MENTAL IMAGERY AND MENTAL HEALTH TREATMENT INNOVATION:

IMAGERIE MENTALE ET INNOVATION EN MATIÈRE DE TRAITEMENT DE LA SANTÉ MENTALE

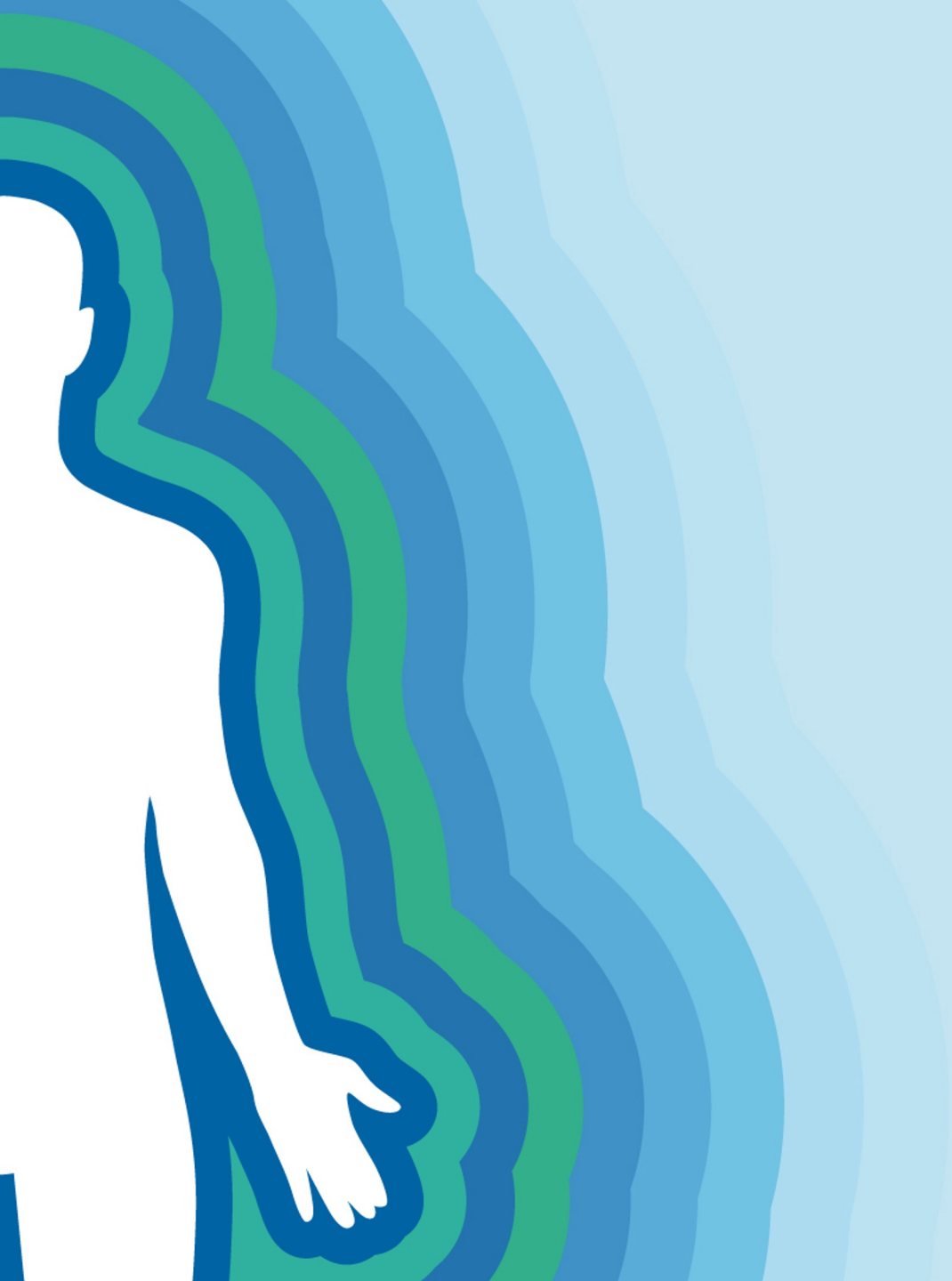
Professor Emily A Holmes

Université d'Uppsala, Suède

Présidente de séance: Catherine Bortolon, Maitre de conférence, HDR & Psychologue

Vendredi 8 decémbre, 14h00-15hr00
Amphithéatre Lavoisier

51ème CONGRÈS AF TCC



MERCI!

Comité Scientifique:

Catherine Bortolon, Anne Denis, Céline Douilliez, Jean-Luc Ducher, Christine Favre, Damien Fouques, Yasser Khazaal, Nicolas Neveux, Stéphane Raffard – Président, Charles-Edouard Rengade, Lucia Romo - Vice-Présidente, Amélie Rousseau, Pierre Taquet,Thomas Villemonteix

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C'est un plaisir de venir à Paris et de vous rencontrer tous

51ème CONGRÈS AF TCC

Conflit d’intérêt

- Professor, Psychology, Uppsala
- Professor, Clinical Neurosciences, Karolinska Institutet (10%)
- 2 books (OUP, Guilford Press) – mental imagery in psychological therapy
- Held funding from sources including the Royal Society, Medical Research Council, The Wellcome Trust, ESRC, NIHR, Lupina Foundation
- Current funding: Swedish Research Council (VR), AFA Försäkring, Oak Foundation, The Wellcome Trust, Wellcome Leap
- Consultancy to P1vital on Wellcome Trust grant
- Occasional psychological therapy training workshops – imagery in CBT

MENTAL IMAGERY AND MENTAL HEALTH TREATMENT INNOVATION:
IMAGERIE MENTALE ET INNOVATION EN MATIÈRE DE TRAITEMENT DE LA SANTÉ MENTALE

- It is a pleasure to join you all in Paris to explore mental imagery with you
- We can think in **words** and we can think in **mental imagery**
- **Both are important for CBT**, though historically CBT focuses more on words
- Today we will explore why imagery is so interesting too

Images de Paris

- Je suis arrivé à Paris à l'âge de treize ans. Je me souviens très bien d'avoir été place du Tertre avec des artistes faisant des croquis et découpant avec des ciseaux pour réaliser des portraits en papier noir.

- Mes premières vacances en tant qu'étudiant universitaire ont été de voyager d'Oxford à Paris. Ce voyage, je me souviens très bien de la découverte du Pompidou, en montant ces escaliers dans les tubes de verre.

- Mes visites depuis renforcent ma conviction que l'art à Paris est merveilleux. C'est un plaisir d'être de retour. Nous regarderons quelques images au cours de cette conférence.

- Mais d’abord, revenons à la science et à ce dont nous allons parler aujourd’hui.

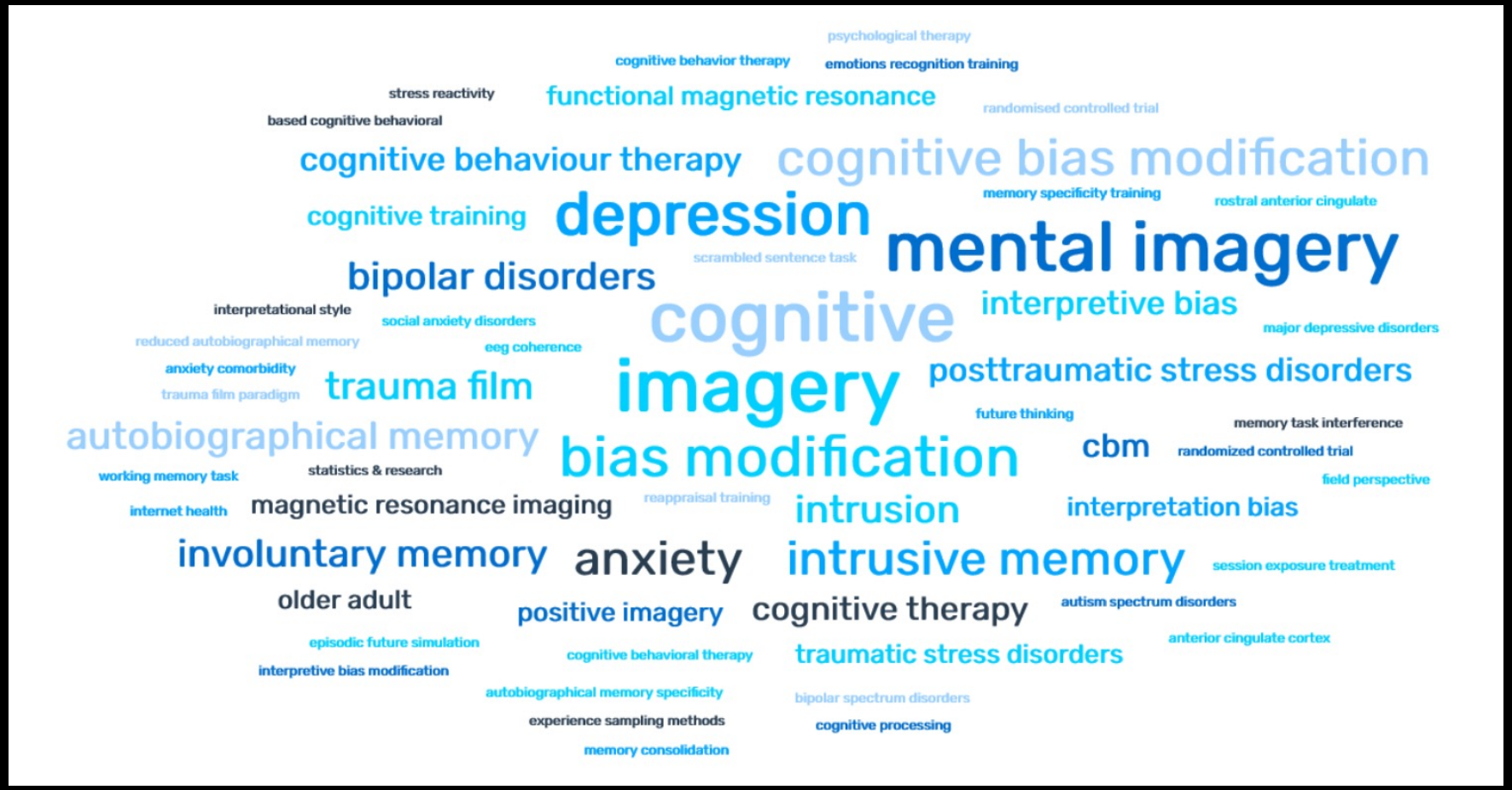
My background

- Clinical Psychologist
- Cognitive Neuroscientist
- (and art college!)

- Psychological Mechanisms
- Treatment Innovation

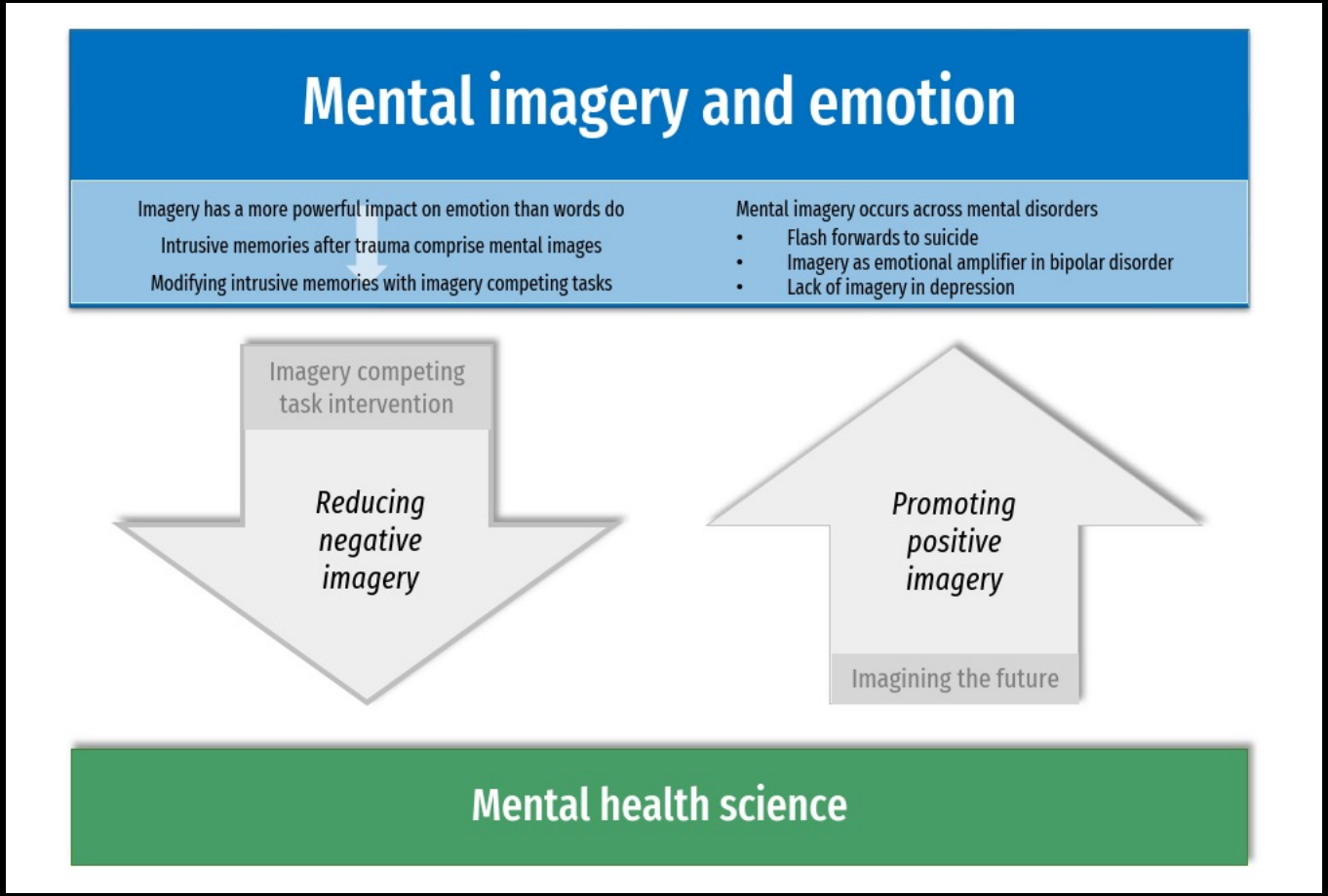
- Curiosity about mental imagery

Investigating mental imagery is central in our research



MeSH tag cloud, June 2020

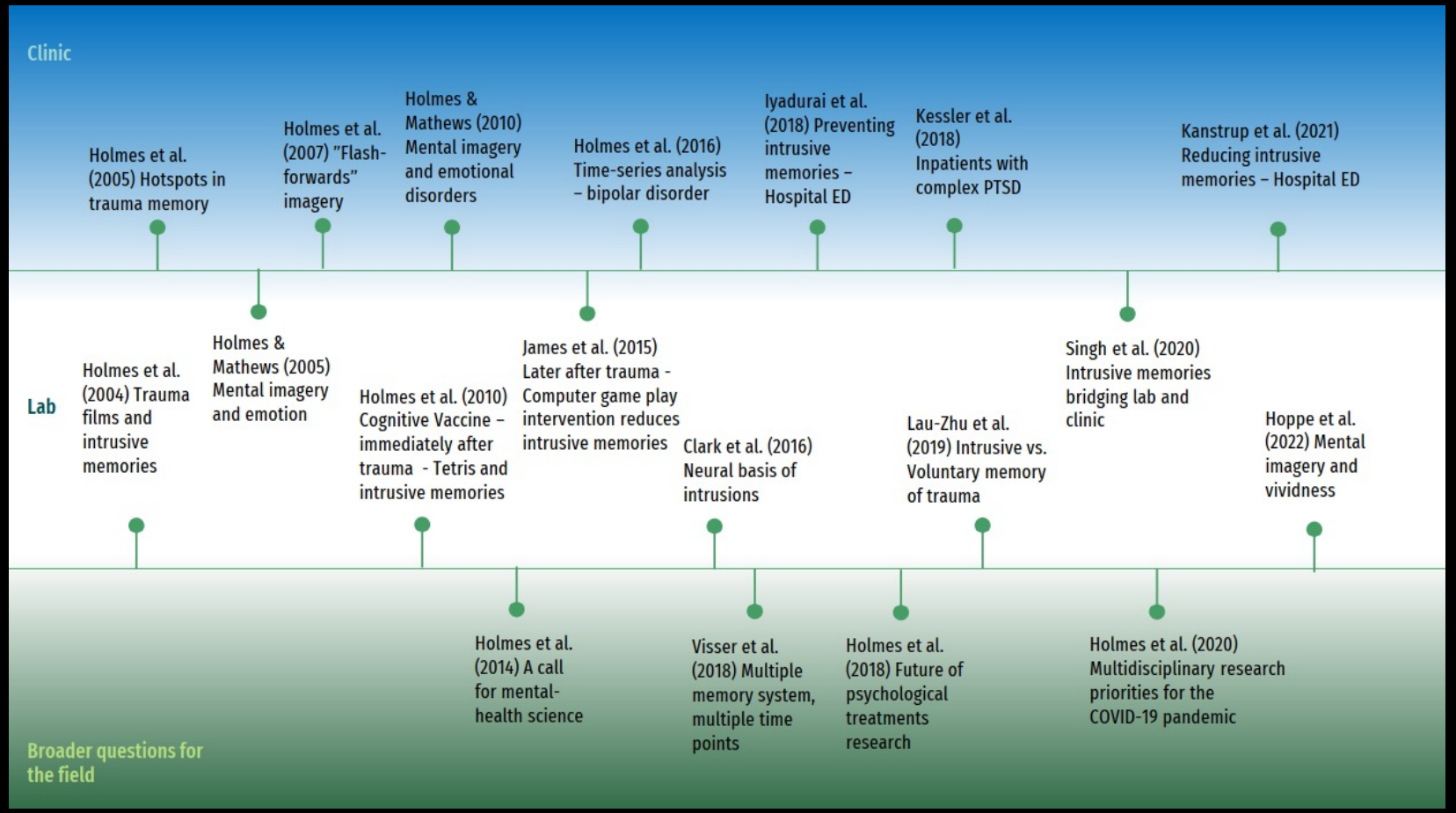
Themes in our work



Themes in our work over time

Mental imagery **in the clinic**

Mental imagery **in the lab**



Mental health treatment innovation

Today we explore two aspects:

1. the detail of mental imagery and some recent studies

2. the *big picture* of mental health treatments given global burden of disease

- new ideas we can explore in CBT
- (some artworks from France will also join us in this talk).

As CBT clinicians, we all see patients with mental imagery in our work

Robert Delaunay « Manège de cochons », 1922

Mental imagery of the self in social phobia

Mental imagery of negative childhood events in depression

Intrusive mental imagery after trauma in posttraumatic stress disorder (PTSD)

- **sensory memories** of traumatic event(s) that repeatedly spring to mind unwanted

Intrusive imagery "flash-forwards" to future suicidal acts
eg jumping from a cliff

Holmes, Crane, Fennel & Williams (2007); Hales, Deeprose, Goodwin & Holmes (2011);
Ng, Di Simplicio, McManus, Kennerley & Holmes (2016)

"Flash-forwards" imagery during mania in bipolar disorder

e.g. "I'm going to buy one"

Holmes, Geddes, Colom & Goodwin, 2008, *BRAT*

Ivins, Di Simplicio, Close, Goodwin, Holmes, 2014, *JAD*

Di Simplicio…. Meyers, Nobre, Lau-Zhu, Holmes (2016). *Bipolar Disorders*

But what is “mental imagery”?

