

Cognitive neuroscience, metaphor and pictures: part 1

TURNER, James <<http://orcid.org/0000-0002-8360-1420>> and RALLEY, Richard

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Mental Health Nursing



COGNITIVE NEUROSCIENCE UNDERSTANDING METAPHOR AND PICTURES

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YVONNE COGHILL CBE**



STUDENT FOCUS

**THE TRANSITION FROM
SOLDIER TO STUDENT**

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The third instalment in the 'Let's talk about suicide' series of comic strips written by mental health nursing students at the University of Dundee. The art for this strip is by Rebecca Horner. The comic is published by Ink Pot Studio, the University of Dundee and is reproduced with kind permission. All rights reserved

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Cognitive neuroscience, metaphor and pictures: part 1

James B Turner Principal lecturer, Sheffield Hallam University

Richard Ralley Senior lecturer, University of East London

Correspondence: james.turner@shu.ac.uk

Abstract

This paper provides a sense of the value of a 'cognitive' perspective to therapists when thinking about minds and situations that they encounter. As well as helping to establish knowledge, the science also offers a framework for critical assessment. The paper also aims to prepare the ground for future progress in our understanding of the value of metaphor or picture-based communications. This is part 1 of 2.

Key words

Cognitive neuroscience, metaphors, pictures, images, brain

Introduction

A key issue in therapeutic practice is the relationship between experience (e.g. how a client feels and represents their problems) and the ability to communicate of that experience to others (which is crucial if thought and behaviour are to be shaped).

This raises questions about what underlies such appraisals and how these might best be accessed. For example, recent developments reported by Turner (2011; 2012; 2014) highlight the value of paying attention to, and finding space for, client-generated metaphor and pictorial metaphor in the therapeutic environment.

In a Delphi study of expert practice, the nurse or therapist made a rudimentary sketch of metaphors to support therapy and recovery. The sketches are 'art', although not to any degree of sophistication, but do appear to be easily

accessible images that have impact on the recognition of clients' problems and ways of helping them manage their responses to them.

Figure 1 represents a metaphor of the bear – a critical and bullying internal voice – and the Russian dolls as the sense of disassociation the client experienced.

Using art in this way appeared to help the client to manage their distress and more importantly enabled the development of alternative ways of acting and being.

The Arts Council of England (2007) suggests the arts include literature and writing, theatre and drama, dance, music and visual arts as facilitating wellbeing.

Staricoff (2004) lists art as benefiting communication, creativity and self-

expression, with a positive impact on health and behaviour noted.

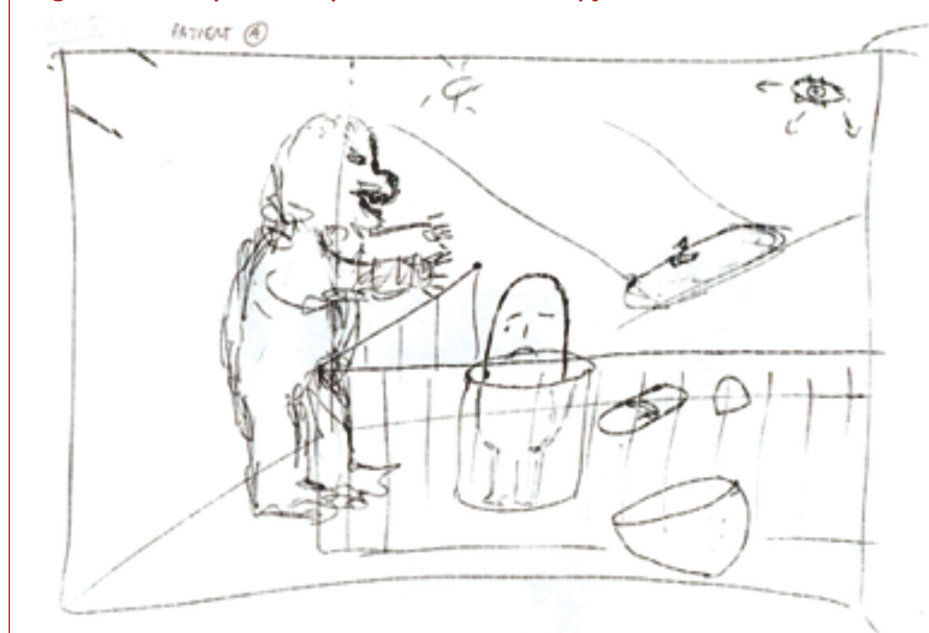
The arts have been found to cause self-reported improvement in mental health (Secker et al 2007; Caddy et al 2012) and increased self-esteem (Clift et al, 2008), and may promote social networks (Leckey 2011).

