formed it is placed around the object that is to be its permanent support.

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## THE TURK'S-HEAD

There are two sizes that the sailor commonly ties in this direct manual way: #1303, which has three leads and two bights; and #1305, which has three leads and four bights.

1304. An unusual but simple method of tying the THREE-LEAD, TWO-BIGHT TURK'S-HEAD is to first make the FIGURE-EIGHT KNOT, then insert thumb and finger into two compartments as shown, and pinch them together. When the two ends meet the knot is complete.

1306. The sailor also ties the THREE-LEAD BY FIVE-BIGHT KNOT, either directly or more often by lengthening #1305, a process that is later described as #1316.

1307. Occasionally he ties directly the FIVE-LEAD BY THREE-BIGHT KNOT as shown here. After reaching the position of the left diagram, the left turn of the two center leads is shifted to the right over the next one to assume the position of the right diagram. To complete the knot, follow the line indicated by the arrow. Any of the TURK'S-HEADS may be doubled or tripled by paralleling one end with the other.

1308, 1309, 1310, 1311. There are several manual methods of tying the FOUR-LEAD BY THREE-BIGHT KNOT. No particular technique is required. After reaching the position shown in any final diagram the knot is placed around its permanent support and "faired," but not drawn up. The lay is then paralleled as many times as wished by "following the lead" that has been established. To do this tuck in one end beside its opposing end, and continue to tuck contrariwise and parallel with the other end, following the lead with identical over-and-under sequence. The second lead must be kept always on the same side of the first lead, either right or left according to how it was started. When the knot has as many plies as desired it is worked snug with a pricker. This is done by progressing from one end of the cord to the other through the whole knot, back and forth, gradually pricking up and hauling out the slack. The knot must not at any time be distorted by pulling too strongly on any one part. When completed it should be so snug around its support that it will not slip. To tie #1311: Start as if you were making KNIFE LANYARD KNOT #781.

I have known several sailors who could tie directly in hand  $4L \times 5B$  and  $5L \times 4B$  TURK'S-HEADS but in each case their methods were individual and often too cumbersome to be generally practical. They were also perhaps unnecessary, as it is easier to tie large knots by *raising* smaller ones to larger dimensions. For this purpose there are several different methods to follow.

There is but one actual limitation to the size and proportions of SINGLE-LINE TURK'S-HEADS: *A knot of one line is impossible in which the number of leads and the number of bights have a common divisor*. All others are possible if the knot tier has sufficient time and cord at his disposal.

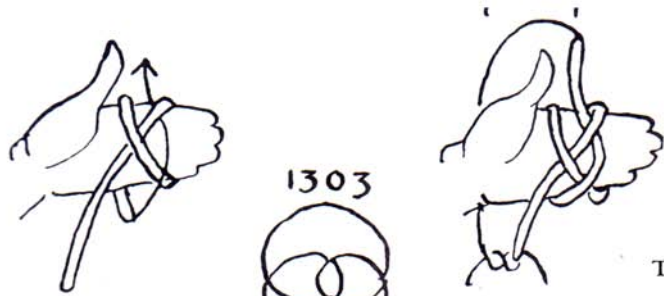
This "Law of the Common Divisor" was discovered at the same time by George H. Taber and the author.

The operation of the Law of the Common Divisor is quite simple. For example, within the limits of twenty-four leads and twenty-four bights there are 576 combinations. Of these combinations, 240 have a common divisor and cannot be tied as a TURK'S-HEAD, and 336 have no common divisor and can be tied. If a knot is attempted in one cord with dimensions that possess a common divisor, the working end and the standing end will meet before the desired knot is complete. Such a knot, being composed of more than one line, can be tied only as a MULTI-STRAND KNOT.