Sonja Delaunay-Terk «Plate (folio 8) from 10 Origin», 1942

But what is "mental imagery"? (it is not verbal thought)

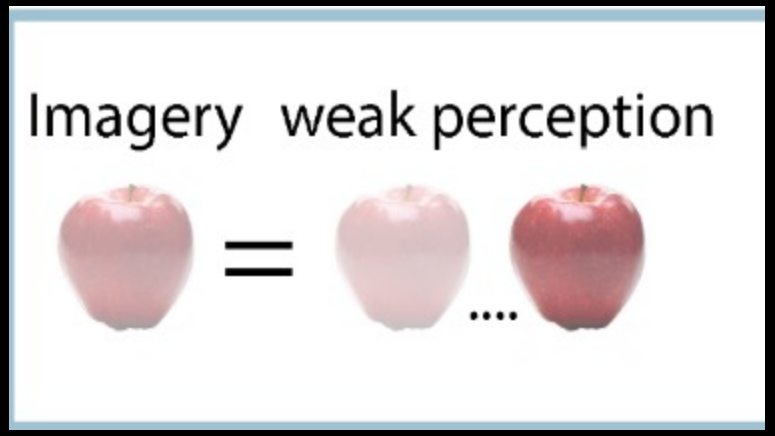
- Seeing in the mind's eye, hearing with our mind's ear etc.
- Representations & experience of sensory information without a direct external stimulus

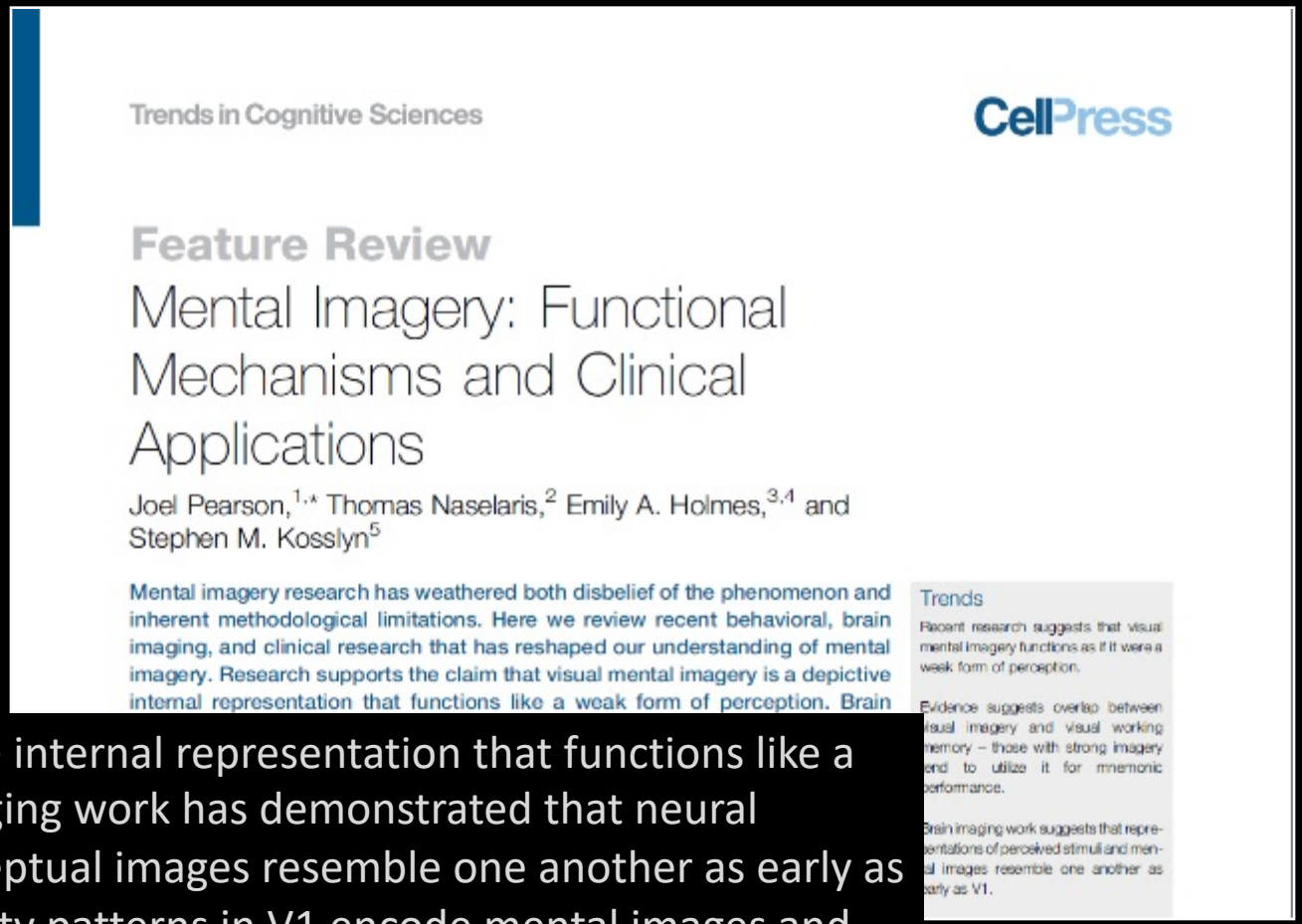
OFTEN VISUAL, CAN BE ANY SENSORY MODALITY

A DIFFERENT PART OF BRAIN THAN VERBAL LANGUAGE

Pearson, Naselaris, Holmes & Kosslyn, 2015, *TiCS*

Neuroimaging – imagery is like perception




Trends in Cognitive Sciences
CellPress

Feature Review

Mental Imagery: Functional Mechanisms and Clinical Applications

Joel Pearson,[1,*] Thomas Naselaris,[2] Emily A. Holmes,[3,4] and Stephen M. Kosslyn[5]

Mental imagery research has weathered both disbelief of the phenomenon and inherent methodological limitations. Here we review recent behavioral, brain imaging, and clinical research that has reshaped our understanding of mental imagery. Research supports the claim that visual mental imagery is a depictive internal representation that functions like a weak form of perception. Brain

Trends

Recent research suggests that visual mental imagery functions as if it were a weak form of perception.

Evidence suggests overlap between visual imagery and visual working memory – those with strong imagery tend to utilize it for mnemonic performance.

Brain imaging work suggests that representations of perceived stimuli and mental images resemble one another as early as V1.

"visual mental imagery is a depictive internal representation that functions like a weak form of perception. Brain imaging work has demonstrated that neural representations of mental and perceptual images resemble one another as early as the primary visual cortex (V1). Activity patterns in V1 encode mental images and perceptual images via a common set of low-level depictive visual features."

Let us imagine walking on a tightrope!

- ***Shut your eyes***
- *Imagine two steep cliffs with a tightrope line stretched between them*
- *Imagine you start walking on the tightrope…*
- *One foot…*
- *The next foot….*
- *Imagine a sudden gust of wind blowing you….and you begin to sway*

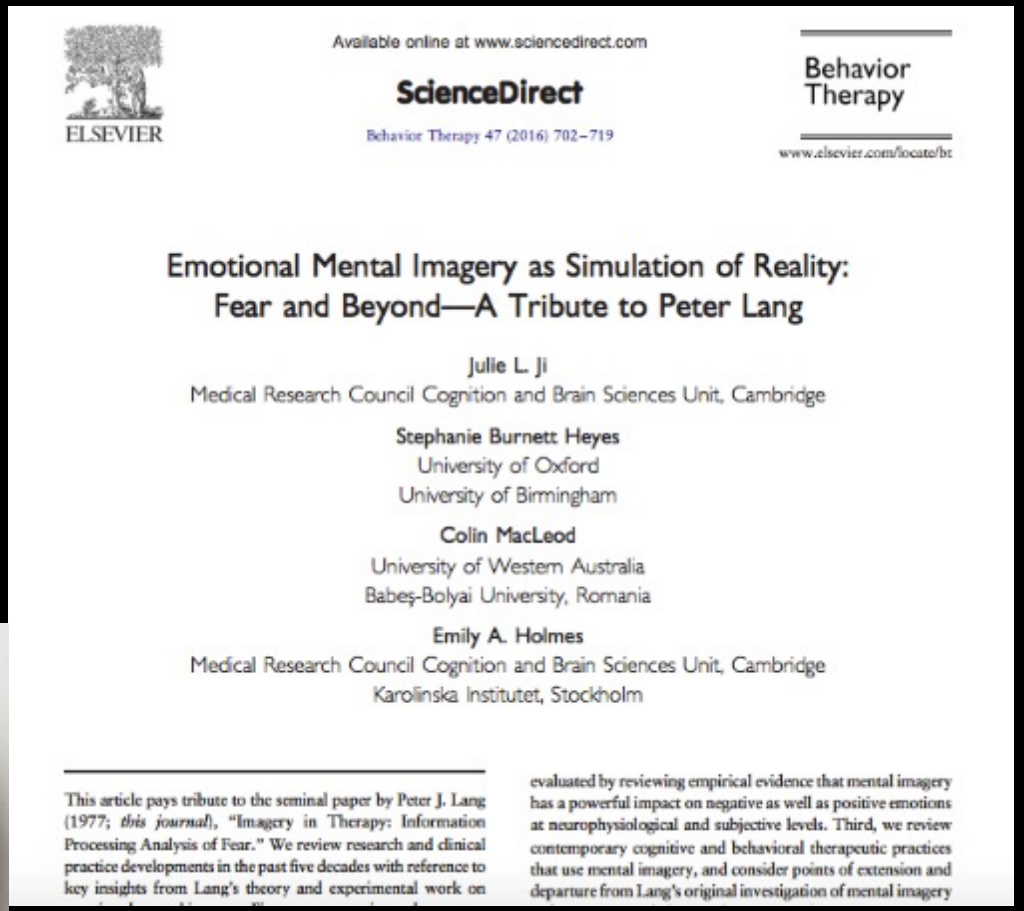
Mental imagery is an "emotion amplifier"

Lab experiments: compared to verbal thought, mental imagery has a more powerful impact on human emotion

I want to scream

Holmes & Mathews 2005; 2006; 2008; 2010; 2013

40th year anniversary in 2016 of American Association of CBT (ABCT): tribute article on mental imagery



Available online at www.sciencedirect.com

ScienceDirect

Behavior Therapy 47 (2016) 702–719

Behavior Therapy

www.elsevier.com/locate/bt

Emotional Mental Imagery as Simulation of Reality: Fear and Beyond—A Tribute to Peter Lang

Julie L. Ji
Medical Research Council Cognition and Brain Sciences Unit, Cambridge

Stephanie Burnett Heyes
University of Oxford
University of Birmingham

Colin MacLeod
University of Western Australia
Babeş-Bolyai University, Romania

Emily A. Holmes
Medical Research Council Cognition and Brain Sciences Unit, Cambridge
Karolinska Institutet, Stockholm

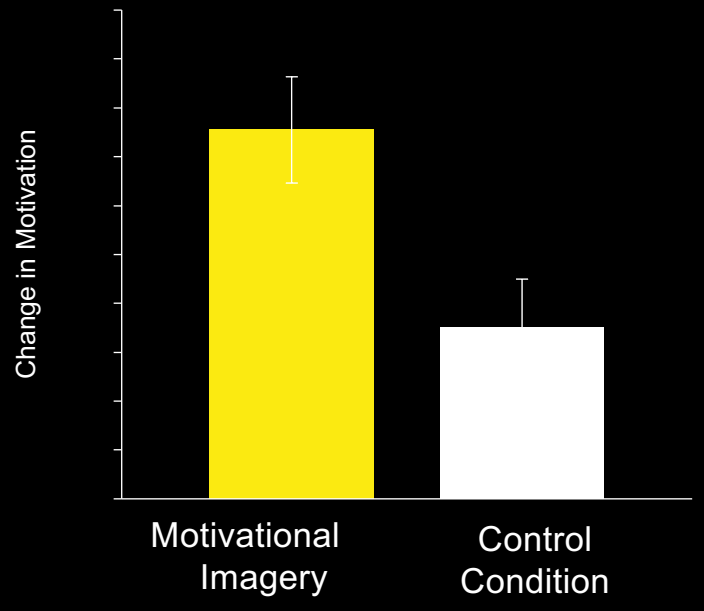
This article pays tribute to the seminal paper by Peter J. Lang (1977; *this journal*), "Imagery in Therapy: Information Processing Analysis of Fear." We review research and clinical practice developments in the past five decades with reference to key insights from Lang's theory and experimental work on

evaluated by reviewing empirical evidence that mental imagery has a powerful impact on negative as well as positive emotions at neurophysiological and subjective levels. Third, we review contemporary cognitive and behavioral therapeutic practices that use mental imagery, and consider points of extension and departure from Lang's original investigation of mental imagery

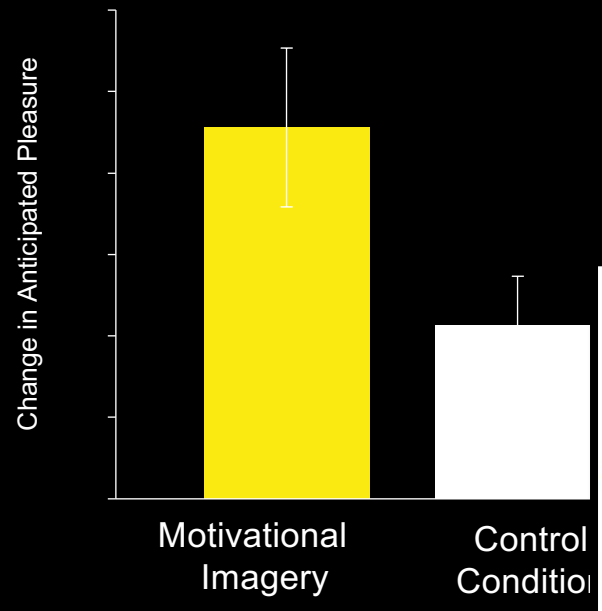
- Evokes emotional response at subjective, physiological and neural levels
- Not just negative emotions, also positive emotions
- *Greater emotional impact than verbal-linguistic representation of emotional information*

Mental Imagery as "Motivational Amplifier"

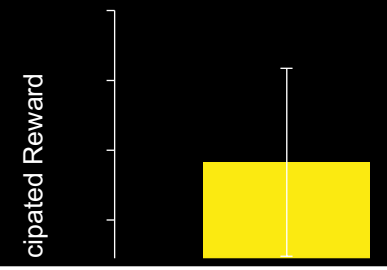
- Mental imagery simulations of engaging in planned activities impact on motivation/anticipated reward to engage in these activities



$F(1,70) = 6.47$, $p = .01$, $\eta 2 = 0.085$



$F(1,70) = 4.91$, $p = .03$, $\eta 2 = 0.06$



Behaviour Research and Therapy 114 (2019) 51–59

Contents lists available at ScienceDirect

Behaviour Research and Therapy

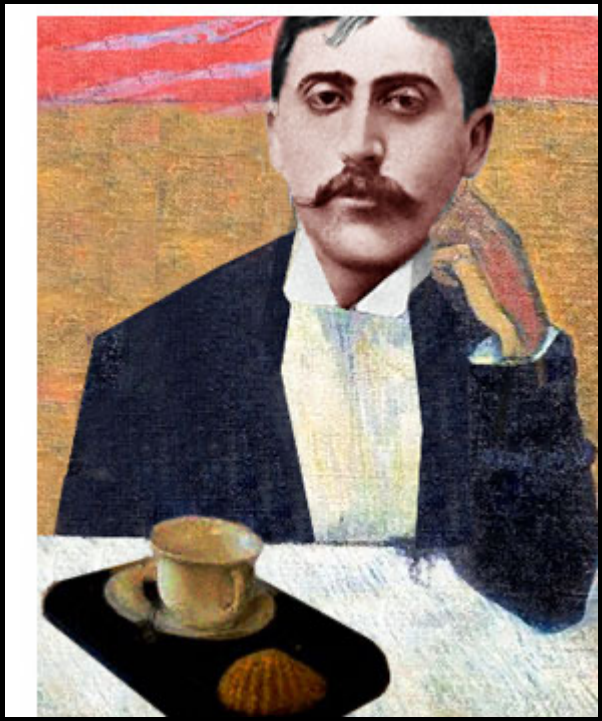
journal homepage: www.elsevier.com/locate/brat

Mental imagery as a "*motivational amplifier*" to promote activities

Fritz Renner[a,b,*,1], Fionnuala C. Murphy[b], Julie L. Ji[c], Tom Manly[b], Emily A. Holmes[b,d]

[a] Department of Clinical Psychology and Psychotherapy, University of Freiburg, Germany
[b] MRC Cognition and Brain Sciences Unit, University of Cambridge, Cambridge, UK
[c] School of Psychological Science, University of Western Australia, Australia
[d] Department of Psychology, Uppsala University, Sweden

Imagery, emotion and behaviour are closely linked



Marcel Proust

Mental imagery is the language of memory and emotion

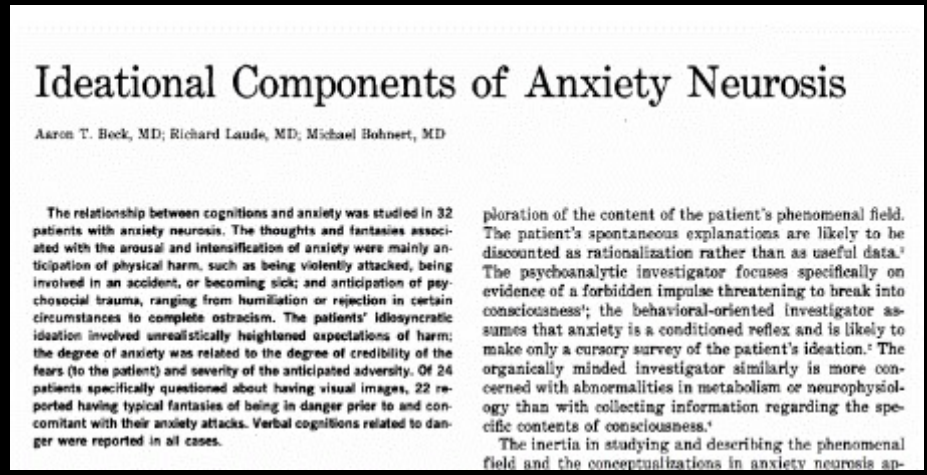
occurs in everyday life; for example when Marcel Proust describes eating his madeleine and suddenly recalling sensory images of his childhood

26

Beck – a founder of CBT described imagery early in his career

Beck AT, Laude R, Bohnert M. Ideational Components of Anxiety Neurosis. *Arch Gen Psychiatry.* 1974;31(3):319–325. doi:10.1001/archpsyc.1974.01760150035005

- “Of 24 patients specifically questioned about having visual images, 22 reported having typical fantasies of being in danger prior to and concomitant with their anxiety attacks.”



Ideational Components of Anxiety Neurosis

Aaron T. Beck, MD; Richard Laude, MD; Michael Bohnert, MD

The relationship between cognitions and anxiety was studied in 32 patients with anxiety neurosis. The thoughts and fantasies associated with the arousal and intensification of anxiety were mainly anticipation of physical harm, such as being violently attacked, being involved in an accident, or becoming sick; and anticipation of psychosocial trauma, ranging from humiliation or rejection in certain circumstances to complete ostracism. The patients' idiosyncratic ideation involved unrealistically heightened expectations of harm; the degree of anxiety was related to the degree of credibility of the fears (to the patient) and severity of the anticipated adversity. Of 24 patients specifically questioned about having visual images, 22 reported having typical fantasies of being in danger prior to and concomitant with their anxiety attacks. Verbal cognitions related to danger were reported in all cases.

ploration of the content of the patient's phenomenal field. The patient's spontaneous explanations are likely to be discounted as rationalization rather than as useful data.[3] The psychoanalytic investigator focuses specifically on evidence of a forbidden impulse threatening to break into consciousness[1]; the behavioral-oriented investigator assumes that anxiety is a conditioned reflex and is likely to make only a cursory survey of the patient's ideation.[2] The organically minded investigator similarly is more concerned with abnormalities in metabolism or neurophysiology than with collecting information regarding the specific contents of consciousness.[4]

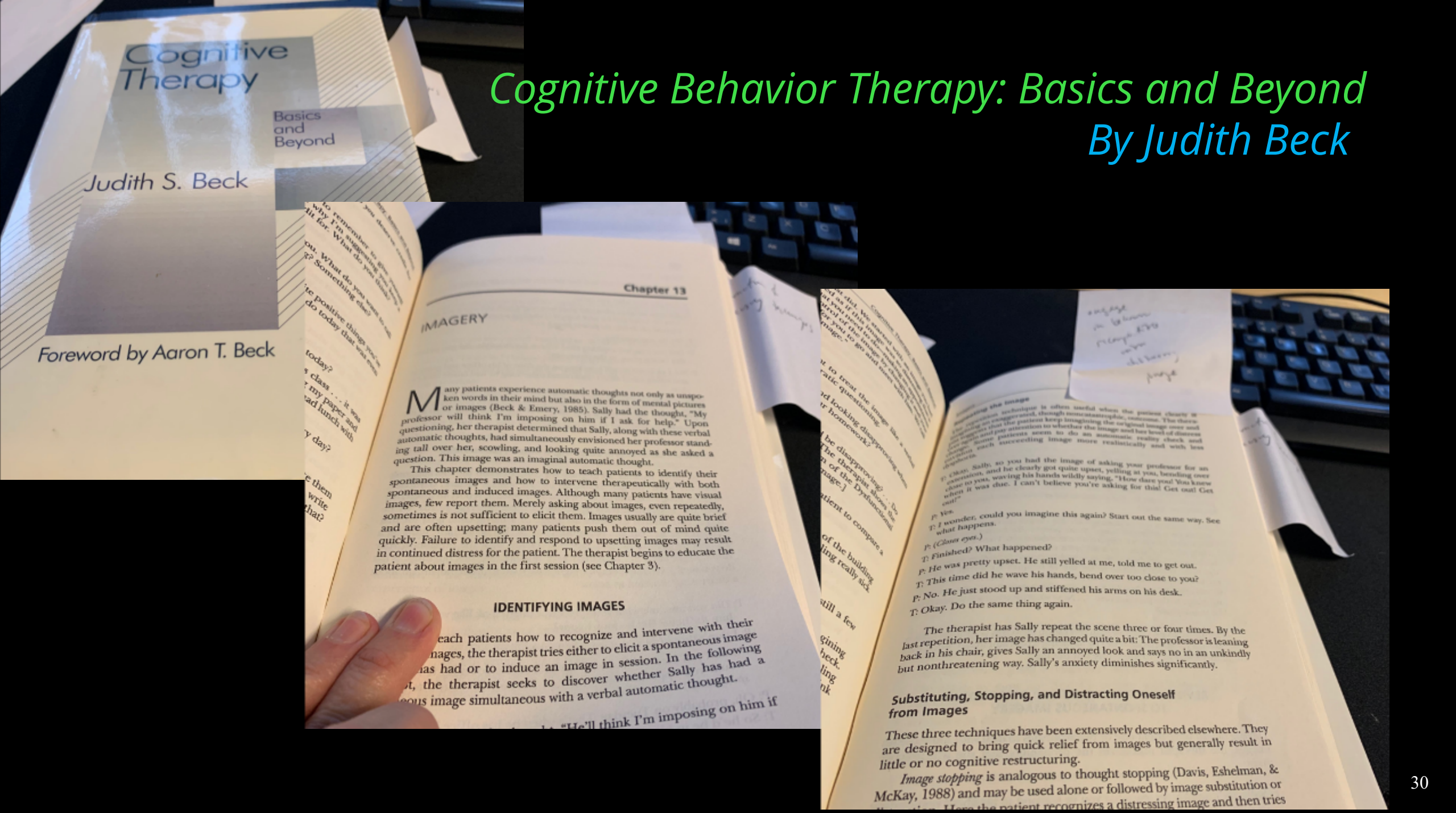
The inertia in studying and describing the phenomenal field and the conceptualizations in anxiety neurosis ap-

So how can we work with dysfunctional imagery in CBT?