The arts and metaphor do appear to be important in mental health care as they add another dimension to the therapeutic encounter.

The value of metaphor also resonates with current advances in cognitive neurosciences, for which a successful account of how our minds experience and interact with the world is crucial.

In these 'embodied' neurosciences, perception, and the thinking,

Figure 1. An example of metaphors shown in art therapy: a bear and Russian dolls



communication, action and emotion that come with it, are increasingly seen to be integrated rather than separate processes (Foglia and Wilson, 2013) as well as being firmly based in the brain.

This has countered many basic assumptions about the nature of experience and how communication is best served: it emphasises that metaphor provides more efficient access to experience, and better allows for the mind's operation, than efforts to render clear and distinct ideas from literal and unemotional exchange (Zwaan, 2014).

In addition, centring experience on emotion and action further removes divisions between hearer and speaker, helping to foreground the reality of the client-practitioner link and the relevance of combining clients' feelings and ideas in activity.

In this paper, we contend that this integrationist perspective provides a useful way to think about how the mind works that enables and informs therapists' practice.

Like Wilkinson (2010), one of the authors recently had a client struggling with change, and by discussing how change relates to the way that the brain alters its physical connections, the client was able to move forward more readily with the reassurance and hope that change of mind could have a firmly physical reality.

In line with this, one aim of this paper is to provide a sense of the value of a 'cognitive' perspective to therapists thinking about minds and situations that they encounter. As well as helping to establish knowledge, the science also offers a framework for critical assessment.

Therefore, a second aim is to prepare the ground for future progress in our understanding of the value of metaphor or picture-based communications.

In the longer term, the usefulness of science-informed account of metaphoric communication might be assessed by its ability to respond positively to a set of basic queries: is it able to aid measurement (e.g. to help us describe and assess the use of metaphor by

clients), and is it able to help build a model of how the relevant processes work? Specifying the underlying processes would be key to seeing which mental tasks usefully relate to each other.

Finally, is the knowledge of the processes applicable, e.g. can it enhance practice, or help to provide a clear understanding of how and when intervention is best used?

Therapy provides a strong test of applicability as it emphasises practical rather than only theoretical application.

In charting current and future progress in these respects, we also contend that the insights from the therapeutic setting and the neuroscience results are mutually informative.

In particular, the therapeutic encounter can contribute to the assessment of a science that (since it unifies emotion, action and perception by its very nature) is well placed to invite practitioner experience as a valid input into research.

Literature search

An exploration of the literature aims to inform the author's research and to critique practice. McNiff and Whitehead (2011) note 'in action research you do not have to write a literature review but you must show that you have reviewed and engaged with the literature' (p117).

They go on to set out a review in action research as having five functions:

- To find out what other people have said on your topic.
- To test your findings against views of key authors.
- To demonstrate critical engagement in research and scholarship.
- To develop your conceptual frameworks.
- To demonstrate originality of your contribution to knowledge of the field and their significance.

A 'Narrative' or 'Topic review' was undertaken as it enabled capture of relevant literature to explore the aims of this discussion (Dallos and Vetere, 2005, Newall and Burnard, 2006).

A systematic search strategy identifies

the relevant literature, informs the development of research questions, and frames inquiry (Aveyard, 2010). Aveyard further notes that 'even if the stringent requirements of a Cochrane collaboration style review may not be within the capacity of the researcher it is necessary to undertake a systematic approach to reviewing the literature' (2010: 15).

This approach 'allows the author to demonstrate an awareness of the entire process and technical proficiency in the component steps' (Grant and Booth, 2009: 103).

Weaknesses include the quality of assessment and synthesis may be less identifiable as is also the likelihood of bias being introduced.

Bias can be managed through following a protocol, in this instance Aveyard's (2010) guidance was followed to develop a protocol, define a question, describe a search strategy, apply inclusion and exclusion criterion, and undertake an analysis.

Sheffield Hallam University's 'Library Gateway' enabled examination of subject-specific databases to include psychotherapy, psychology, sociology/social science and art psychotherapy. Relevant databases were PSYCHLIT, SCOPUS, MEDLINE, CINAHL and Google Scholar.

Scholar was used alongside traditional search engines as it allows for identifying articles, related references and citation searches readily, and articles can be exported with ease into Refworks.

Searches used Boolean operators of AND/OR combinations on 'title' and 'abstract' searches parameters. The anagram 'PICO' was identified to manage keywords, where P stood for population, I for intervention, C for comparison and O for outcome, leading to the researcher using a controlled vocabulary to manage resources.