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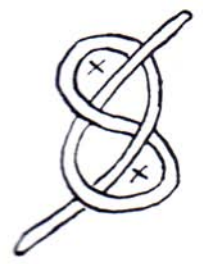
# Text instructions to make a Turk's Head

First reference  
in print 1848

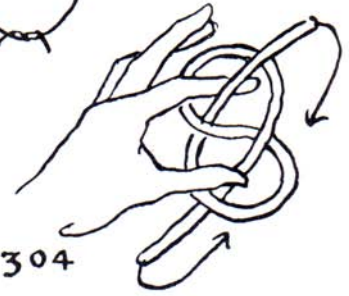


1303

THE TURK'S-HEAD



1304



1305



# Illustrations

Date: 1943



3513



3514

# Thole pin: the metaphor

‘Linguistic river of rivers... A journey of language’  
that inspired his Beowulf translation: suffer - polian - thole

‘They’ll just have to thole,’ my aunt would say about  
some family member who had suffered an unforeseen  
Bereavement. (Seamus Heaney, Beowulf 2007)



**SUFFER!!**



Thole Pins

# Neuroscience informs e-learning?

## Application at a personal level: teaching

Going into work location:

- Example: from broadcasting
- Organise ideas:
  - Example: white box kit
- Conversation, story
  - Moving in the environment
    - Example: Walking and writing
    - Example: Walking and talking

Csikszentmihalyi, M.  
(1996). Creativity

Gauntlett, D. (2011).  
Making is Connecting.

Charney, D., (2011).  
Power of Making. V&A

Making is connecting

# Discussion in 3D

Ideas boxes



Physical discussions where issues, problems, ideas are drawn on boxes and moved around

# Improving the quality of writing

Amongst a range of specific techniques - “The Self Editor” - a common theme: movement

- Move the words around.
- Walk around. Read the sentence out.
- Move sections around again until they sound right.
- Enjoy the process!

# Improving e-learning: online conversation



# Improving e-learning: presentation methods



Click on image  
to go to link

- Move position to make a point.
- Use your hands. Make depth.
  - Example: techniques familiar in media

# Improving e-learning: Meaning as depth & distance



Prof David Boud at Middlesex University: MH

MHMVR Services

These examples compare the physical quality of *reflection*, *depth*, *perspective*, *distance* metaphors, embodied in a message



Andy Palmer  
Director of Education



Recent CBI launch of apprentice initiative!!

# Neuroscience: Making is Connecting?

Making teaching resources

Video resources made by an informed practitioner

- Video tailored for e-learning
  - Lecturer to students
  - Peer to peer
  - Student case studies
  - Partner organisations:
    - Examples: Forum for the Future, V&A
  - Recording lectures for resources
    - Examples: Boud, Zukas, Cavanagh, Lane, Ghaye, Jennings
  - Recording conferences:
    - Examples: Cyprus WBL, 3rd Sector, HEA, informatology

# Neuroscience implications in a university wide context

## Academic study of distance learning

- Patterns of cultural development driven by brain's hemisphere.
- The divided nature of mental experience. (p241, McGilchrist,2009)
- Theory and Practice merging
- Tacit knowledge
- Nietzsche, Heidegger, Kant. Gestalt revisited with a physiological component.
- Informing study of academic behaviour in the workplace

## Attitudes to distance learning in a university

HEFCE & current apprenticeship policy.

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Dr Mike Howarth [mhmv.com](http://mhmv.com)

# A: Understanding metaphor

- **A metaphor is not** just ‘a literary figure of speech’. Figurative language, that uses an image, story or tangible thing to represent a less tangible thing or some intangible quality or idea’. (simile, metonym, synecdoche)
- **Any metaphor we utter is** the process of a whole physical embodied experience of an individual in the world (Lakoff and Johnson).

# Metaphor and WBL

- **The issue:** We are largely oblivious to the embodied, experiential operation of metaphor.
- We are unaware of its power and value.

## **However.....**

- What we do in Work Based Learning is an example of the embodied, experiential operation of metaphor.
- The Work Based Learning process - fine detail of project activity (left hemisphere) and reflection upon the work (right hemisphere) mirrors the operation of the brain.