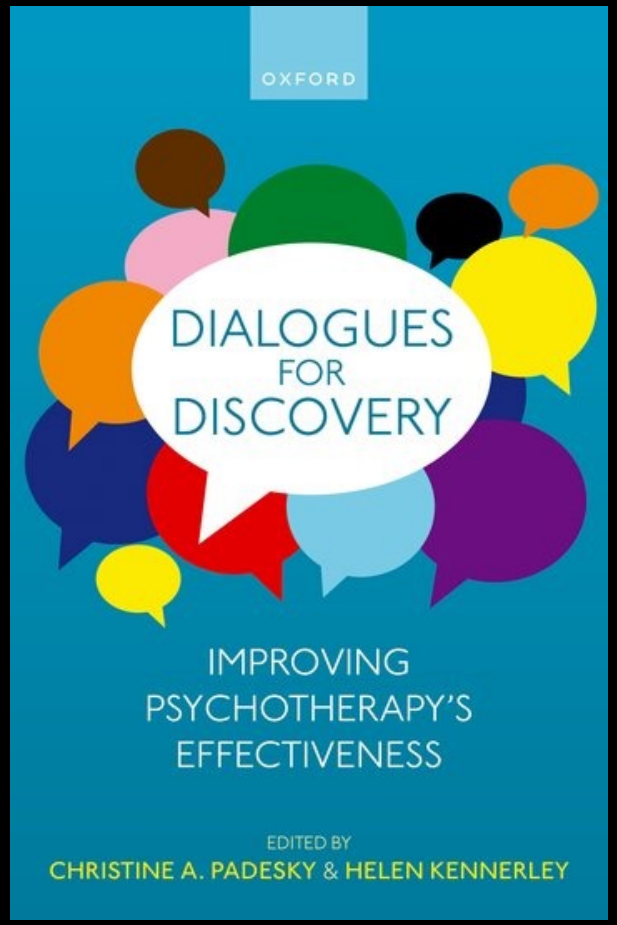
Not just by talking about it in words!

Fernand Léger, «Nus dans la forêt», 1909-1911

Cognitive Behavior Therapy: Basics and Beyond
By Judith Beck

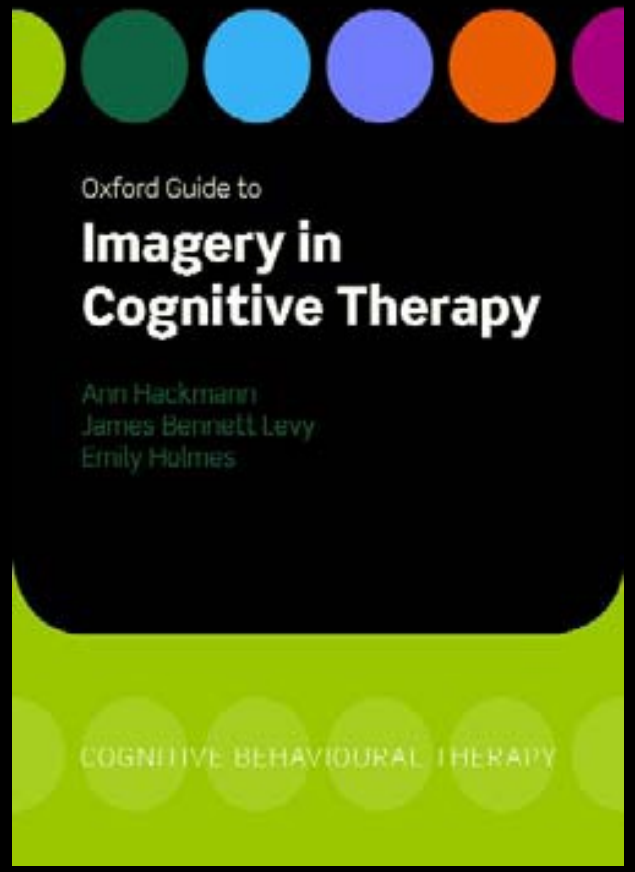


2023

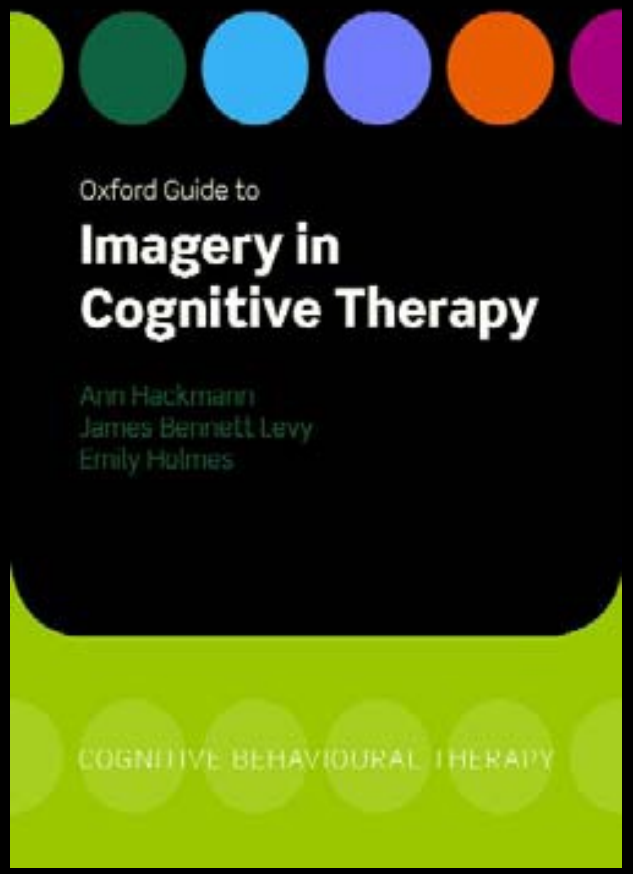


Imagery and socratic dialogue

Guide for clinicians
Hackmann, Bennett Levy & Holmes (2011)



Guide for clinicians
Hackmann, Bennett Levy & Holmes (2011)

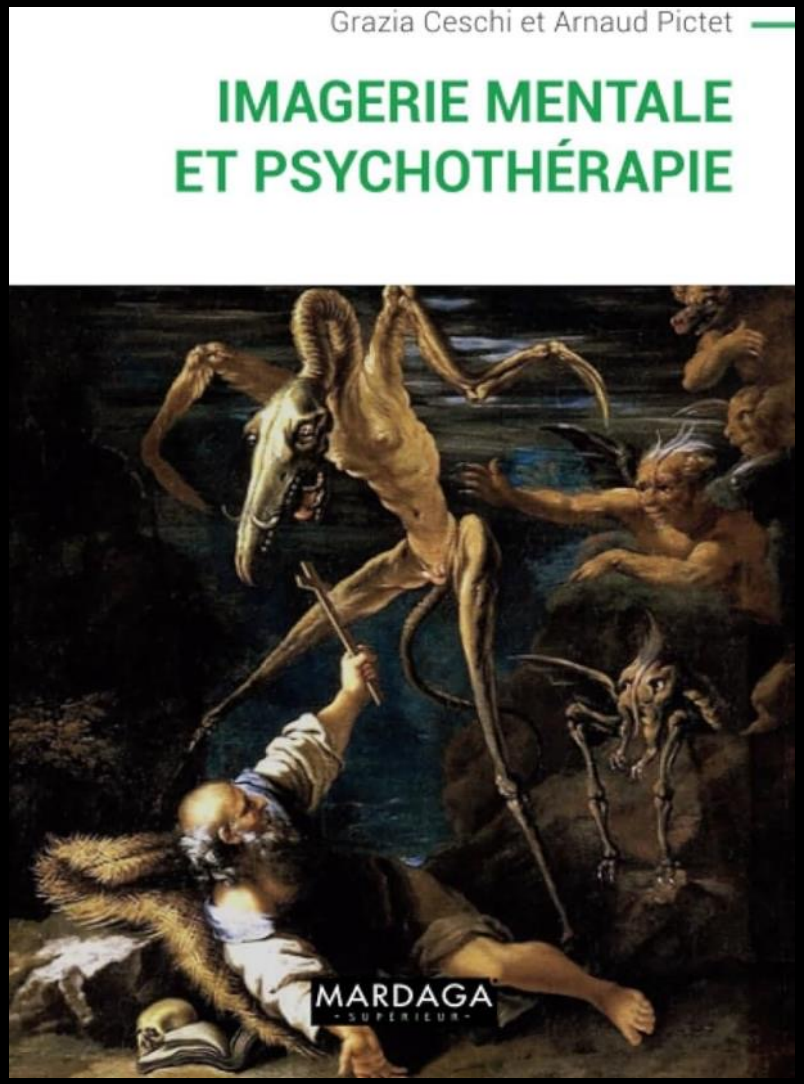


Assessment:

Ask about presence of negative intrusive images / absence positive images.

Treatment:

Imagery introduces additional techniques compared to just a focus on verbal thought.

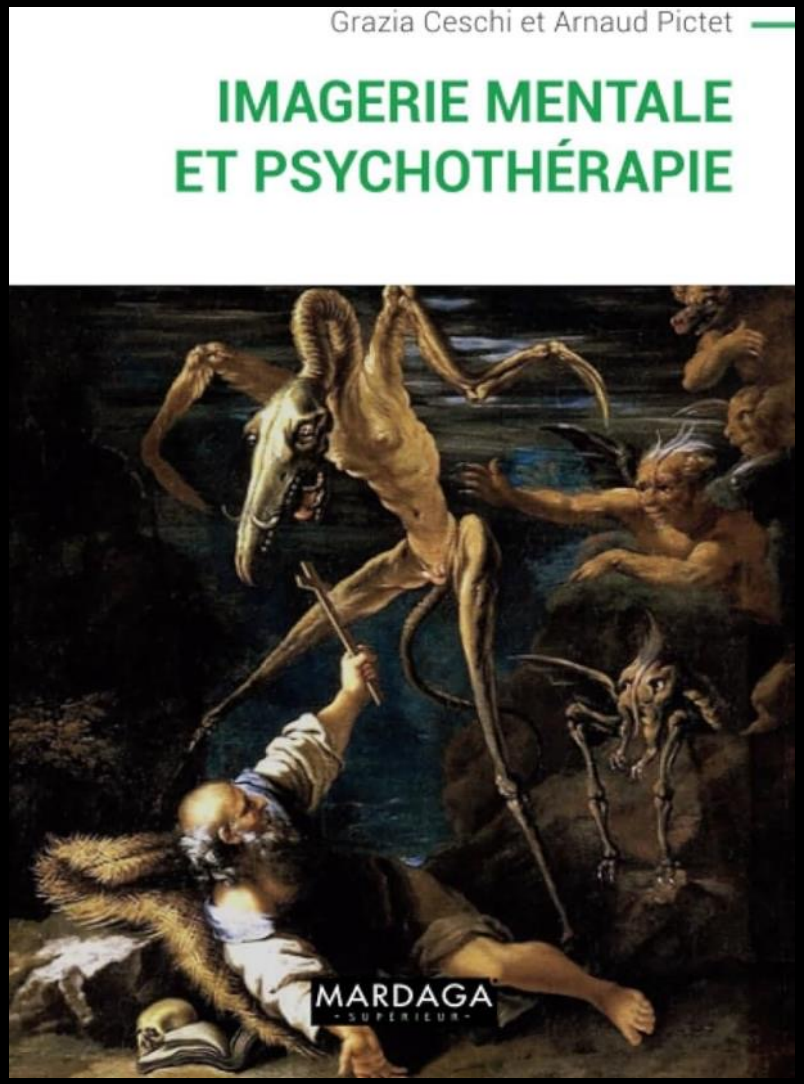


2018

À PROPOS DES AUTEURS

Docteur en psychologie, **Grazia Ceschi** est actuellement maître d'enseignement et de recherche à la section de psychologie de l'Université de Genève.

Arnaud Pictet, docteur en psychologie, s'est joint à l'@ET.lab juste après avoir mené à bien un doctorat à l'Université d'Oxford, dans le laboratoire du professeur Emily Holmes. Psychologue clinicien et chercheur, Arnaud Pictet s'intéresse au rôle de l'imagerie mentale dans les troubles de l'humeur et au développement d'interventions psychologiques visant à entraîner l'imagerie positive dans le cadre de la dépression



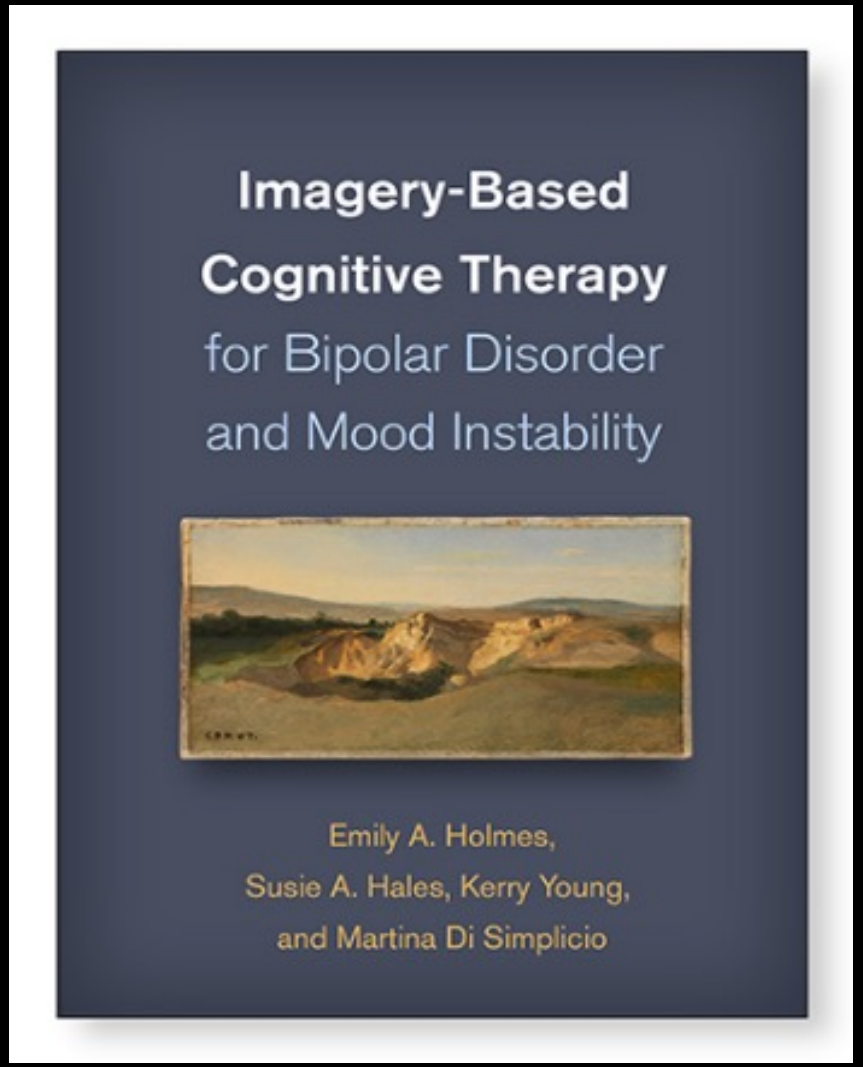
L’ouvrage présente une vision récente des techniques d’évaluation et d’intervention psychologique fondées sur l’imagerie mentale.

Ces techniques, qui s’appuient sur une base empirique de plus en plus importante, suscitent un très vif intérêt dans le milieu de la psychologie clinique anglophone. Néanmoins, elles restent encore largement inconnues du public francophone.

Ce livre est conçu comme une revue critique de psychopathologie cognitive avec un double objectif : offrir une synthèse de la littérature scientifique récente sur les images mentales en psychopathologie cognitive expérimentale, et mettre à disposition du public francophone un certain nombre d’outils d’évaluation et d’intervention dans le cadre de l’imagerie mentale. Les présentations théoriques sont complétées par des exemples d’application dans des domaines cliniques tels que l’état de stress posttraumatique, les troubles de l’humeur, l’anxiété sociale, les troubles obsessionnels compulsifs, les troubles du comportement alimentaire ou les addictions.

Un ouvrage de référence destiné aux psychologues cliniciens et aux chercheurs francophones.

Our second Imagery book: clinical manual



Holmes, Hales, Young and DiSimplicio (2019)

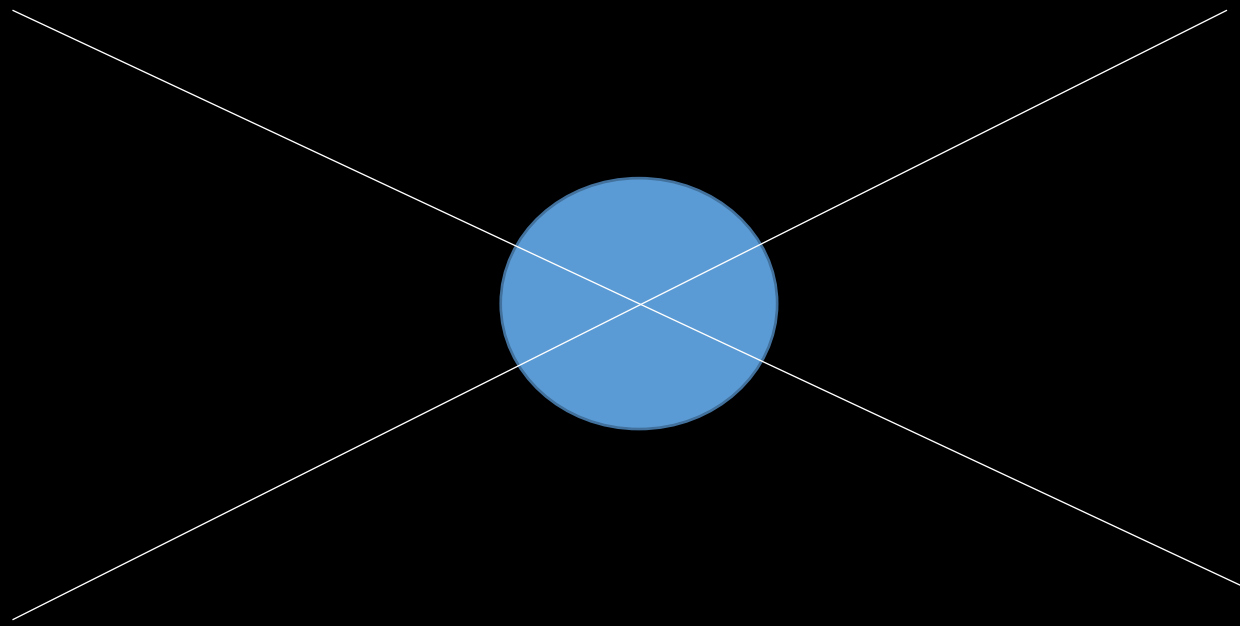
Guilford Press, May 2019

Forwards by Guy Goodwin and Gillian Butler

Our hypotheses re. bipolar disorder
(Holmes et al, 2008, 2011, 2016):

1. Vivid and compelling imagery in bipolar disorder
2. Imagery is a driver of mood instability
3. Imagery focussed CBT may help improve mood instability

