Cognitive bias, worry, and behavioural preparation for bushfire threat:

Enhancing preparedness through the modification of thought.

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Project aims

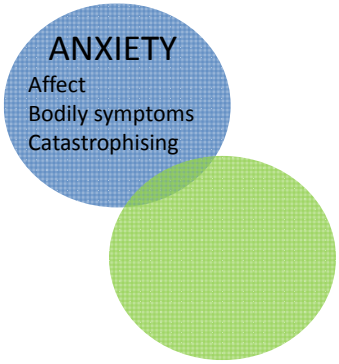
To improve behavioural threat management through:

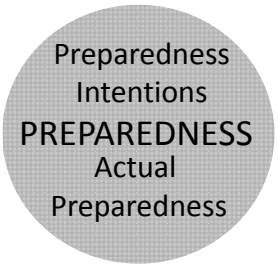
- Enhancing understanding of how variation in emotional experience impacts on behavioural preparedness that mitigates threat.
- Establishing the cognitive mechanisms driving the types of emotional experiences that enhance or impede such behavioural preparedness.
- Developing techniques to modify these cognitive mechanisms in ways that foster emotional experiences conducive to effective behavioural preparedness.

Emotion and Preparedness

Emotional experience

Behavioural preparedness





Anxiety

- Anxious apprehension (Barlow, 1988)
  - Acts on a number of physiological and cognitive systems to enhance an individual's ability, and motivation to deal with potential threats.
- Often targeted as an unwanted intrusion to otherwise healthy functioning → Something to be eliminated, reduced
- Anxiety can also be very helpful
  - "Without anxiety little would be accomplished. The performance of athletes, entertainers, executives, artisans and students would suffer; creativity would diminish; crops might not be planted. This would be as deadly for the species as nuclear war." (Barlow, 2002)

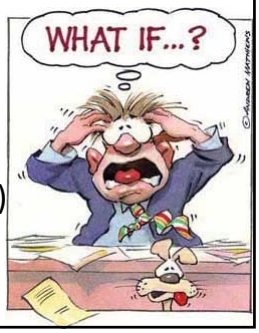
Emotion and Preparedness

Emotional experience

Behavioural preparedness

Worry

- Cognitions which focus on a future negative event
  - 'Self-talk' : internal dialogue about a particular concern
- Worry can be influential in determining the adoption of preparedness behaviours.
- Lee & Lemyer, 2009
  - Worry regarding the likelihood of a disaster (terrorist attack) predicts behavioural response to this perceived threat (Avoidance of air travel)



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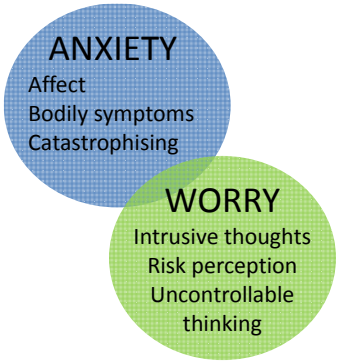