In this way gaps and inconsistencies in the current body of knowledge are identified (Cronin et al, 2008). This approach provided evidence within the context of informed debate (Hawker et al, 2002; Greenhalgh and Peacock, 2005).

Findings

Neuroscience, attachment and metaphor

Attachment is seen as important to the healthy development of the psyche and has been well expressed in the work of Bowlby, Schore, Stern and Siegel, to name but a few.

Essentially the central idea is that the quality of the early child/caregiver relationship is important in determining the child's ability to establish a secure base from which to explore the world in a confident manner (Greenwood, 2011).

Current interest in psychology and biology has begun to reinforce studies such as Bowlby's attachment work; evidencing the importance of how human society is woven into the physiological structures of the body (Fuchs, 2004).

Neuroscience provides compelling evidence to support the importance of metaphors as a means to help clients manage early relational attachments and subsequent attachments (Greenwood, 2011; Wilkinson, 2010).

For example, studies of orbitofrontal cortex activity suggest a strong relationship to the emotional regulation systems in the mind. Schore (in Hermans, 2003: 107) argues that 'the capacity to make transitions from negative to positive states of mind, and to realise a certain level of adaptive continuity of the self, is seriously reduced in forms of insecure attachment'.

Wilkinson (2010) directs us to view the working mode of attachment as being stored in the right hemisphere, the early developmental brain that deals with affect regulation for coping and survival.

Relationships to the later-developing left hemisphere are subsequently developed characterised by verbal, conscious and serial information processing (Greenwood, 2011; Wilkinson, 2010).

In practice when working with someone who has a traumatic childhood, the use of gestalt techniques, such as opening a dialogue through an simulated empty chair exercise with both the 'abuser' and the 'abused' can be helpful.

In this way integration of the emotions

and feelings of childhood can be worked through. This allows the adult mind to come to terms with, manage and reevaluate the effects of early life experience.

In effect, learning occurs when individuals establish alternative ways of harnessing their thoughts and emotions (Carter, 2003). Rose (1993) supports this view that cognition cannot be divorced from affect, try as one might.

Furthermore, psychotherapy has been found to significantly change functions and structures of the brain, in a manner that seems different from the effects of psychopharmacology (Fuchs, 2004).

One way that change in therapy and emotional learning can be explained is by Damasio's (2003) somatic marker hypothesis (SMH):

'When a person comes across a novel situation that requires a response, the bodily, emotional aftermath of the response is retained and becomes a 'somatic marker'... 'later when the person meets a similar situation the SMH is recreated, thus guiding the person to make an appropriate response based on the emotions that were felt previously' (Carter, 2003: 229).

We suggest that the novel use of metaphor can be such a marker, akin to Barker's (1996) 'outflanking' manoeuvre on the unconscious and where the message of the metaphor can bypass the logical functioning of the brain (Sharp et al, 2002).

Current cognitive neuroscience perspectives

Psychotherapy has a long tradition of integrating subjective mental experience with an understanding of the brain and neural networks.

In fact, Freud in 1895 drafted a first attempt three years after the discovery of the 'synapse' to formulate a neurologically based view (Toomey and Ecker, 2009).

There is currently impressive progress being made in the cognitive

neurosciences and the psychology of emotion with supporting and opposing positions (Beutal et al, 2003).

Historical positions have been recently over-ridden by advances in neuro-imaging due to autoradiography, electroencephalogram, magnetencephalogram, fMRI and PET scans (Dolan et al, 2006).

Current psychology of emotion seems to be distilled into one key question: how do emotion and cognition relate? There is no definitive view, as often the debate for synthesis degenerates into polarised views of 'mind vs brain', 'holism vs reductionism' and 'top down vs bottom up' (Toomey and Ecker, 2009).

However, the literature regarding emotion seems mostly divided into roughly two camps: the separatists and the integrationists.

The separatists

The separatists emphasise the idea that emotion is evolved, functional and, crucially, rather separate of cognition. The key evidence for this camp is response to threat. Responses to threat reveal the separation of cognitive circuitry from emotional circuitry.

They consider that emotions are, at root, simple, functional and switch-like, hence Ekman and Freisen's (1975) 'basic emotions', which remain attractive. Emotions and cognitions can relate, but this is likely to be displacement or interference.

Key names in the area include:

- Ekman and Freisen (1975): discrete basic emotions that are functional.
- Maclean (1990): atavistic emotion – the limbic brain is reptilian, cortex is mammalian, evolution is a 'bodge job', with these two separate modes of response interfering with and displacing one another.
- Panksepp (1998): the need for a separate 'affective neuroscience'; that is, separate of the cognitive approach.
- Rolls (1999): consciousness is not a property of animal minds. Rolls considers that the affective representation of taste is important as a means of advancing our understanding of the neural mechanisms

for the regulation of food intake as well as the mechanisms underlying emotional processing in the brain (Rolls, 1999).