Emotional mental imagery – a tractable target for intervention

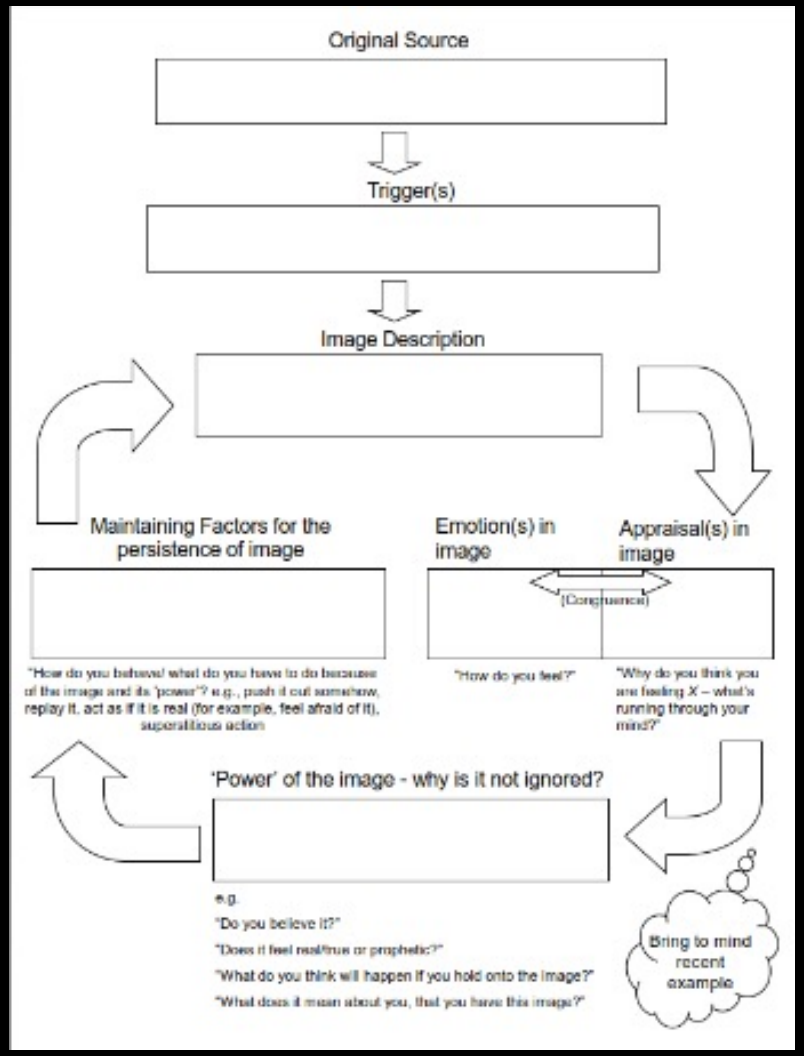


Mental imagery

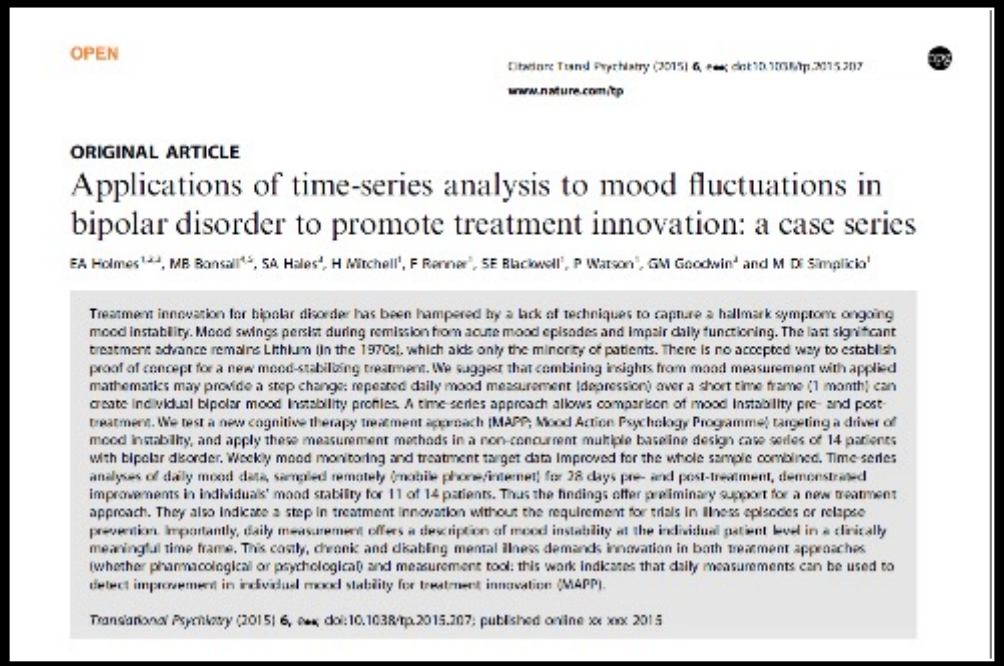
Mood instability

Thank you to Chris Fairburn for CBT consultancy

The CBT core: co-constructed understanding of the presenting problem
”mental imagery microformulation”



We developed an imagery-focussed CBT for bipolar disorder (c.6 sessions)



OPEN

Translational Psychiatry (2015) 6, e[illegible]; doi:10.1038/tp.2015.207

www.nature.com/tp

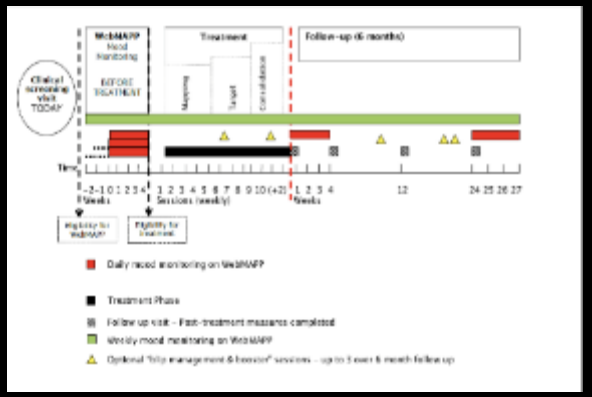
ORIGINAL ARTICLE

Applications of time-series analysis to mood fluctuations in bipolar disorder to promote treatment innovation: a case series

EA Holmes[1,2,3], MB Bonsall[4,5], SA Hales[4], H Mitchell[1], F Renner[1], SE Blackwell[1], P Watson[1], GM Goodwin[3] and M Di Simplicio[1]

Treatment innovation for bipolar disorder has been hampered by a lack of techniques to capture a hallmark symptom: ongoing mood instability. Mood swings persist during remission from acute mood episodes and impair daily functioning. The last significant treatment advance remains Lithium (in the 1970s), which aids only the minority of patients. There is no accepted way to establish proof of concept for a new mood-stabilising treatment. We suggest that combining insights from mood measurement with applied mathematics may provide a step change: repeated daily mood measurement (depression) over a short time frame (1 month) can create individual bipolar mood instability profiles. A time-series approach allows comparison of mood instability pre- and post-treatment. We test a new cognitive therapy treatment approach (MAPP; Mood Action Psychology Programme) targeting a driver of mood instability, and apply these measurement methods in a non-concurrent multiple baseline design case series of 14 patients with bipolar disorder. Weekly mood monitoring and treatment target data improved for the whole sample combined. Time-series analyses of daily mood data, sampled remotely (mobile phone/Internet) for 28 days pre- and post-treatment, demonstrated improvements in individuals' mood stability for 11 of 14 patients. Thus the findings offer preliminary support for a new treatment approach. They also indicate a step in treatment innovation without the requirement for trials in illness episodes or relapse prevention. Importantly, daily measurement offers a description of mood instability at the individual patient level in a clinically meaningful time frame. This costly, chronic and disabling mental illness demands innovation in both treatment approaches (whether pharmacological or psychological) and measurement tool; this work indicates that daily measurements can be used to detect improvement in individual mood stability for treatment innovation (MAPP).

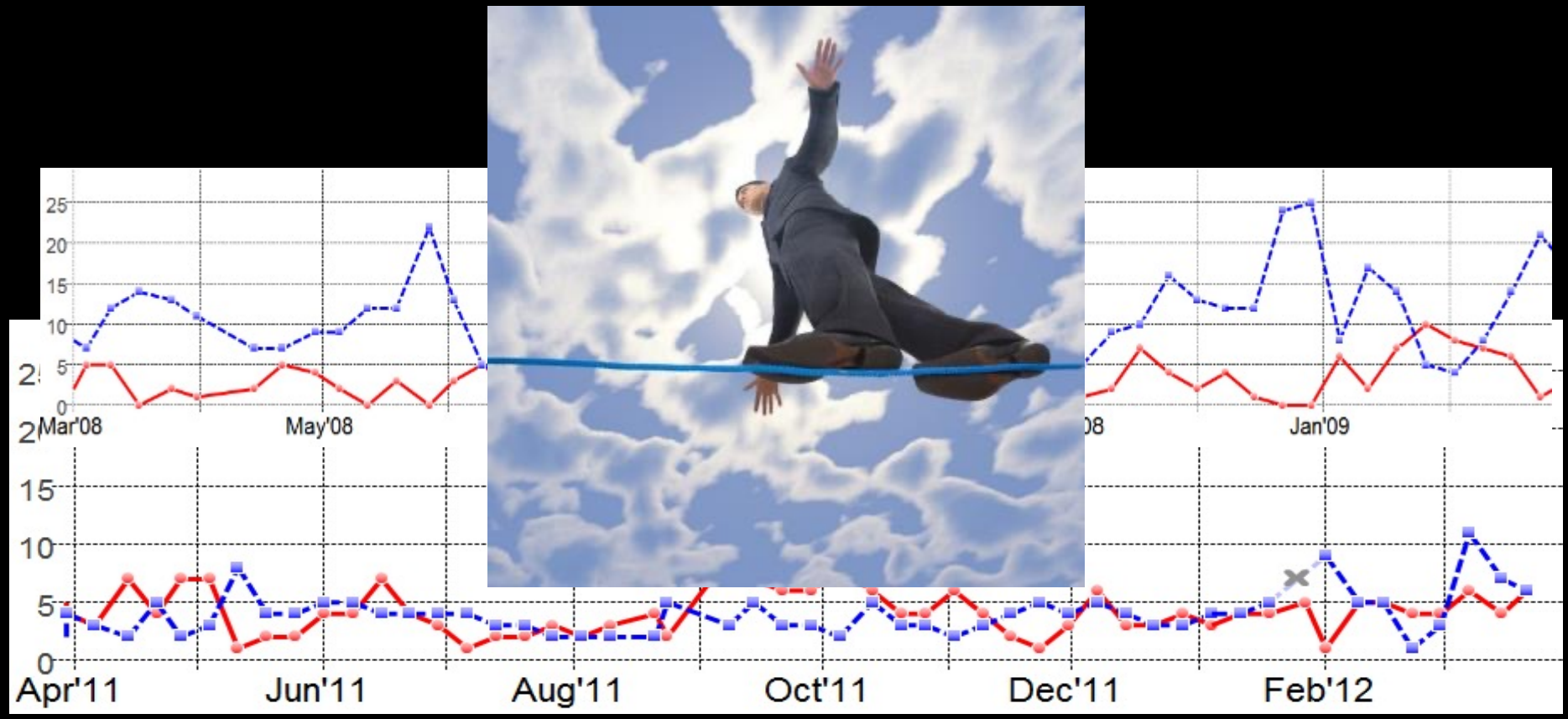
Translational Psychiatry (2015) 6, e[illegible]; doi:10.1038/tp.2015.207; published online xx xxx 2015



4 imagery-focussed therapy techniques

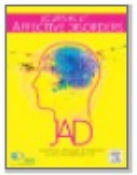
- metacognitive (it's not real)
- imagery rescripting
- imagery competing tasks
- positive imagery

Imagery-focussed cognitive therapy to stabilise bipolar mood instability



Holmes, Bonsall, Hales, Mitchell, Renner, Blackwell, Watson, Goodwin & Di Simplicio (2016), *Translational Psychiatry*

Journal of Affective Disorders
Volume 320, 1 January 2023, Pages 691-700



Research paper

Comparing the effectiveness of imagery focussed cognitive therapy to group psychoeducation for patients with bipolar disorder: A randomised trial ☆

K.C. van den Berg [a, b] ✉, A.T. Hendrickson [c], S.A. Hales [d, e], M. Voncken [b], G.P.J. Keijsers [b, f]

Highlights

- Imagery Focused Cognitive Therapy (ImCT) is as affective as group psychoeducation in reducing mood instability.
- ImCT is more effective at reducing levels of anxiety and depression measured daily.
- ImCT is more effective at reducing levels of hopelessness and better at increasing control over problematic imagery.

Abstract

Background

Bipolar disorder is a severe, chronic mental disorder. Treatment options are limited, with pharmacological approaches continuing to dominate. However, relapse rates remain high. Several adjunctive psychosocial interventions, mostly psychoeducation (PE) and cognitive behavioural therapy (CBT), have been trialled, but treatment innovation is still needed. In the past, brief group PE has proven as beneficial as longer individual CBT in reducing levels of depression and increasing self-management strategies. We compared the relative effectiveness of group PE to an imagery focussed cognitive behavioural therapy (ImCT).

Study design

This was a randomised parallel group study with both daily and weekly measures. A total of 62 adult patients were randomly allocated to either ImCT or group PE. Daily, weekly and pre-and post-intervention measures were used to assess impact on (i) mood instability, (ii) overall levels of depression, anxiety and mania, and (iii) general functioning, hopelessness and imagery characteristics. A four-week baseline and 16-week follow-up period were included.

Results

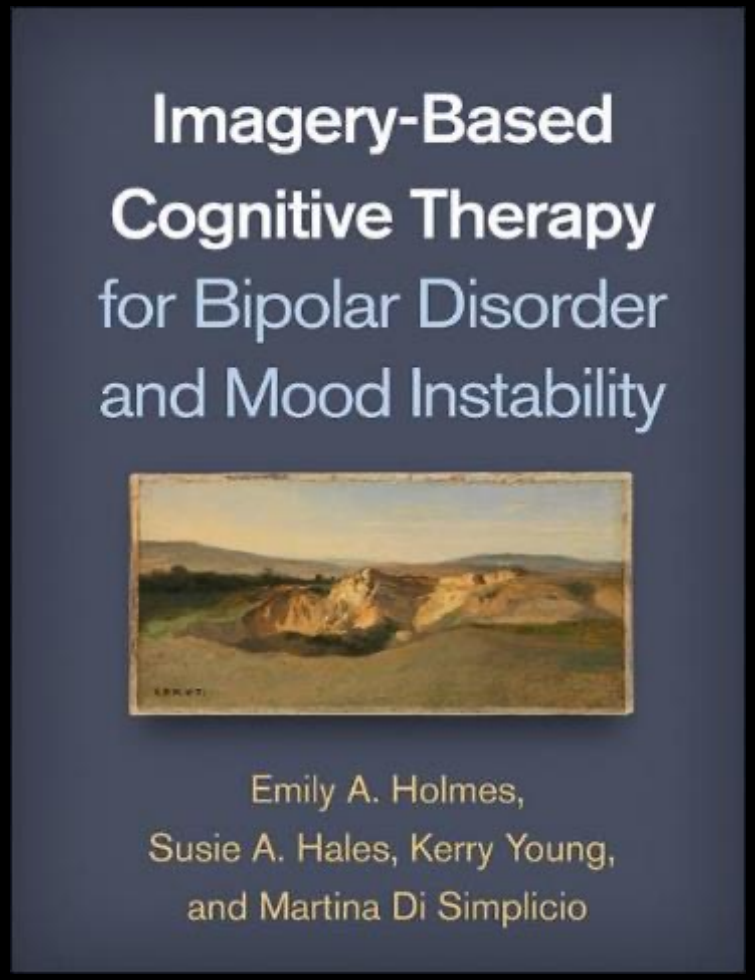
Mood instability reduced in both conditions after intervention. Levels of mania, depression and anxiety also reduced in both conditions, but on the daily measures, depression and anxiety significantly more so in the ImCT condition. Compared with the PE condition, the ImCT condition additionally showed increased level of functioning, reduced hopelessness, and a decrease in intrusive, problematic imagery.

Limitations

These findings need to be replicated in a larger trial.

Conclusions

Findings suggest that ImCT is a promising new avenue for management of bipolar disorder, an area in which treatment development is urgently needed.



Note: focus on one focal outcome – mood instability (not the whole of bipolar disorder)

Simplicity
Focus
Disseminability

Doing 1 thing, as simply as possible

2019

The 4 imagery techniques in the book could be used to any emotional instablity driven by imagery (not just bipolar disorder):

4 imagery-focussed therapy techniques:

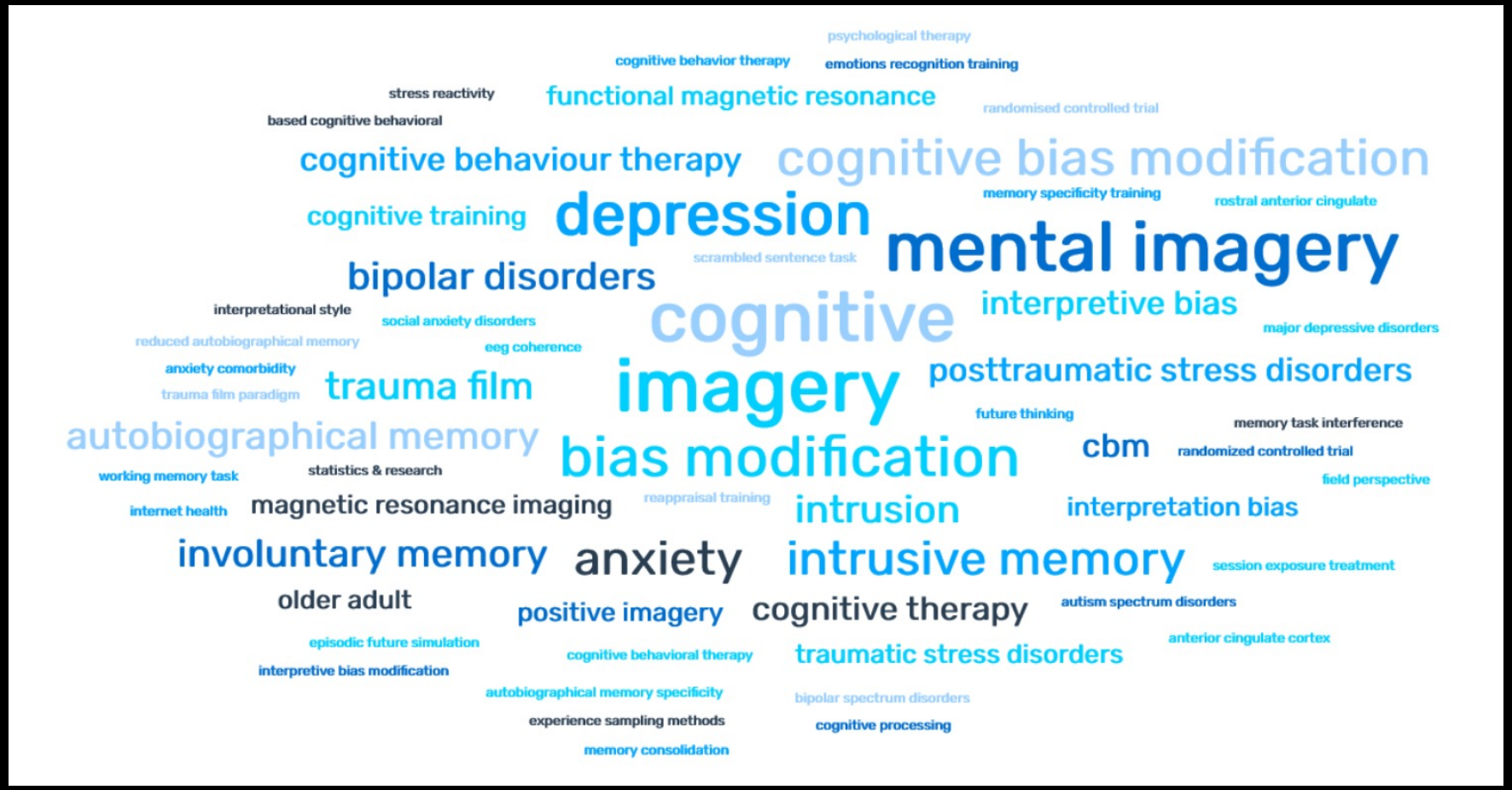
- metacognitive (it's not real)
- imagery rescripting
- positive imagery

- imagery competing tasks

Sandro Botticelli, «Primavera», late 1470s or early 1480s

Robert Delaunay, « La Ville de Paris» ,1912

Curiosity about Mental Imagery: Lines of enquiry in our research



Mesh terms, June 2020

How did we came to the idea of ” imagery competing tasks”?

Perhaps in treating imagery we can work more directly with **perceptual** systems!

Why research a new way of doing things?