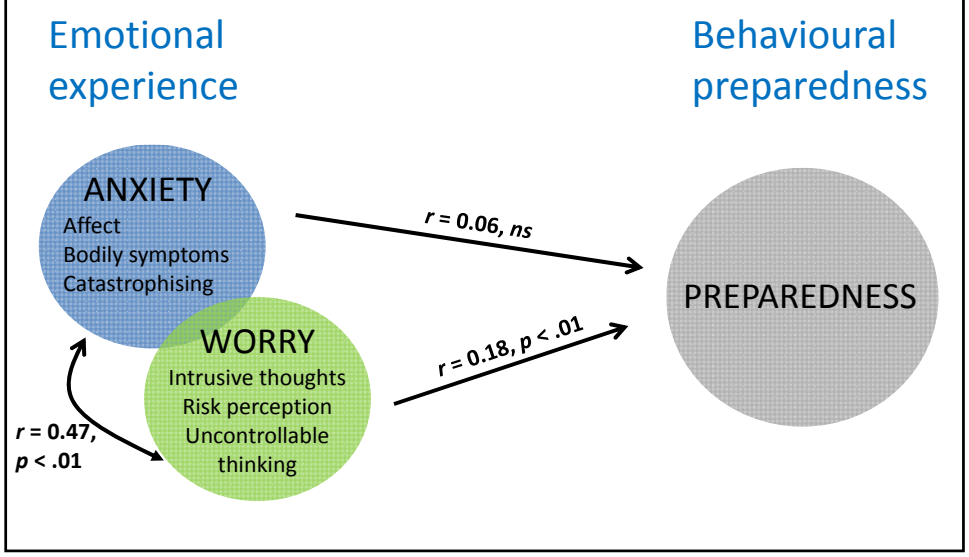
Study 1: Questionnaire Assessment

- Kelmscott, Roleystone, Red Hill (WA)
- Feb 5th and 6th fires
- Coordinated interviewing of 400 community members.
- Questions including:
  - Preparedness actions prior to the event
- Emotional assessment measures
  - Anxiety (STAI-T)
  - Worry (General and Bushfire)

bushfire CRC

FESA
Fire & Emergency Services Authority of Western Australia

Study 1: Questionnaire Assessment



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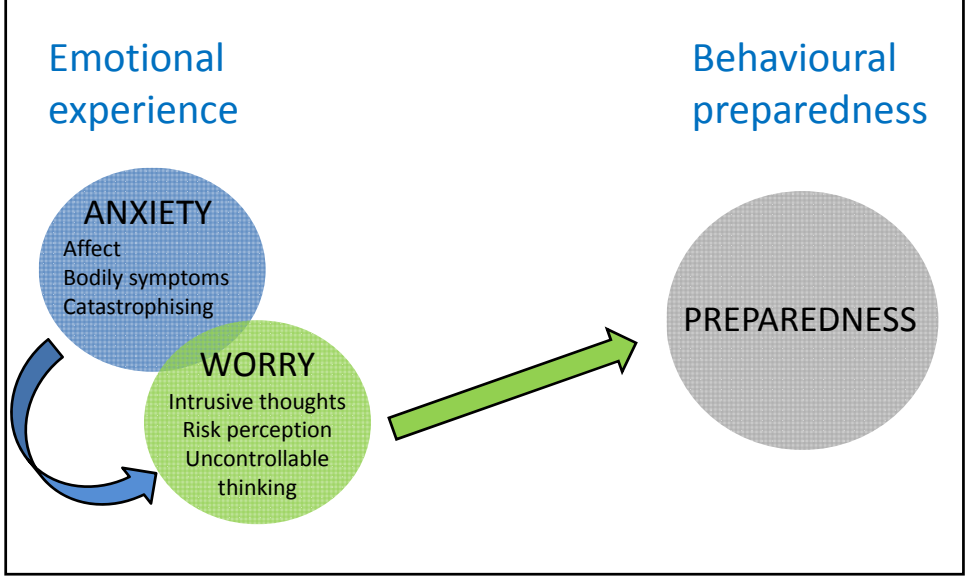

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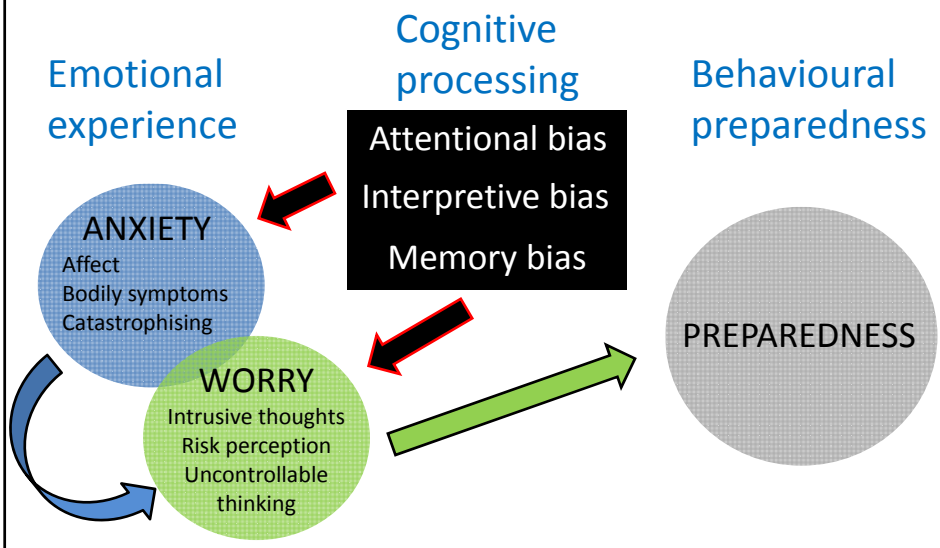
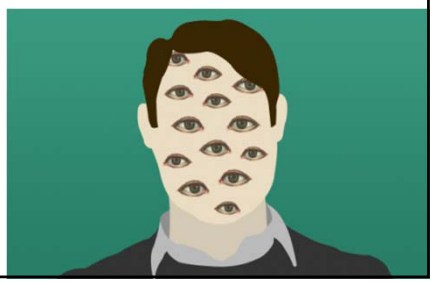