- Öhman (2009): ‘snakes in the grass’ – things that are threatening pop out at us from visual displays like the functioning of an automatic mechanism that pushes cognition around.
- LeDoux (2002): components necessary for emotion include an emotion system, a memory system and a feedback system from the body.
- Bowers (2009): an attempt to make emotion into a kind of cold cognition, which can’t work and thus makes it look from the start that real emotion can’t be anything to do with cognitive theory.

A tension with this research is that the separatist movement often focuses on the amygdala and threat, or emotion and taste, rather than the amygdala-frontal cortex relationship as a means of understanding the underlying emotional relationship.

The other camp – integrationists

Integrationists emphasise that emotion is integrated with cognition. Damasio’s (2003) famous patient ‘Elliot’ indicates that (cognitive) decision making does not work when emotions are impaired.

Thus emotion and cognition are built to work together; they have evolved together, and the view that they are separate/interfere with one another is insufficient.

This is the prevailing view at the moment, steering away from the old prejudice that emotion is ‘irrational’. However, some people think this makes things far too jolly and panglossian (blindly or naively optimistic), and we end up forgetting about the (moral psychology) problems that come with emotion.

‘Evolutionary neuroscience’, ‘evolutionary psychology’ and ‘neurobiology’ suggest that as animals deploy aggression/emotion highly selectively, and humans’ limbic systems are biologically meshed with the frontal lobe (cognition), the conclusion has to be that human anger/emotion is deliberate, and about getting a reward or pay-off.

The convergence

The convergent and consequence seems to be that LeDoux (2000; 2003) for example, looks at the bottom end (biology) and says that emotion and cognition split, but only for a brief moment; and Damasio (2003) looks at the top end (decision-making) and finds that emotions are absolutely crucial to effective thought.

Thus, from top to bottom, emotion and cognition are linked. The frontal cortex represents the expansion of emotionality in humans.

The orbitofrontal cortex activates very reliably and consistently during emotional reactions (Damasio 2003) and particularly where reward contingencies are involved (Rolls 1999).

The amygdala and frontal cortex are very strongly linked biologically (Damasio, 2003, Lane and Nadel, 2002; Rolls, 1999), and the importance of the orbitofrontal cortex is underlined by the result that damage to emotionality entails problems for ‘cognition’ (Damasio, 2003).

Toomey and Ecker (2009) argue that clinical symptoms involving implicit memory and therefore a selective depotentiation of implicit memory have the ‘broadest efficacy’. Implicit memory being the regulation of social behaviour by the amygdala-orbitofrontal relationship.

A little bit of neuroscience

Cells and their connection produce functioning minds. Brains consist of a dense network of cells. Many are glial cells that hold the brain together, while the others are called neurons.

Every brain has billions of neurons that together make trillions of synaptic connections. Neurotransmitters are chemicals that transmit messages from brain cell to brain cell. For example:

- Dopamine – arousal, curiosity-interest-expectancy responses and the dreaming process.
- Noradrenalin – physical and mental arousal, heightens mood, and is involved in the brains emergency response to trauma.
- Serotonin – regulates mood emotion

“Psychotherapy has a long tradition of integrating subjective mental experience with an understanding of the brain and neural network”

and anxiety.

- Acetylcholine – involved in attention, learning and memory.
- Glutamate – major excitatory chemical and enables short and long term memory processing.
- Gamma-amino butyric acid (GABA) – acts as a chemical guard between cells preventing over activity that might lead to cell destruction.
- Endorphins (endogenous opiates) – modify traumatic experiences, reduce stress, induce calm and reward bonding.

Some act throughout the brain (e.g. glutamate and GABA), while others such as serotonin and dopamine have specific pathways that enable execution of their particular functions.

It is interesting and important to note that psychotherapy and medications have similar effects on neurotransmitters in some cases (Fuchs, 2004; Cappas et al, 2005), whereby learning and plasticity are improved by both processes. Both papers cite Kandel (1998) research, paraphrasing ‘insofar as counselling and psychotherapy are effective... it presumably does this through learning, by producing changes in gene expression that alter the strength of synaptic connections’.

This leads to the position that learning has a measurable impact on the brain, so successful therapeutic interventions should equally lead to measurable change (Beutal et al, 2003). ■

The second part of this paper, including a full references list, will appear in the next edition of Mental Health Nursing (December 2019/January 2020 issue).