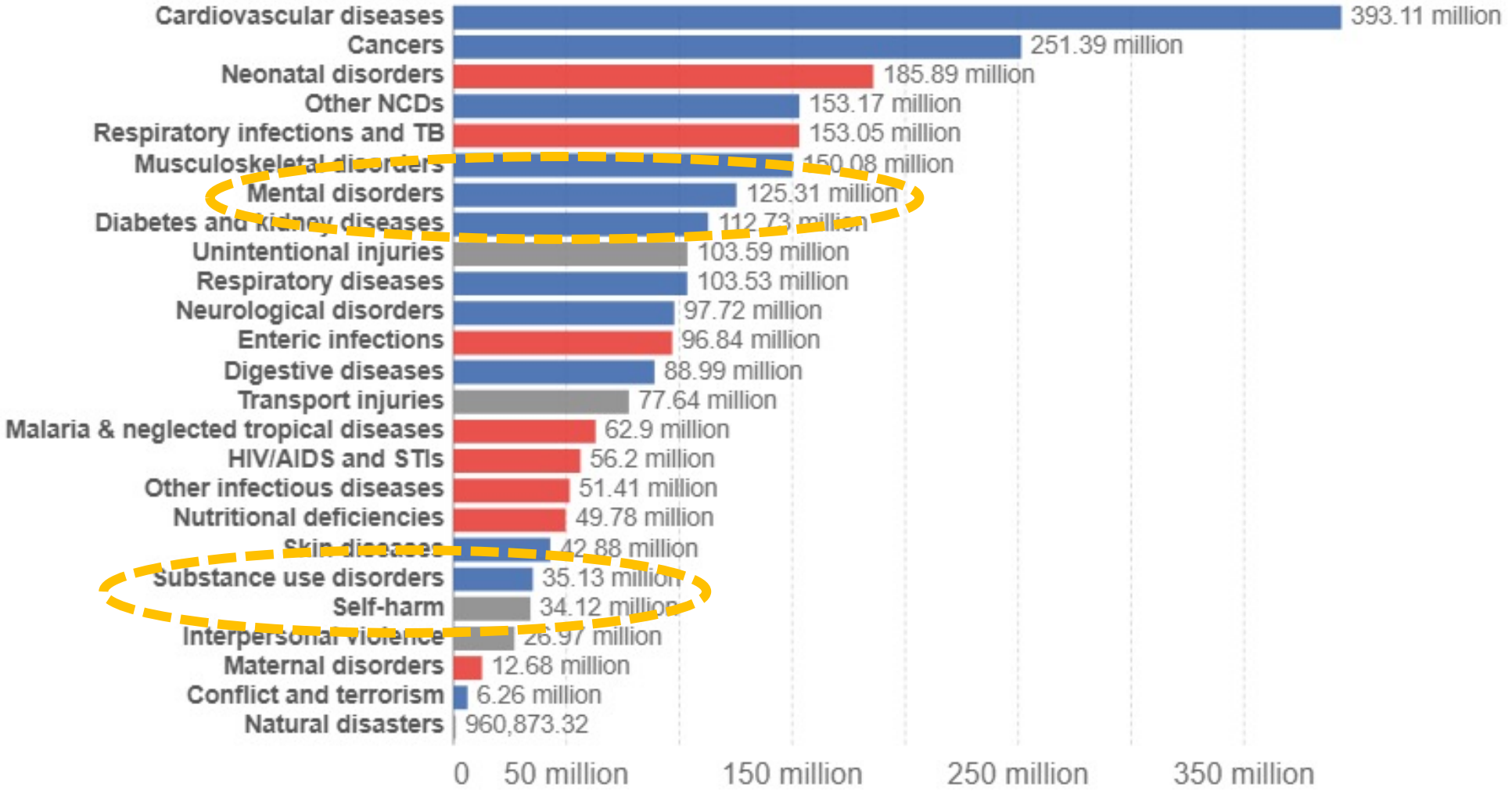
- The CBT therapy we have today is excellent
- But we cant reach everyone who needs it in the world
- So to complement our CBT approaches we use today, we also need new techniques that are simpler to reach people

Martial Raysse,
« Made in Japan - La grande odalisque », 1964

Burden of disease by cause, World, 2019

Our World in Data

Total disease burden, measured in Disability-Adjusted Life Years (DALYs) by sub-category of disease or injury.
DALYs measure the total burden of disease – both from years of life lost due to premature death and years lived with a disability. One DALY equals one lost year of healthy life.



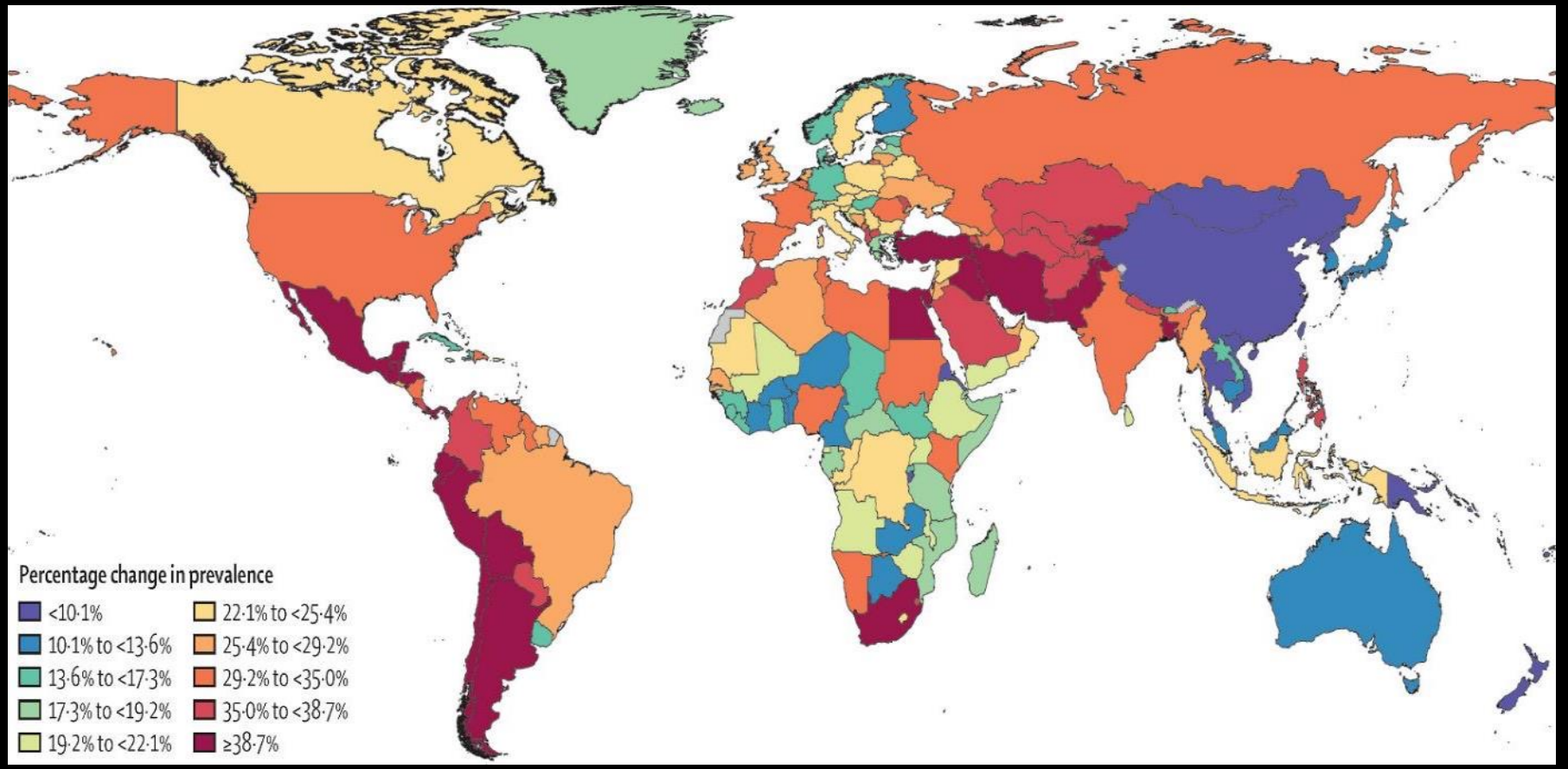
Source: IHME, Global Burden of Disease

OurWorldInData.org/burden-of-disease • CC BY

Note: Non-communicable diseases are shown in blue; communicable, maternal, neonatal and nutritional diseases in red; injuries in grey.

Increase in the prevalence of clinical **depression** during the Covid-19 pandemic, 2020

Rates of depression increased 27·6%
= 53·2 million more individuals globally



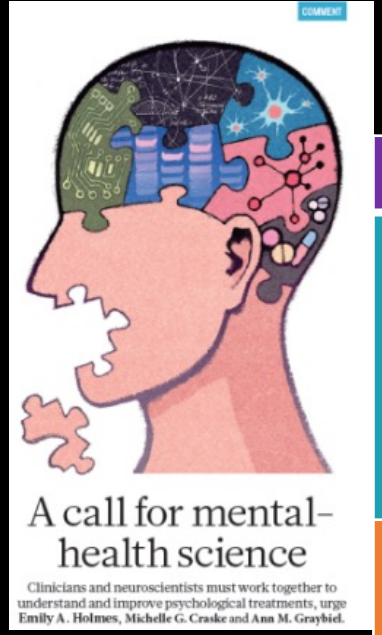
The Lancet 2021 3981700-1712DOI: (10.1016/S0140-6736(21)02143-7)

How do we rethink/imagine psychological treatments given the global burden of mental health?

- **Imagine** a 25% increase in patients, i.e. 53 million people globally in a year. Its clear we need to rethink.
- Radical rethink
- But remember, CBT has always been progressive, it was quite radical when it started too!
- Back to science…

Jean Metzinger, «Le goûter», 1911

Co-creating "Mental Health Science"



	Mental Health Science	Evolving ideas
2014 *Nature,* Holmes, Craske & Graybiel 	an umbrella discipline that can link different disciplines to **share a common goal:** improving treatments	e.g. psychology, psychiatry, neuroscience, social sciences, economics, maths, public health, epidemiology, history, arts etc etc
	2018 e.g. Future of Psychological Treatments *The Lancet Psychiatry* Holmes, Ghaderi, Harmer, Ramchandani, Cuijpers, Morrison, Roiser, Bockting, O'Connor, Shafran, Moulds & Craske	e.g. linking clinical & lab researchers, mechanisms, global perspective, developmental
	2020 *The Lancet Psychiatry*	e.g. importance of working together with experts by lived experience
	2021	e.g. focus on inequalities
	2022, 2023	…… ……

Here in France – we worked with younger researchers for a vision for the future

European Neuropsychopharmacology (2018) 28, 317-333

ELSEVIER

www.elsevier.com/locate/euroneuro

From neuroscience to evidence based psychological treatments - The promise and the challenge, ECNP March 2016, Nice, France

Guy M. Goodwin[a,*], Emily A. Holmes[b], Erik Andersson[b], Michael Browning[a], Andrew Jones[c], Johanna Lass-Hennemann[d], Kristoffer NT Månsson[e,k], Carolin Moessnang[f], Elske Salemink[g], Alvaro Sanchez[h], Linda van Zutphen[i], Renée M. Visser[j]

[a]University Department of Psychiatry, University of Oxford and Oxford Health NHS Trust, Warneford Hospital, Oxford OX3 7JX, UK
[b]Department of Clinical Neuroscience, Karolinska Institutet, SE-171 77 Stockholm, Sweden
[c]Psychological Sciences, University of Liverpool, Bedford St South, Liverpool L697ZA, UK
[d]Division of Clinical Psychology and Psychotherapy, Department of Psychology, Saarland University, D- 66123 Saarbrucken, Germany
[e]Department of Psychology, Stockholm University, SE-106 91, Department of Clinical Neuroscience, Karolinska Institutet, SE-171 77 Stockholm, Sweden
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[h]Ghent University, Department of Experimental Clinical and Health Psychology, Henri Dunantlaan 2, B-9000 Ghent, Belgium
[i]Department of Clinical Psychological Science, Faculty of Psychology and Neuroscience, Universiteitssingel 40; 6229 ER, Maastricht University, Maastricht, the Netherlands
[j]Medical Research Council Cognition & Brain Sciences Unit, University of Cambridge, 15 Chaucer Road, Cambridge CB2 7EF, UK
[k]Department of Psychology, Uppsala University, SE-75105, Uppsala, Sweden

ecnp
Neuroscience applied

What do we mean uncovering the mechanisms behind CBT?

The story of Willow Bark to Aspirin

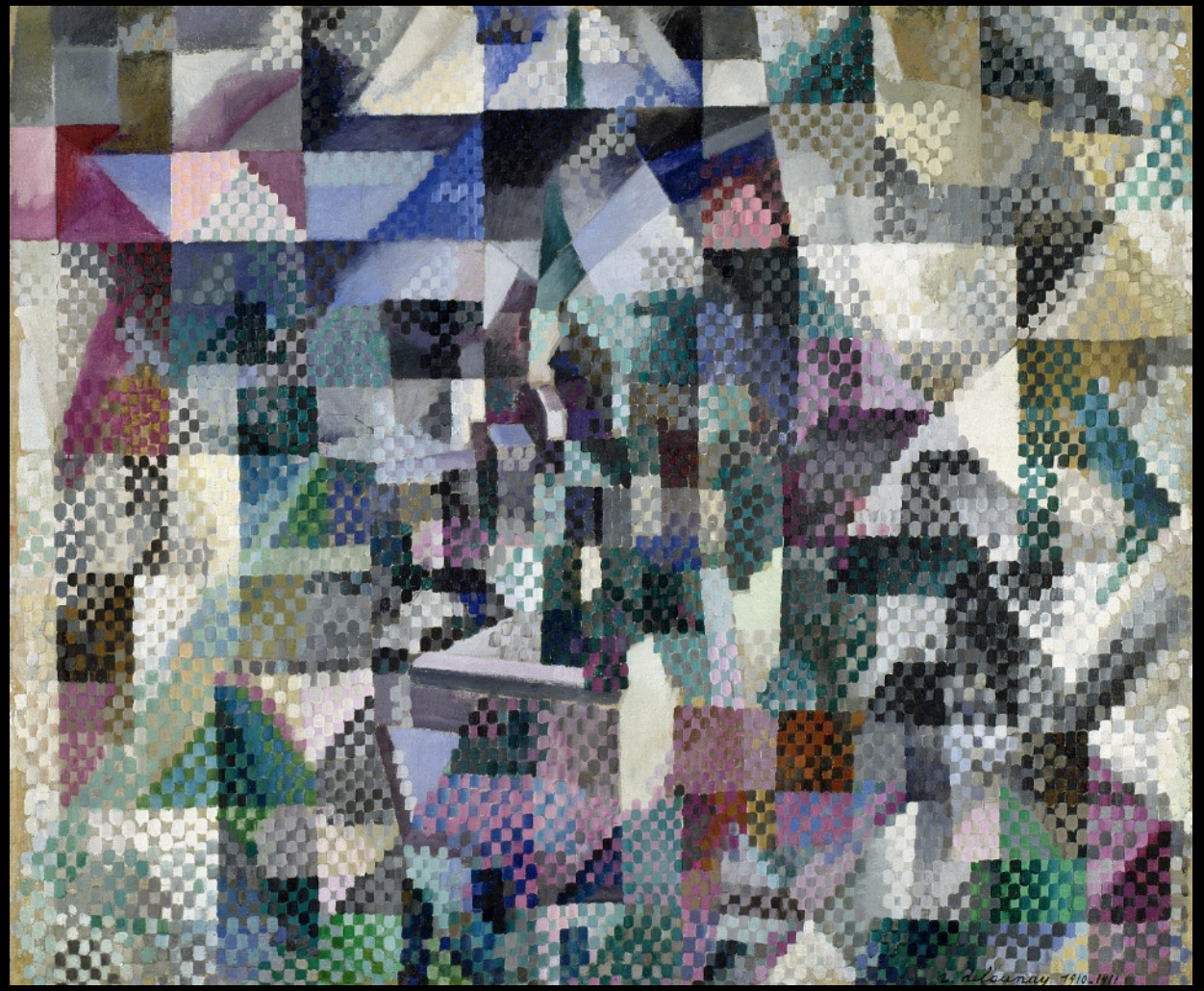
Desborough & Keeling (2017)

Egyptians (3500 years ago)
Making Salicin crystals from willow bark on a bread oven, 3 hours (1830 AD)
First trials of salicin (1876)
Aspirin discovery (1897)
Widespread use in flu pandemic (1918)
First presciptions of aspirin (1950)
prevention of stroke (1978)
prevention bowel cancer (2010)
2017 ”now the most commonly used drug in the world, life saving in the prevention of cardiovascular disease”

From CBT to xxx?

- Psychological treaments work
- Excellent work has been done
- And excellent work is still needed to progress CBT into new innovative forms which complement what we already have but can reach more people

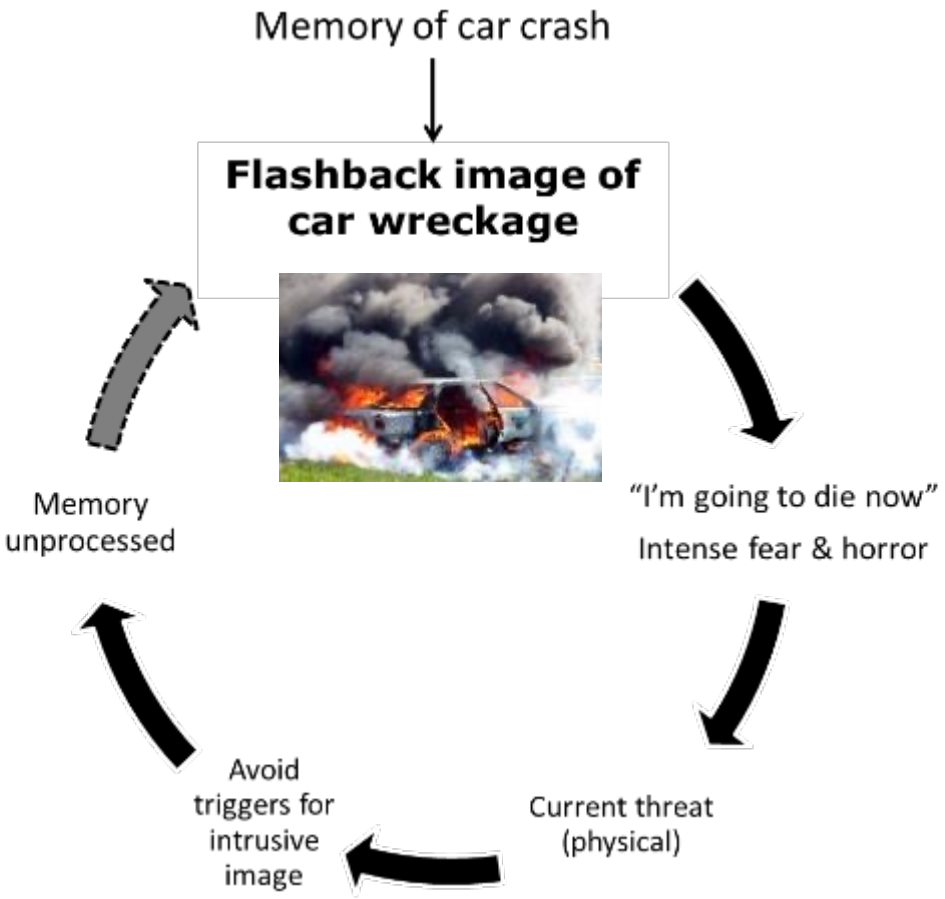
CBT can give us a formulation, an invaluable place to start asking questions



Robert Delaunay, «Window on the City No. 3», 1911-12

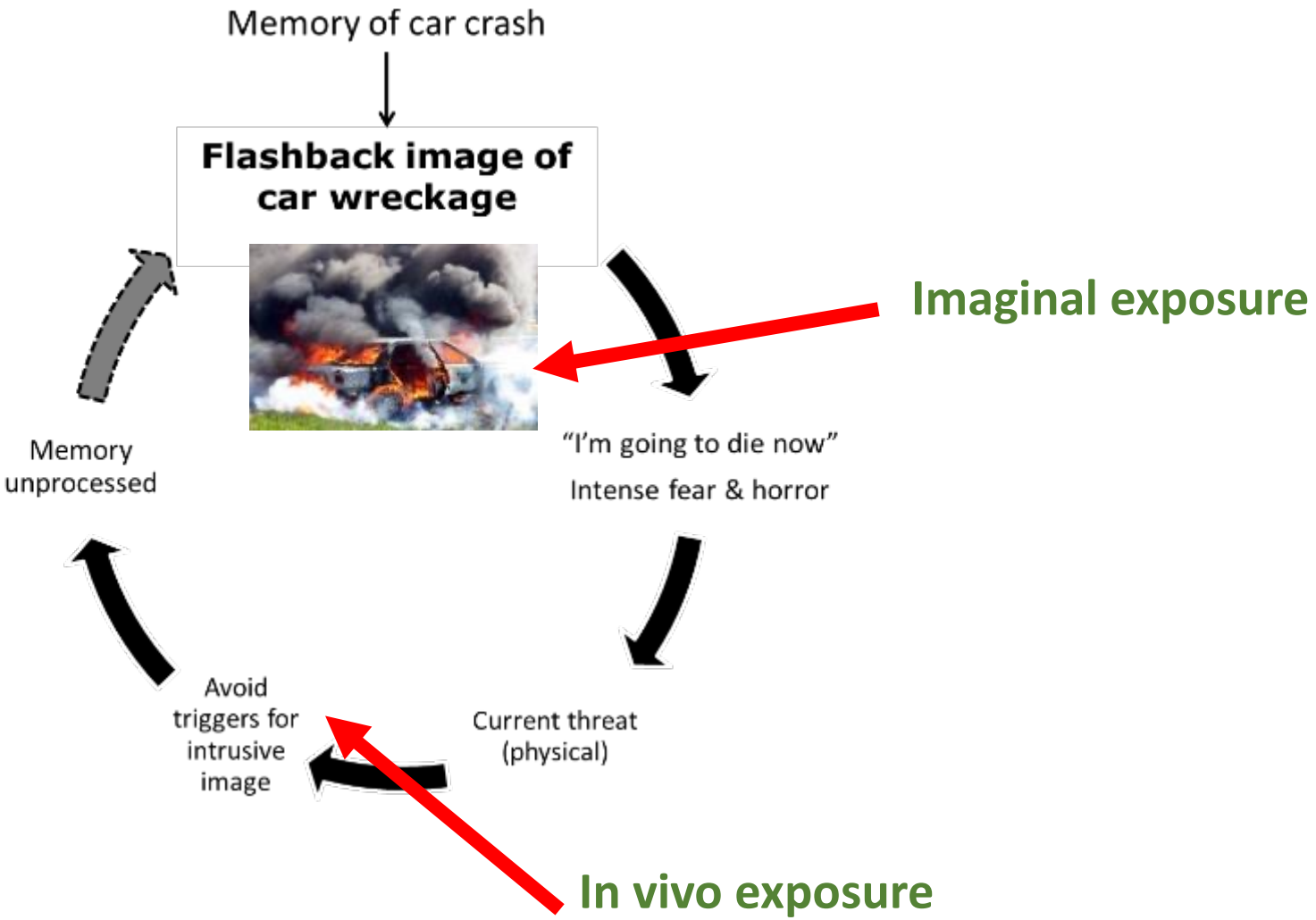
Mechanisms involved in CBT treatment for intrusive memories in post-traumatic stress disorder

CBT formulation – vicious cycle



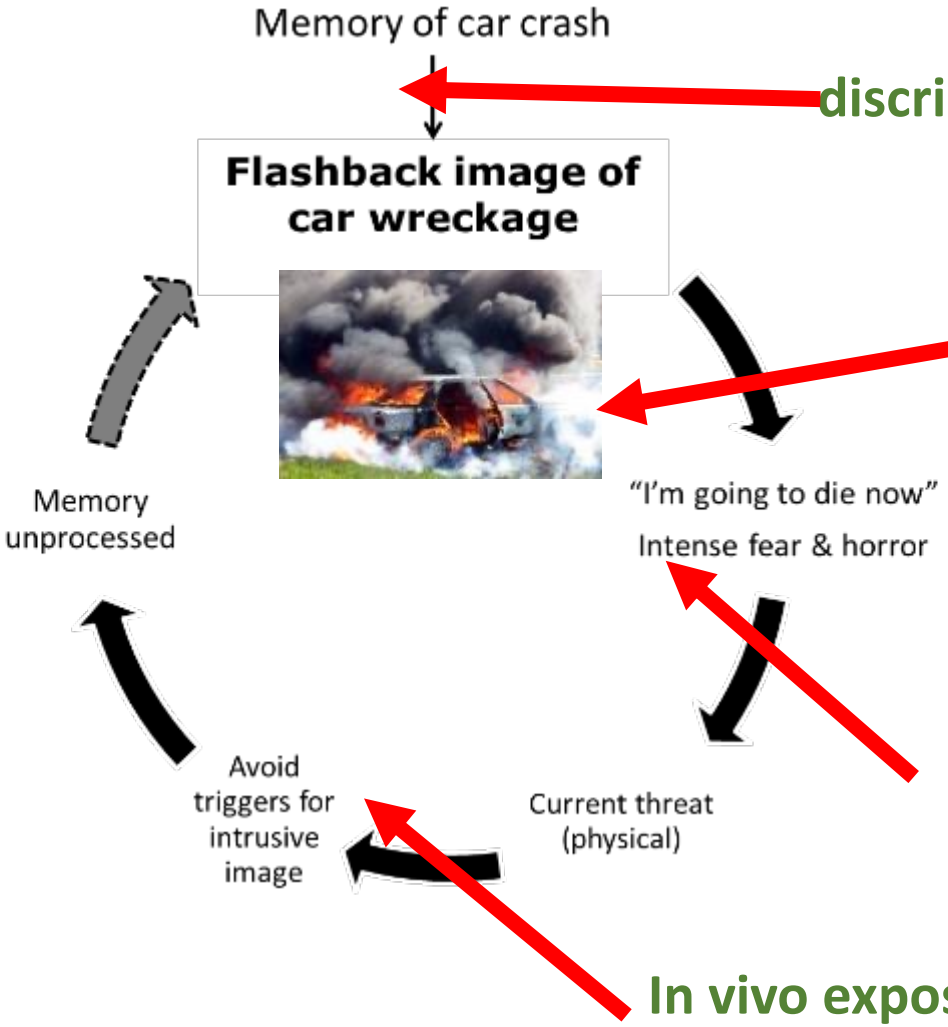
Mechanisms involved in CBT treatment for intrusive memories in post-traumatic stress disorder – some examples

CBT formulation – vicious cycle



Mechanisms involved in CBT treatment for intrusive memories in post-traumatic stress disorder – some examples

CBT formulation – vicious cycle



discrimination of triggers

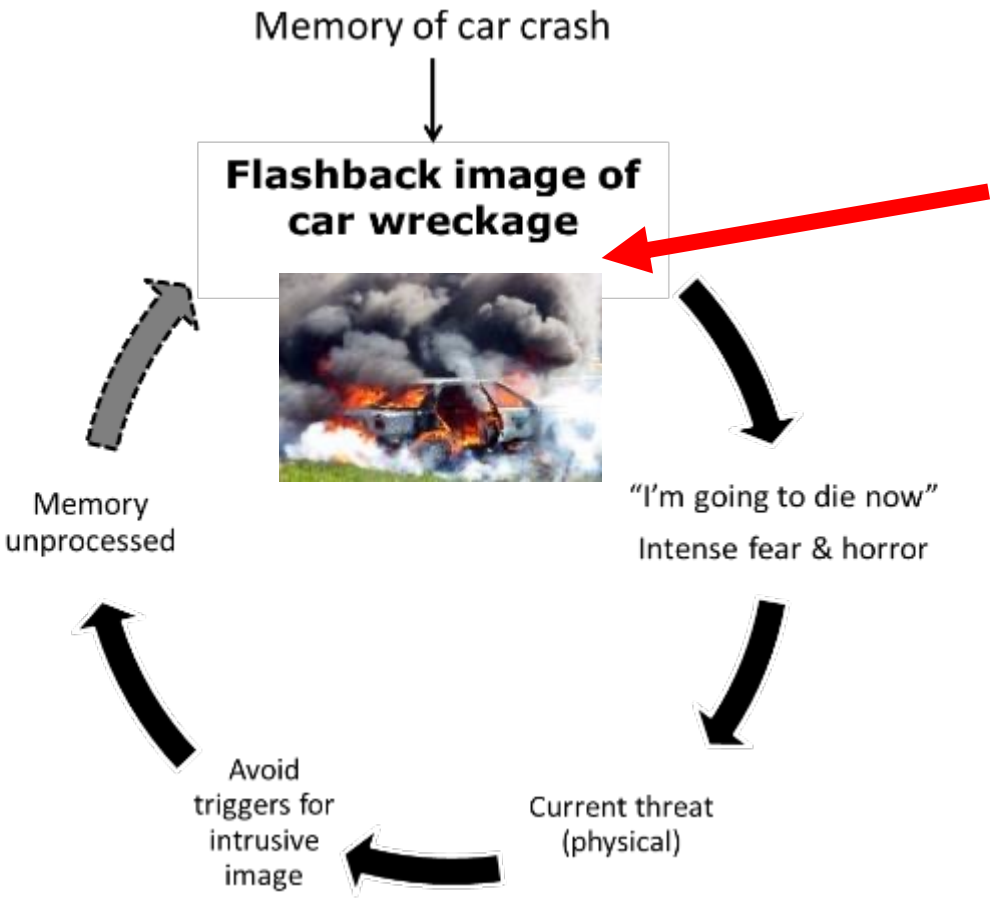
Imaginal exposure

Reappraisal/updating meaning of the content either verbally or with imagery scripting

In vivo exposure

"Mechanisms are blind to intervention type" (Steve Hollon)
intervene in any way at key points

CBT formulation – vicious cycle



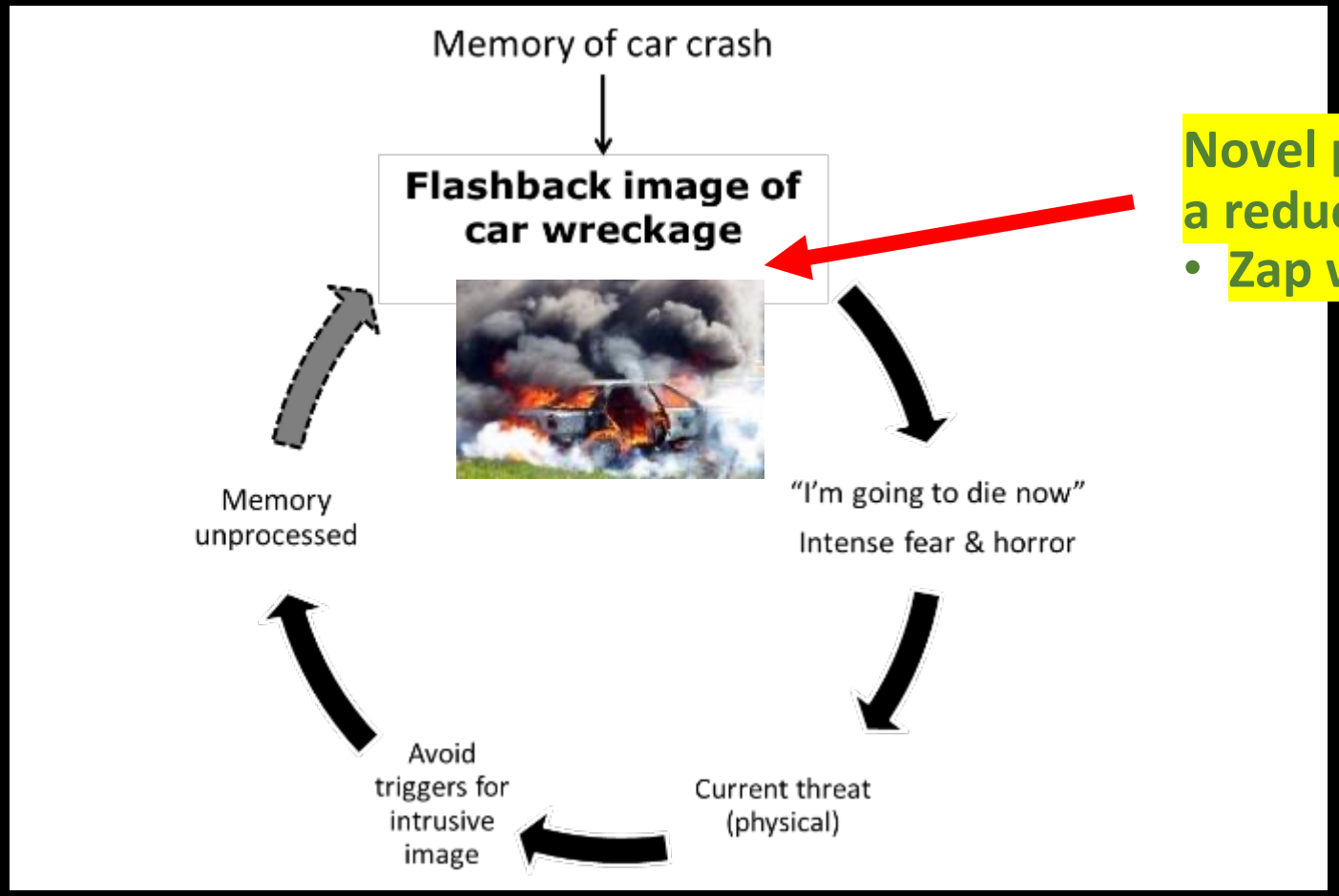
"PERCEPTUAL CBT"?

*Iyadurai et al, 2018; Singh et al, 2020; Kanstrup et al, 2021

Critically, intrusive memories after trauma are mental images

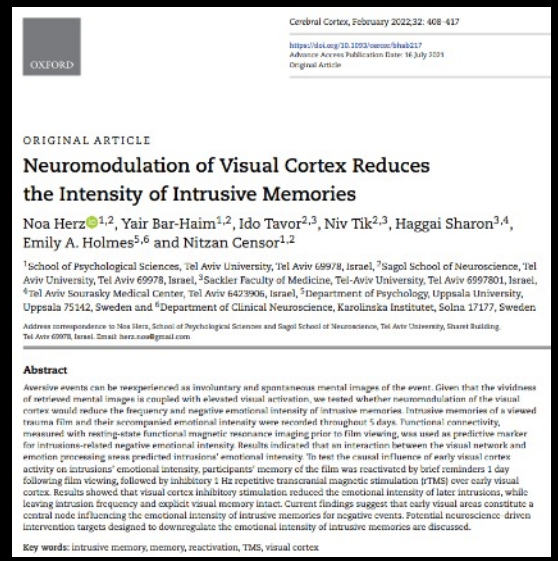
- are **sensory memories** of traumatic event(s) that repeatedly spring to mind unwanted.

“Mechanisms are blind to intervention” (Steve Hollon)
intervene in any way at key points



Novel perceptual ways of achieving a reduction in intrusive memories

- **Zap with TMS**



Cerebral Cortex, February 2022;32: 408–417

https://doi.org/10.1093/cercor/bhab217
Advance Access Publication Date: 16 July 2021
Original Article

ORIGINAL ARTICLE

Neuromodulation of Visual Cortex Reduces the Intensity of Intrusive Memories

Noa Herz[1,2], Yair Bar-Haim[1,2], Ido Tavor[2,3], Niv Tik[2,3], Haggai Sharon[3,4], Emily A. Holmes[5,6] and Nitzan Censor[1,2]

[1]School of Psychological Sciences, Tel Aviv University, Tel Aviv 69978, Israel, [2]Sagol School of Neuroscience, Tel Aviv University, Tel Aviv 69978, Israel, [3]Sackler Faculty of Medicine, Tel-Aviv University, Tel Aviv 6997801, Israel, [4]Tel Aviv Sourasky Medical Center, Tel Aviv 6423906, Israel, [5]Department of Psychology, Uppsala University, Uppsala 75142, Sweden and [6]Department of Clinical Neuroscience, Karolinska Institutet, Solna 17177, Sweden

Address correspondence to Noa Herz, School of Psychological Sciences and Sagol School of Neuroscience, Tel Aviv University, Sharet Building, Tel Aviv 69978, Israel. Email: herz.noa@gmail.com

Abstract

Aversive events can be reexperienced as involuntary and spontaneous mental images of the event. Given that the vividness of retrieved mental images is coupled with elevated visual activation, we tested whether neuromodulation of the visual cortex would reduce the frequency and negative emotional intensity of intrusive memories. Intrusive memories of a viewed trauma film and their accompanied emotional intensity were recorded throughout 5 days. Functional connectivity, measured with resting-state functional magnetic resonance imaging prior to film viewing, was used as predictive marker for intrusions-related negative emotional intensity. Results indicated that an interaction between the visual network and emotion processing areas predicted intrusions' emotional intensity. To test the causal influence of early visual cortex activity on intrusions' emotional intensity, participants' memory of the film was reactivated by brief reminders 1 day following film viewing, followed by inhibitory 1 Hz repetitive transcranial magnetic stimulation (rTMS) over early visual cortex. Results showed that visual cortex inhibitory stimulation reduced the emotional intensity of later intrusions, while leaving intrusion frequency and explicit visual memory intact. Current findings suggest that early visual areas constitute a central node influencing the emotional intensity of intrusive memories for negative events. Potential neuroscience- driven intervention targets designed to downregulate the emotional intensity of intrusive memories are discussed.

Key words: intrusive memory, memory, reactivation, TMS, visual cortex

We couldn’t use TMS to tackle an image at global scale

- However we can influence perceptual procesing in many other ways, e.g. use behavioural tasks which interfer with mental imagery

- E.g. visuospatial tasks such as games, pattern making, shape moulding etc

Sonia Delaunay-Terk, «Triptych», 1963

Perhaps we could use an imagery competing task, such as computer game play

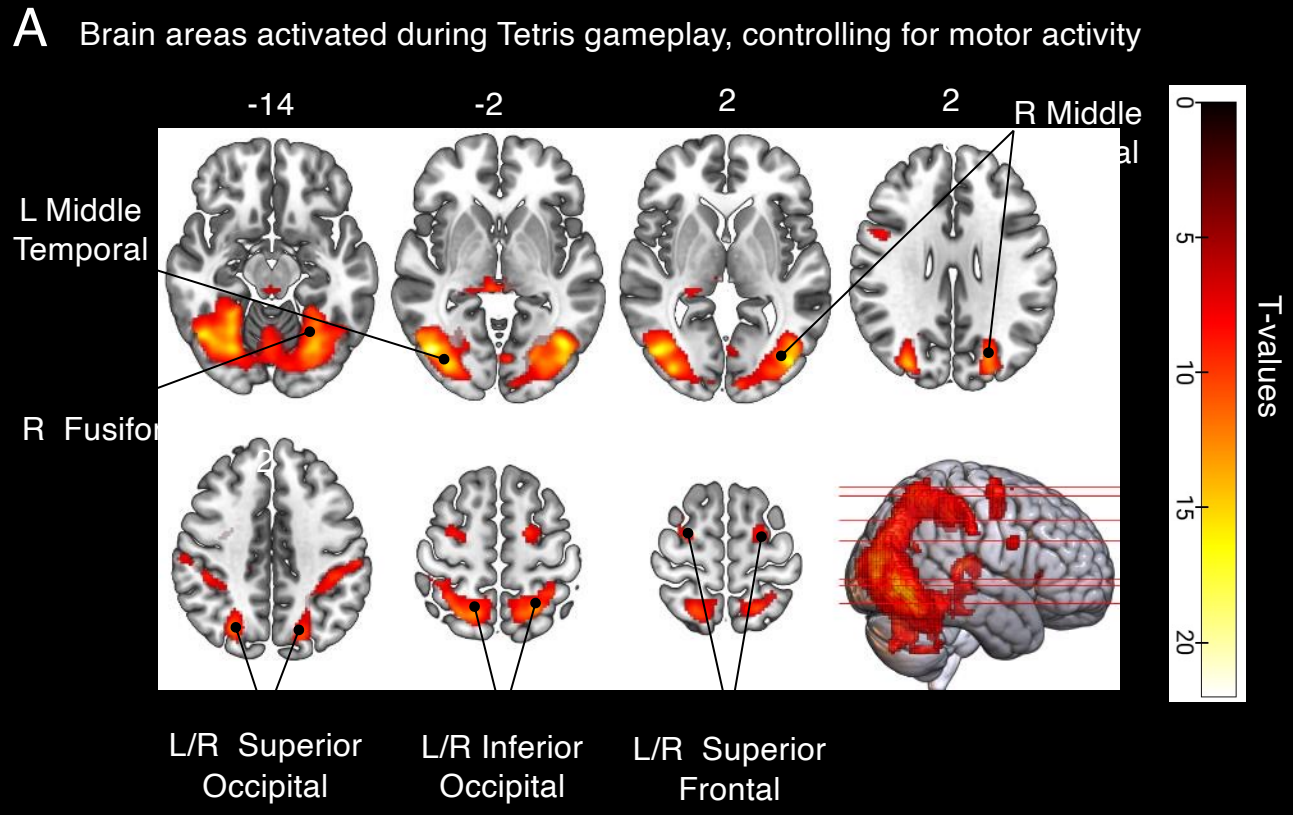


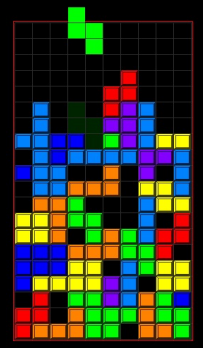
Figure 1 from Agren, Hoppe, Singh, *et al.* The neural basis of Tetris gameplay: implicating the role of visuospatial processing. *Curr Psychol* (2021). https://doi.org/10.1007/s12144-021-02081-z

One possibility – an imagery competing task + memory updating

when a memory is active in "working memory" and malleable

engaging in a visuospatial task may reduce the number of intrusive memories

Intrusive memories of trauma comprise sensory mental images



Visuospatial tasks interfere with visual mental images (i.e. imagery-competing tasks)

Disrupting the storage/restorage of sensory representations of trauma, will limit the reoccurrence of intrusive memories

Holmes et al, 2009; 2010

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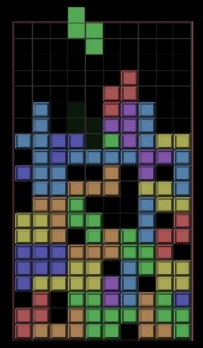

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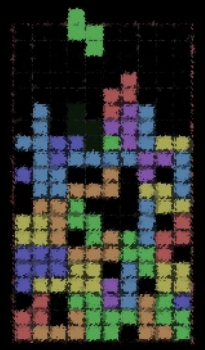

Visuospatial tasks interfere with visual mental images (i.e. imagery-competing tasks)

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Holmes et al, 2009; 2010

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+

Visuospatial tasks interfere with visual mental images (i.e. imagery-competing tasks)

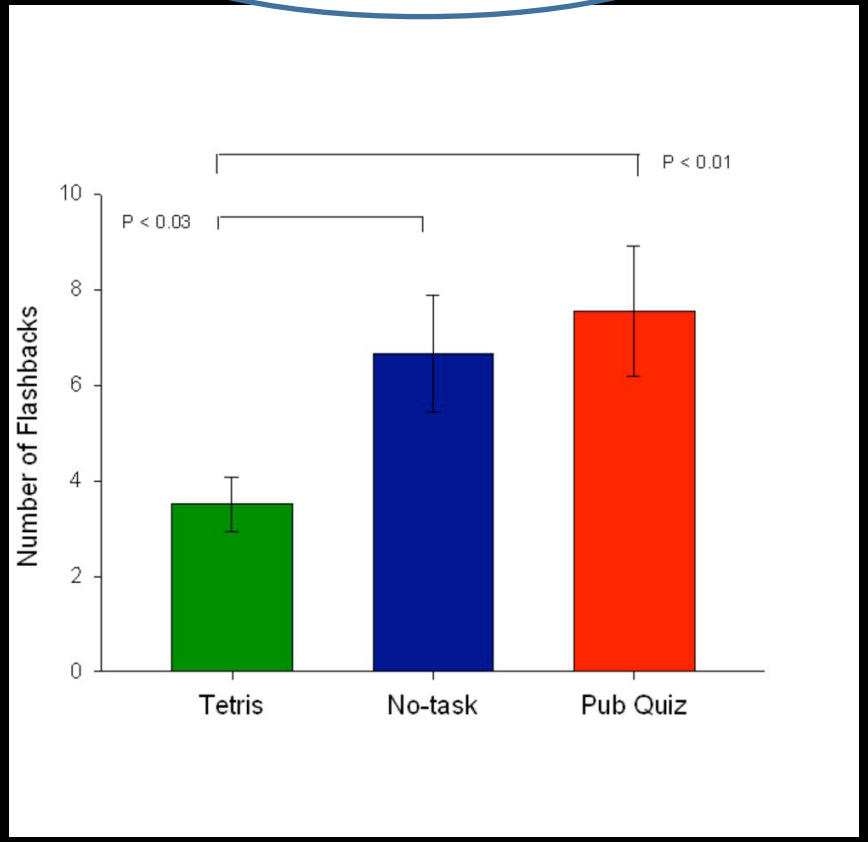
→

Disrupting the storage/restorage of sensory representations of trauma, will limit the reoccurrence of intrusive memories

Holmes et al, 2009; 2010

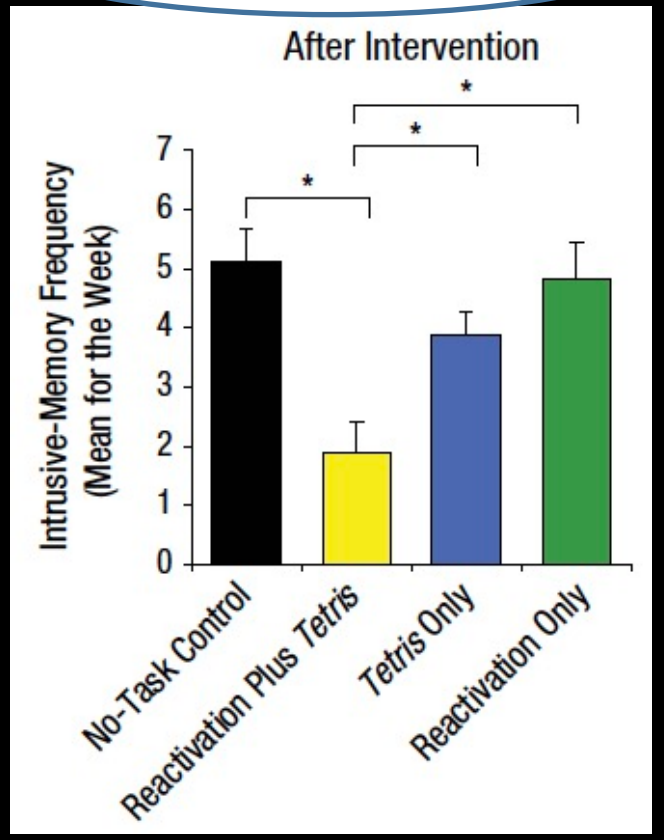
Laboratory experiments

4 hours after viewing a traumatic film



Holmes, James, Kilford & Deeprose, 2010, PLOS ONE

24 hours after viewing a traumatic film



James et al. (2015) *Psych Science*

After actual trauma in the ED

Road traffic accident patients waiting in an emergency department
(n = 71 RCT)

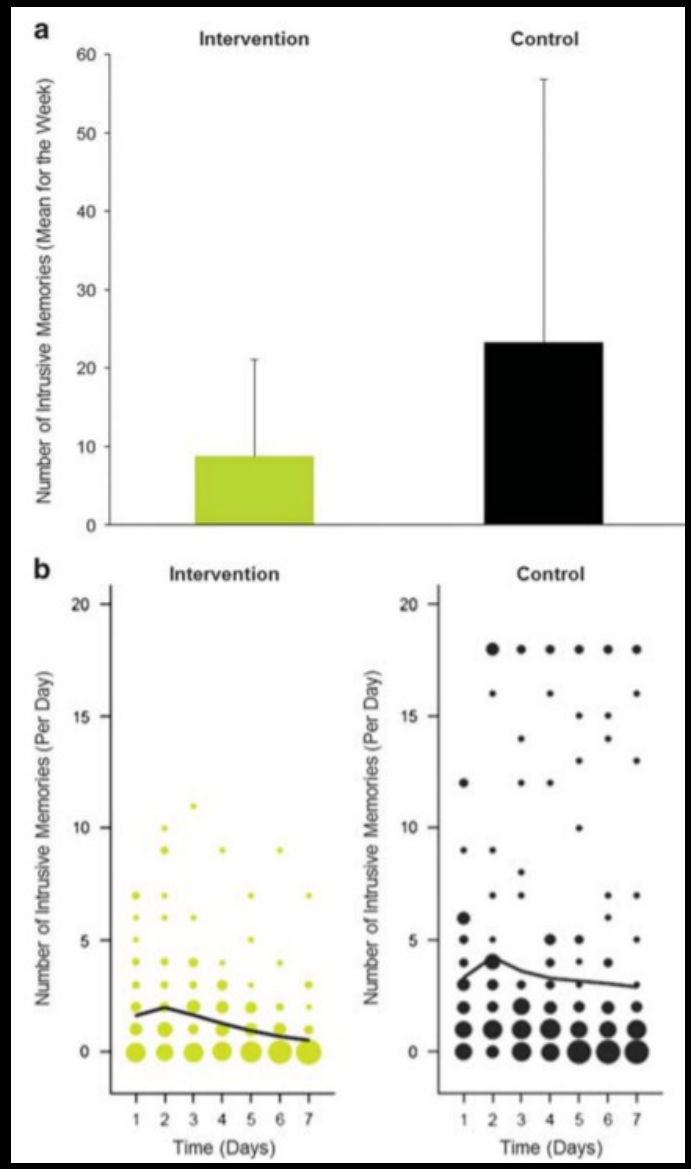
OPEN

Molecular Psychiatry (2017) 00, 1–9
www.nature.com/mp

ORIGINAL ARTICLE

Preventing intrusive memories after trauma via a brief intervention involving Tetris computer game play in the emergency department: a proof-of-concept randomized controlled trial

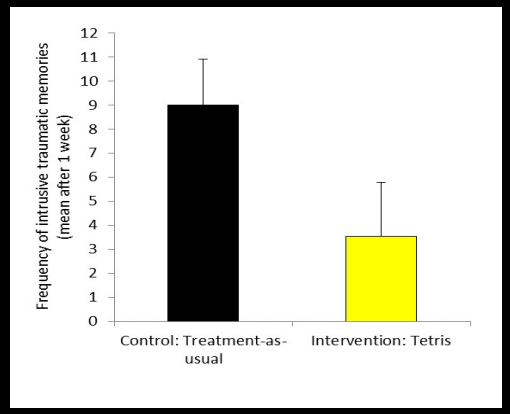
L Iyadurai[1], SE Blackwell[2,3], R Meiser-Stedman[4], PC Watson[2], MB Bonsall[5], JR Geddes[1,6], AC Nobre[1] and EA Holmes[7]



Fewer intrusive memories in the intervention v. control group (8 v. 23)

Intervention in first hours after traumatic childbirth

Photo by A. Horsch
with permission



→Fewer intrusive memories 1-week post-intervention

Horsch, Vial, Favrod, …Watson, Iyadurai, Bonsall & Holmes (2017), *Behaviour Research and Therapy*

Second trial in ED

Kanstrup et al. *Translational Psychiatry* (2021)11:30
https://doi.org/10.1038/s41398-020-01124-6

Translational Psychiatry

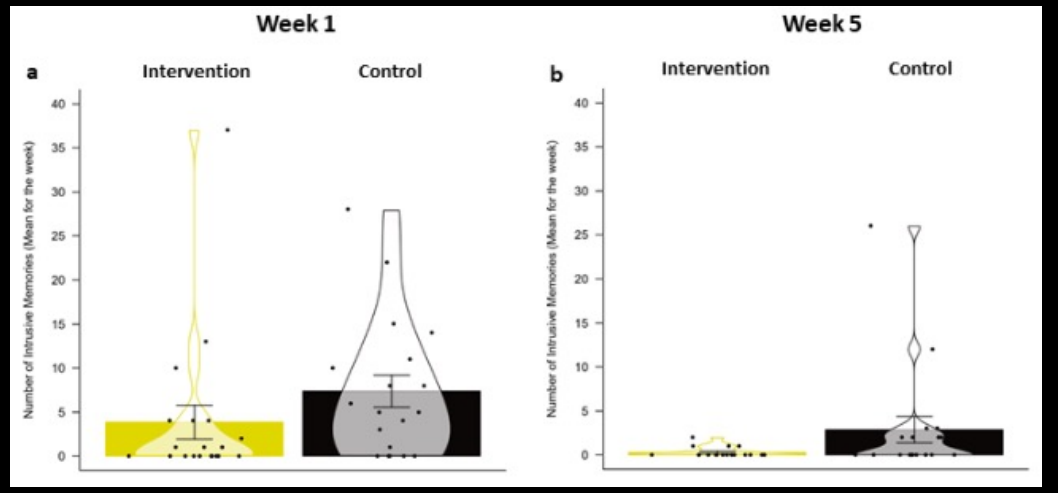
ARTICLE Open Access

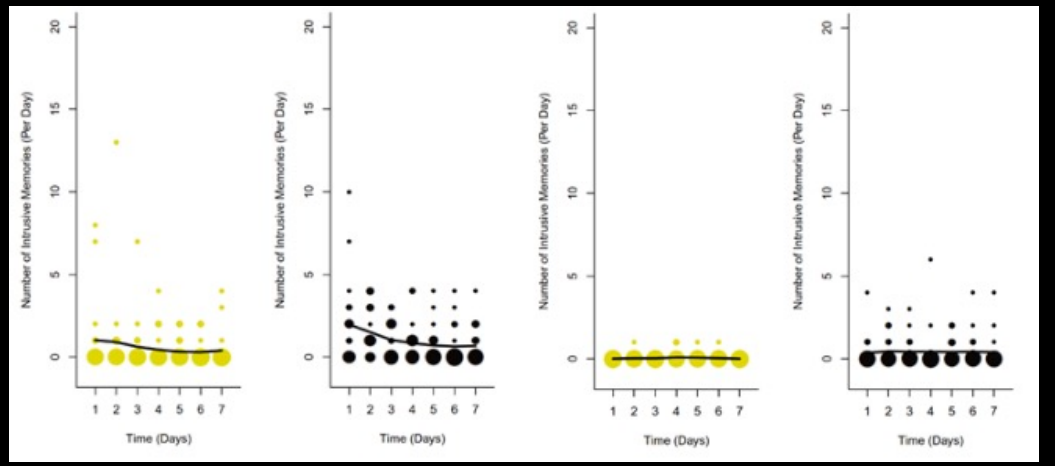
Reducing intrusive memories after trauma via a brief cognitive task intervention in the hospital emergency department: an exploratory pilot randomised controlled trial

Marie Kanstrup[1,2], Laura Singh[3], Katarina E. Göransson[4,5], Julia Widoff[1], Rod S. Taylor[6], Beau Gamble[3], Lalitha Iyadurai[7], Michelle L. Moulds[8] and Emily A. Holmes[1,2]

Abstract

Intrusive memories are common after trauma, and can cause significant distress. Interventions to prevent/reduce the occurrence of this core clinical feature of posttraumatic stress disorder are needed; they should be easy to deliver, readily disseminated and scalable. A novel one-session intervention by Iyadurai et al. 2018, *Molecular Psychiatry*, resulted in intrusion reduction over the subsequent week. Its feasibility in a different setting and longer-term effects (>1 month) need investigation. We conducted an exploratory open-label pilot randomised controlled trial (RCT) to investigate the feasibility and effects of a brief behavioural intervention to reduce intrusive memories in trauma-exposed patients in a Swedish hospital emergency department (ED). Participants (final $N = 41$) were randomly allocated to either intervention (including memory reminder cue then visuospatial cognitive task "Tetris" with mental rotation instructions) or active control (podcast) condition within 72 h of presenting to the ED (both conditions using their smartphone). Findings were examined descriptively. We estimated between-group effect sizes for the number of intrusive memories post-intervention at week 1 (primary outcome) and week 5 (secondary outcome). Compared to the control condition, participants in the intervention condition reported fewer intrusive memories of trauma, both at week 1 and week 5. Findings extend the previous evaluation in the UK. The intervention was readily implemented in a different international context, with a mixed trauma sample, with treatment gains maintained at 1 month and associated with some functional improvements. Findings inform future trials to evaluate the capacity of the cognitive task intervention to reduce the occurrence of intrusive memories after traumatic events.





Test of replication, and extension to 5 weeks
Kanstrup et al (2021)

Covid-19 has shone a spotlight on work-related trauma in healthcare staff

30.2% healthcare workers in COVID-19 pandemic for probable PTSD
(Lamb et al, Occupational and Environmental Medicine, 2021)

Intrusive memories after trauma: a novel intervention target

- Recurrent, sensory-perceptual memories that pop into mind involuntarily
- Vivid and emotional
- Hijack attention
- Distressing in themselves
- Disrupt functioning
- Core symptom of PTSD

Contents lists available at ScienceDirect

Clinical Psychology Review

journal homepage: www.elsevier.com/locate/clinpsychrev

Review

Intrusive memories of trauma: A target for research bridging cognitive science and its clinical application

Lalitha Iyadurai[a,*,1], Renée M. Visser[b,h,1], Alex Lau-Zhu[b,c], Kate Porcheret[d], Antje Horsch[e,f], Emily A. Holmes[g], Ella L. James[b]

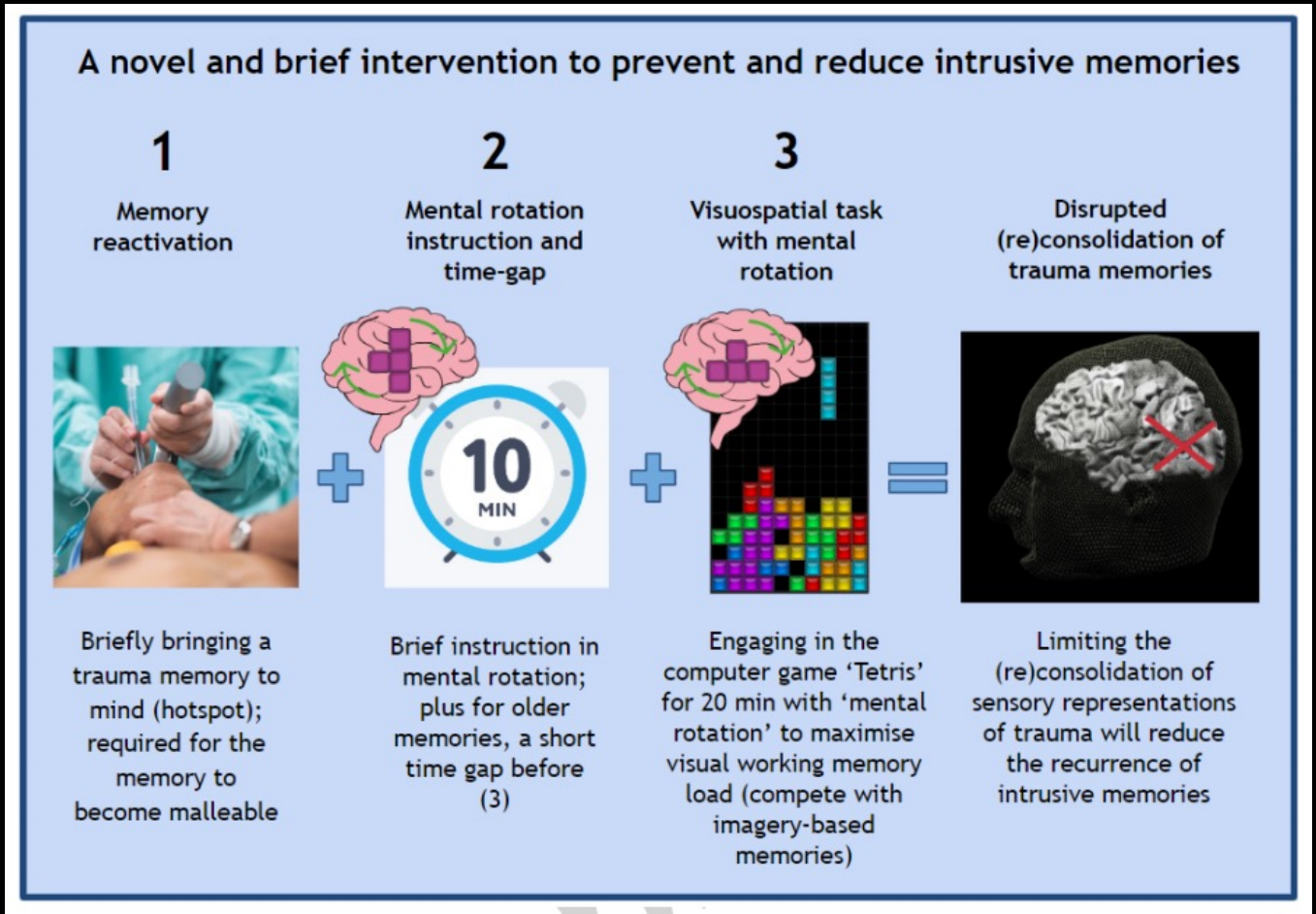
"seeing myself by the side of the bed and the image of the blood coming out of [the patient's] breathing tube."

"The dad actively dying and the children saying goodbye to him by zoom"

"Hearing the mum screaming and crying when she was told the news."

Intrusive images of work-related trauma in healthcare staff

An novel intervention based on mental health science



- **First session guided by researcher.**
- Then can be **self-guided** or with optional researcher support (25 mins per session).
- Note: Researcher requires **training** to deliver the intervention (Anemone™)

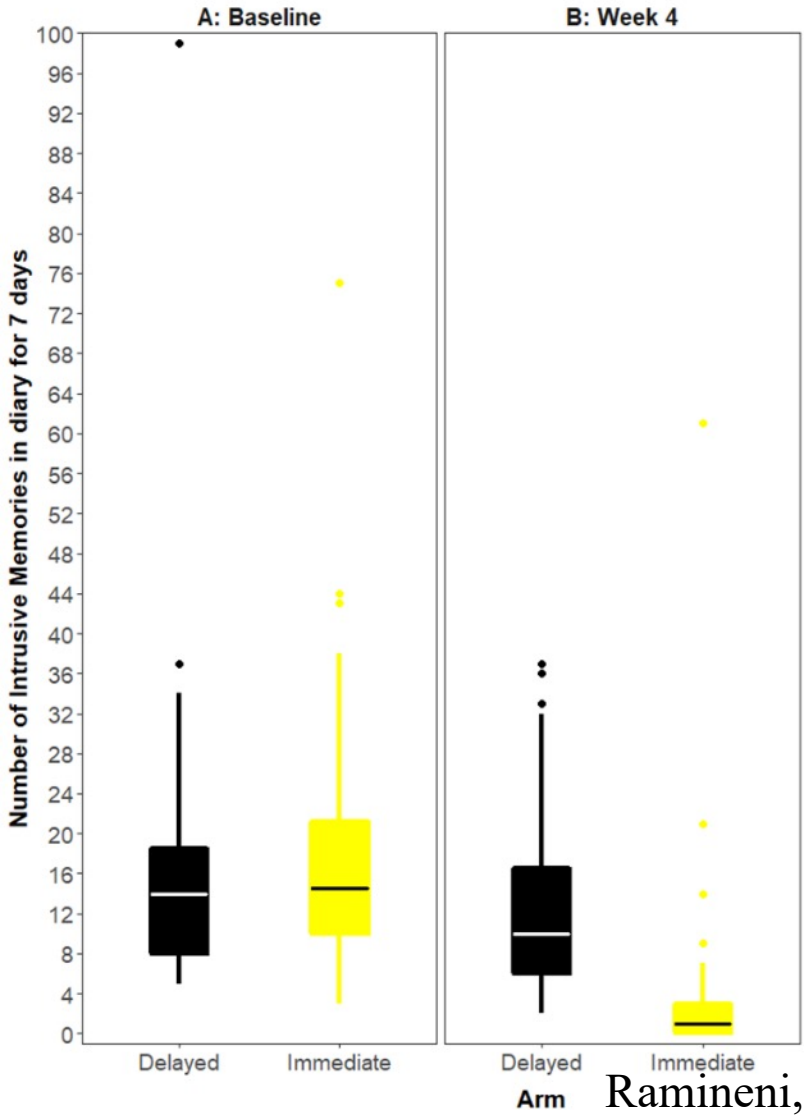
Imagery competing task plus memory updating

Note: – It's NOT JUST PLAYING TETRIS!

A brief gameplay intervention for NHS ICU staff affected by COVID-19 trauma

https://p1vital-gains.com

Primary outcome: number of intrusive memories in week 4



Box plot of the total number of intrusive memories

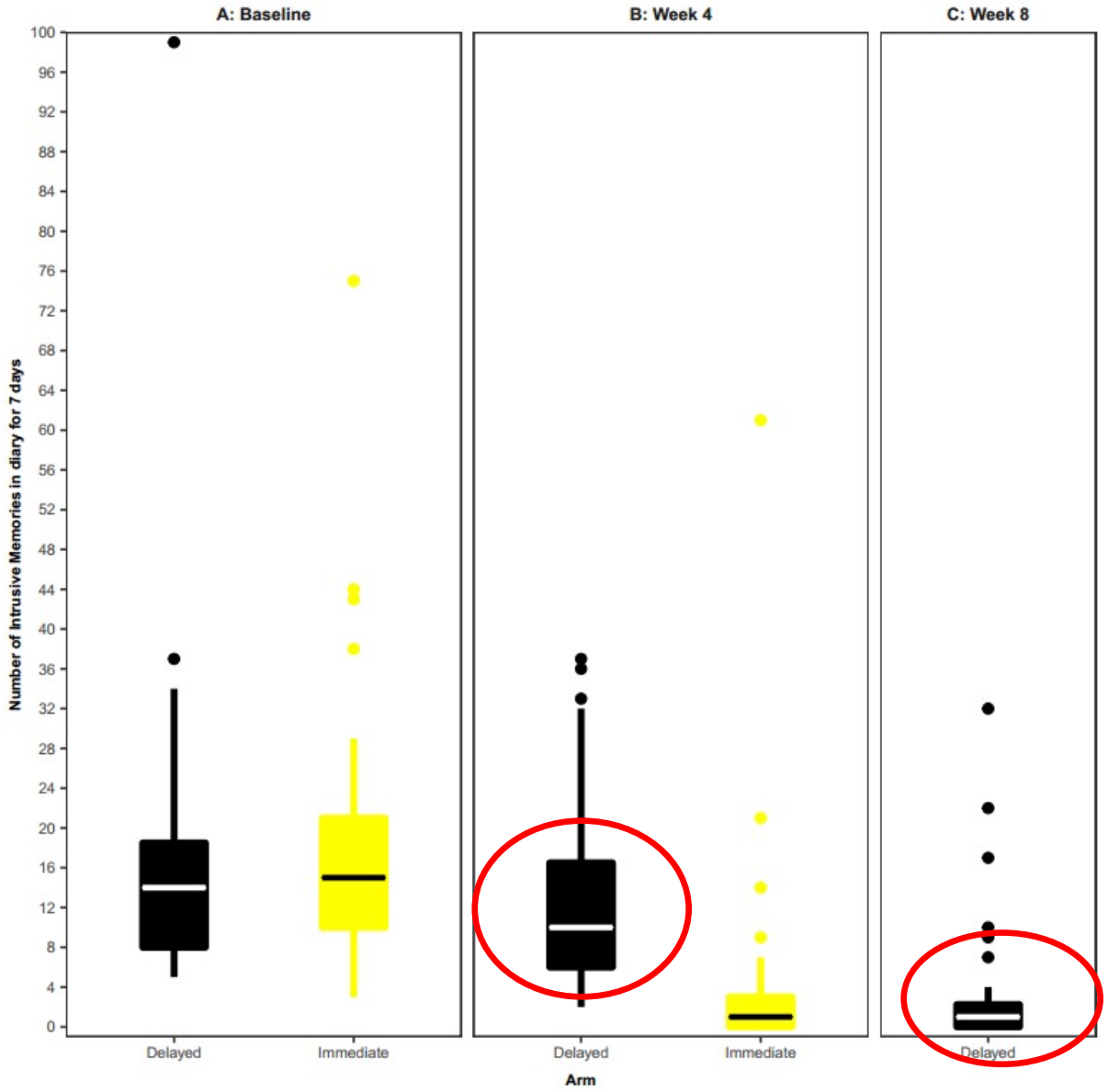
Baseline	Delayed	Immediate
Median (IQR)	**14** (8-18.5)	**14.5** (10-21.3)

Week 4	Delayed	Immediate
Median (IQR)	**10** (6-16.5)	**1** (0-3)

Delayed arm N=39
Immediate arm N=36

Ramineni, Millroth, Iyadurai, Jaki, Kingslake, Highfield, Summers, Bonsall & Holmes (2023), *Molecular Psychiatry,* in press

GAINS



Replication of main result:
Cross over effect at Week 8,
i.e. after delayed arm had received the intervention

Box plot of the total number of intrusive memories

Iyadurai et al,
***Translational Psychiatry,* in press**

Translational Psychiatry www.nature.com/tp

ARTICLE OPEN

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Reducing intrusive memories after trauma via an imagery-competing task intervention in COVID-19 intensive care staff: a randomised controlled trial

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Intrusive memories (IMs) after traumatic events can be distressing and disrupt mental health and functioning. We evaluated the impact of a brief remotely-delivered digital imagery-competing task intervention on the number of IMs for intensive care unit (ICU) staff who faced repeated trauma exposure during the COVID-19 pandemic using a two-arm, parallel-group, single-blind randomised controlled trial, with the comparator arm receiving delayed access to active treatment (crossover). Eligible participants worked clinically in a UK NHS ICU during the pandemic and had at least 3 IMs of work-related traumatic events in the week before recruitment. Participants were randomly assigned (1:1) to immediate (weeks 1–4) or delayed (weeks 5–8) intervention access. Sequential Bayesian analyses to optimise the intervention and increase trial efficiency are reported elsewhere [1]. The primary endpoint for the pre-specified frequentist analysis of the final study population compared the number of IMs experienced in week 4 between the immediate and delayed access arms. Secondary outcomes included clinical symptoms, work functioning and wellbeing. Safety was assessed throughout the trial by scheduled questions and free report. All analyses were undertaken on an intention-to-treat basis (86 randomised participants). There were significantly fewer intrusive memories during week 4 in the immediate (median = 1, IQR = 0–3, $n = 43$,) compared to the comparator delayed arm (median = 10, IQR = 6–16.5, $n = 43$), IRR 0.31, 95% CI: 0.20–0.48, $p < 0.001$. After crossover, the delayed arm also showed a significant reduction in IMs at week 8 compared to week 4. There were convergent findings for symptoms of PTSD, insomnia and anxiety, work engagement and burnout, general functioning and quality of life. The intervention was found safe and acceptable to participants. All adverse events were unrelated to the study. Our study provides the first evidence of a benefit on reducing IMs, improving other clinical symptoms, work functioning and wellbeing, as well as safety of a brief remotely-delivered digital imagery-competing task intervention. An efficacy trial with an active control and longer follow-up is warranted. The trial is registered at ClinicalTrials.gov (NCT04992390).

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INTRODUCTION

Healthcare staff commonly experience and witness difficult events such as sudden or tragic deaths as part of their daily work which are potentially psychologically traumatic [2]. The frequency of these events has been increased during the COVID-19 pandemic for some clinical areas. A common symptom following a psychologically traumatic event is an intrusive memory related to the event. Such memories spring to mind unbidden—i.e., are involuntarily recalled, replaying of events in the form of sensory-

themselves intrusive memories can cause distress, impair concentration and disrupt daily functioning [4]. Q1 –Q5

Intensive care unit (ICU) staff represent a discrete group for whom the adverse impact of the pandemic has been well established. In the UK intensive care units expanded beyond capacity, workforce to patient ratios had to be reduced, staff were unable to deliver the same level of attention to care, and in the first wave there were higher mortality rates and, therefore higher rates of witnessing death, and a lack of family visiting the ICU.

GAINS

Clinical symptoms: reduction in symptoms of PTSD, insomnia and anxiety in immediate vs delayed intervention arm

Outcome measure	Effect at 4 weeks
PTSD symptoms (PCL-5 4 item)	✓
Insomnia (Sleep Condition Indicator)	✓
Anxiety (GAD-2)	✓
Depression (PHQ-2)	No effect

Iyadurai, Highfield, Kanstrup, Markham, Ramineni, Guo, Jaki, Kingslake, Goodwin, Summers, Bonsall & Holmes, *Translational Psychiatry,* in press

Work burnout and engagement: reduced burnout and increased engagement in immediate vs delayed intervention arm

Outcome measure	Effect at 4 weeks
Work engagement (SWEBO)	✓
Work burnout (SWEBO)	✓
Sickness absence (number of sick days over past 4 weeks)	No effect

Scale of work engagement and burnout (SWEBO)

	In the past two weeks at work I have felt… *Mark one alternative for each row.*	Not at all	Some of the time	Most of the time	All of the time
		1	2	3	4
(Vig1)	… energetic	☐	☐	☐	☐
(Vig2)	… determined	☐	☐	☐	☐
(Vig3)	… active	☐	☐	☐	☐
(Exh1)	… lethargic	☐	☐	☐	☐
(Exh2)	… exhausted	☐	☐	☐	☐
(Exh3)	… weary	☐	☐	☐	☐

Iyadurai, et al
***Translational Psychiatry,* in press**

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Functioning: improvement in general functioning and quality of life in immediate vs delayed arm

Outcome measure	Effect at 4 weeks
General functioning (WHODAS 2.0)	✓
Quality of life (EQ-5D-5L)	✓
Impact of participant-identified problems (PSYCHLOPS)	✓

Iyadurai, Highfield, Kanstrup, Markham, Ramineni, Guo, Jaki, Kingslake, Goodwin, Summers, Bonsall & Holmes, *Translational Psychiatry,* in press

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Participant feedback (positive comment examples)

- *Amazing. I genuinely did not expect it to work*
- *Like a magic trick! Some memories I've had for years which pop up frequently have just become normal memories.*
- *It's such a simple tool to use to target these frustrating and upsetting thoughts. It's definitely working.*
- *The simplicity of actually applying it and the fact I could target specific memories. Pretty well non-distressing*

Patel el al, submitted

GAINS

Next step: GAINS 2 efficacy trial

- Active control
- Longer-term follow-up
- All NHS staff (beyond ICU staff alone)

UPPSALA UNIVERSITET

Intensive Care Society

wellcome

P1vital®

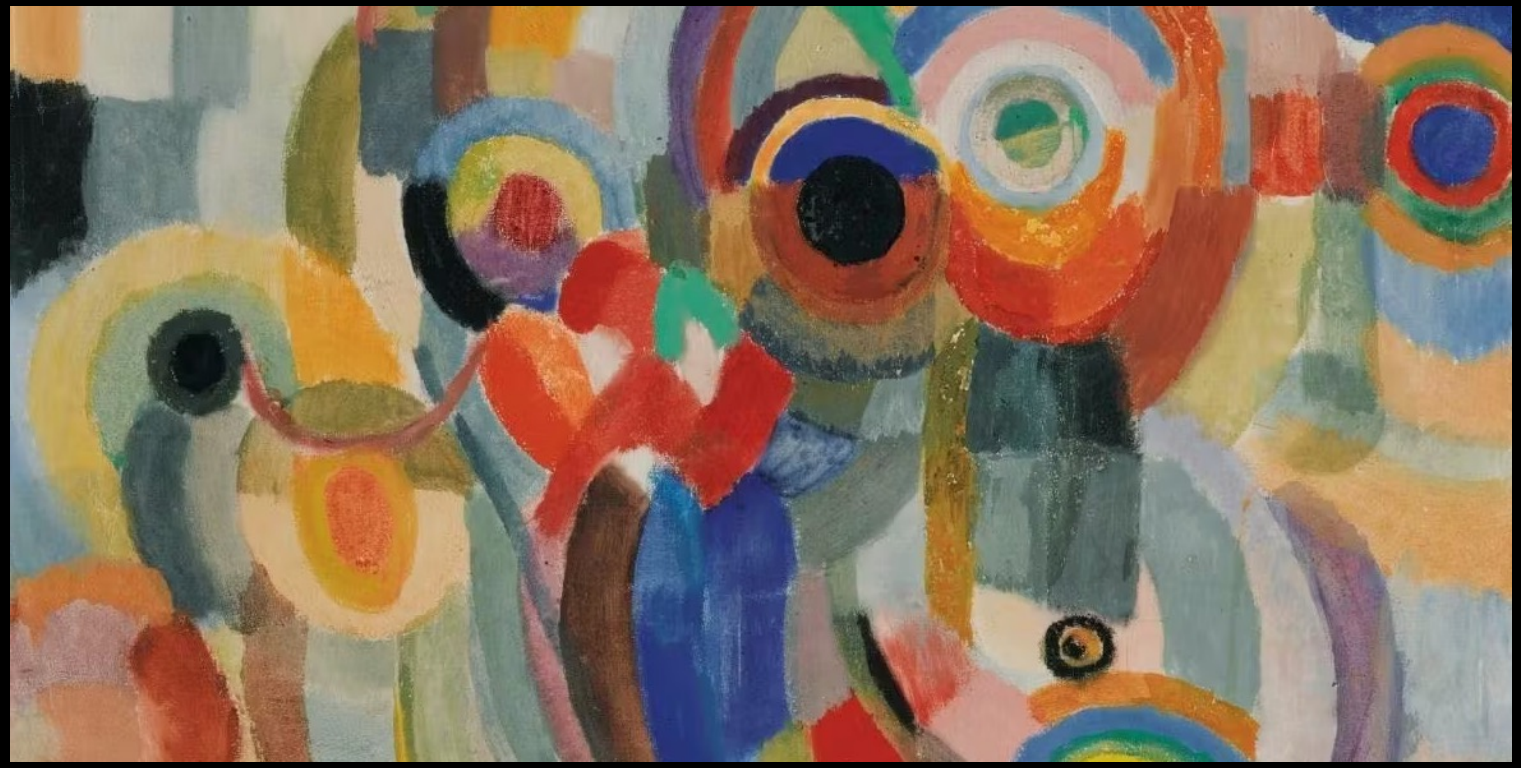
Recap: A brief cognitive task intervention to reduce the number of intrusive memories (imagery competing task for memory updating)

- Brief: one guided session 1hr, then self-guided 25 mins each time
- Repeatable (to deal with **ongoing exposure** to trauma at work)
- Flexible use when wish to (to aid use in around extremely busy work schedules)
- A low-stigma, **practical task-based self-management tool** rather than "mental health treatment"
- Potentially scalable e.g. low-cost and remotely-delivered (digital)
- Do not discuss trauma in detail
- Driven by mental health science rather than a typical talking therapy

GAINS

Rethink: Single symptom approach to this transdiagnostic symptom

We suggest here developing an intervention that target a single, prevalent and disruptive symptom – e.g. *intrusive memories of traumatic events*; i.e., a single symptom approach



Sonia Delaunay-Terk, «The Minho Market», 1915

BACK TO CBT: Difference from existing tfCBT methods?

Cons:

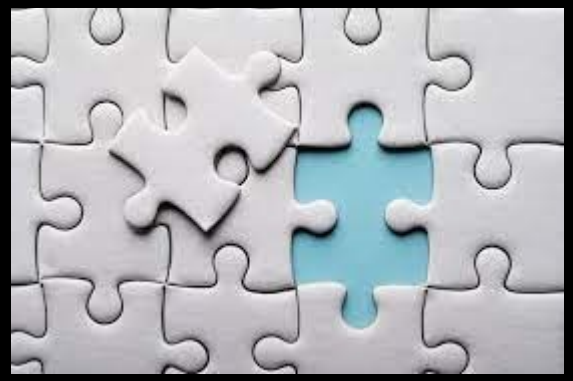
- Playing a game?
- Looks like distraction
- Hard for to fit into a traditional CBT framework
- Focusses on ”perception” not ”emotion”

Pros:

- Task based, Not talking based
- Focusses on ”perception” not ”emotion”
- Brief (30 mins per memory) very little therapist involvement
- Preventative
- Repeatable for new traumas
- Complementary to any other approach e.g. tfCBT

Fernand Léger, «Les Grand Plongeurs Noirs», 1944

One piece of a bigger puzzle: **intrusive memories after trauma**



Hypothesis:

- While focusing on one part of the puzzle (**intrusive memories**) may be helpful in its own right
- & also have downstream benefits for other types of difficulties

Intrusive memories occur across mental health disorders (not just PTSD)

Including:

- Acute stress disorder
- Complicated grief
- Addictions
- Depression
- Psychosis
- Bipolar disorder
- Borderline personality disorder
- and are also a possible pre-clinical precursor of later disorder

Bryant et al. (2017) *JAMA*

Today we explored two aspects:

1. the detail of mental imagery and some recent studies

2. the *big picture* of mental health treatments given global burden of disease

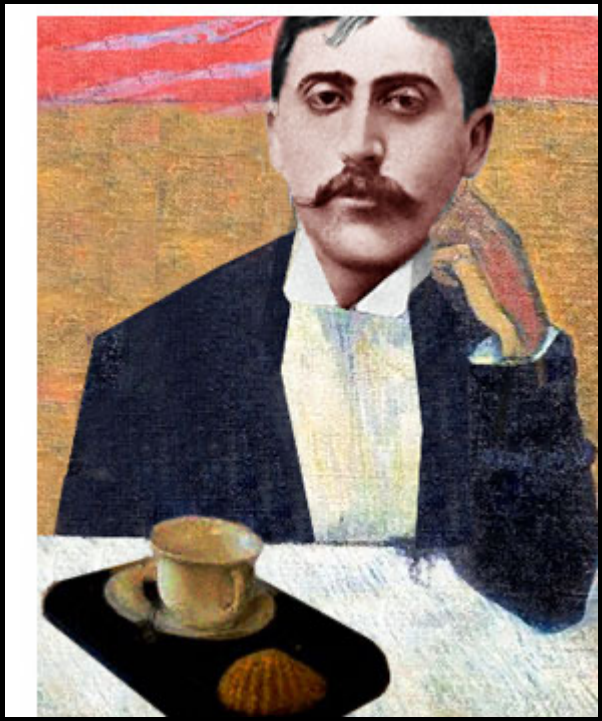
- new ideas we can explore in CBT
- (and some artworks from France).

Key take home message: mental imagery is an "emotion amplifier"

Lab experiments: compared to verbal thought, mental imagery has a more powerful impact on human emotion

I want to scream

Holmes & Mathews 2005; 2006; 2008; 2010; 2013



Marcel Proust

Mental imagery is the language of memory and emotion

Occurs in everyday life; for example when Marcel Proust describes eating his madeleine and suddenly recalling sensory images of his childhood

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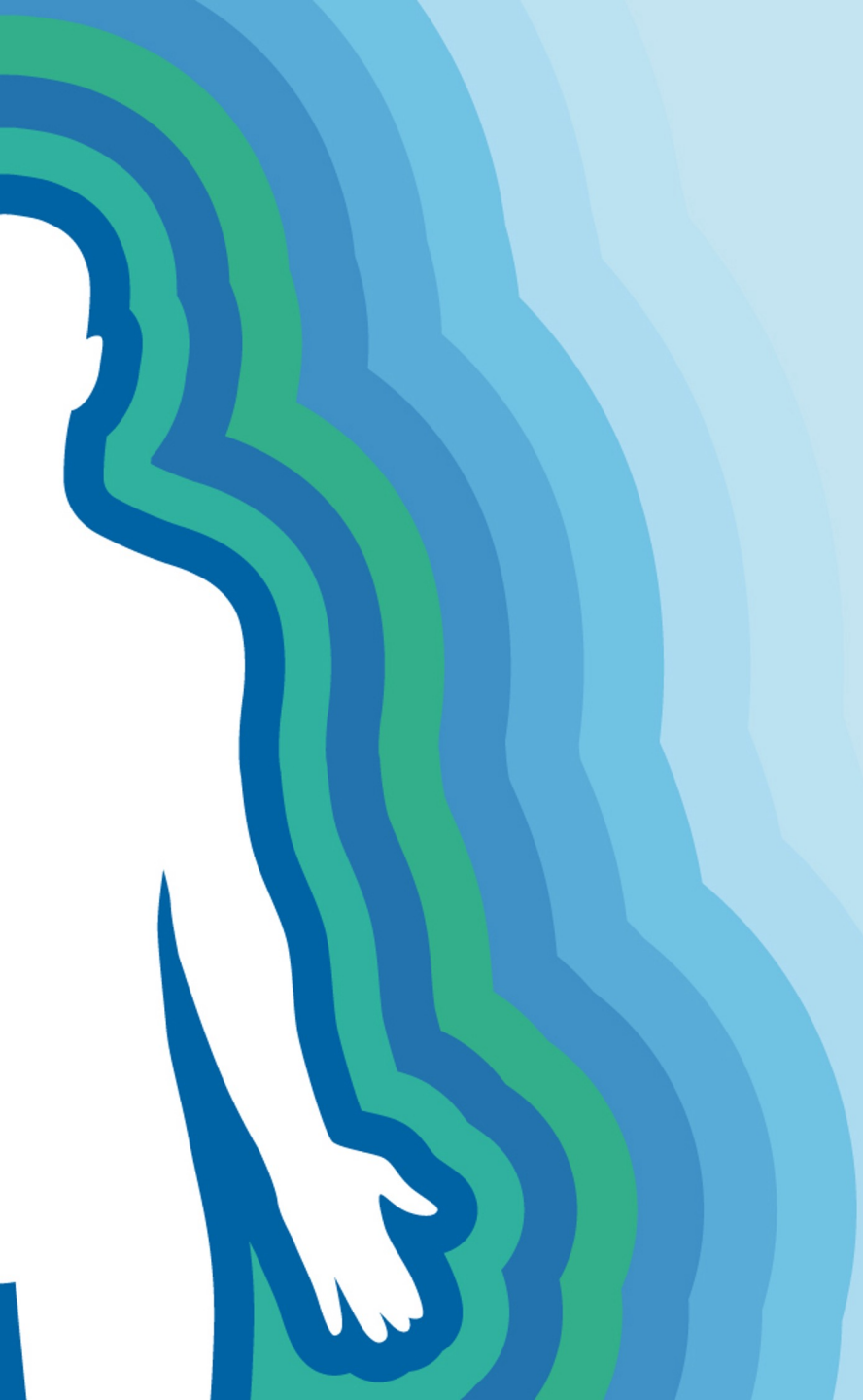
THANK YOU to all collaborators and students without whom this work is not possible!



Merci!

MENTAL IMAGERY AND MENTAL HEALTH TREATMENT INNOVATION:

IMAGERIE MENTALE ET INNOVATION EN MATIÈRE DE TRAITEMENT DE LA SANTÉ MENTALE

51ème CONGRÈS AFTCC