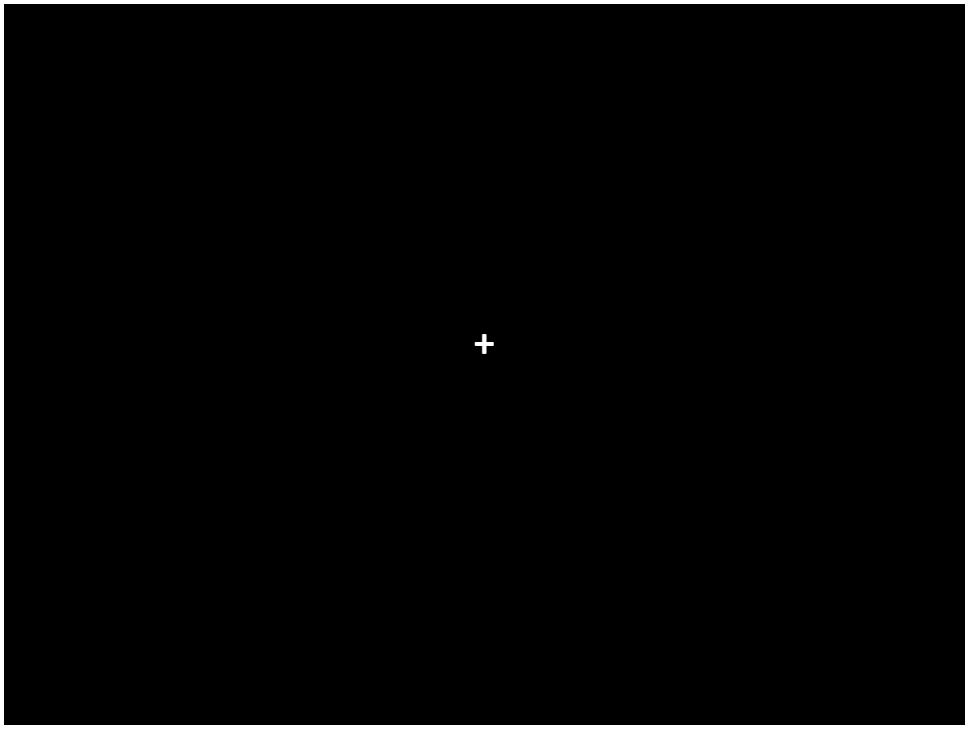
Study 2: Cognitive Bias Assessment

- Participants: 39 Kelmscott/Roleystone residents
- Procedure
  - Questionnaires
    - Anxiety
    - Worry (incl. worry about bushfires)
    - Preparedness questionnaire
  - Cognitive Bias Assessment Tasks
    - Attentional bias assessment
    - Interpretive bias assessment
    - Memory bias assessment
- Total time: 1.5 – 3 hours

Attentional Bias
Assessment

- Preferential attention to one particular type of information
- Related to anxiety: high anxious people show attentional bias to threat; low anxious do not, and often even show avoidance of threat
- Measured with dot-probe task
  (MacLeod, Mathews & Tata, 1986)

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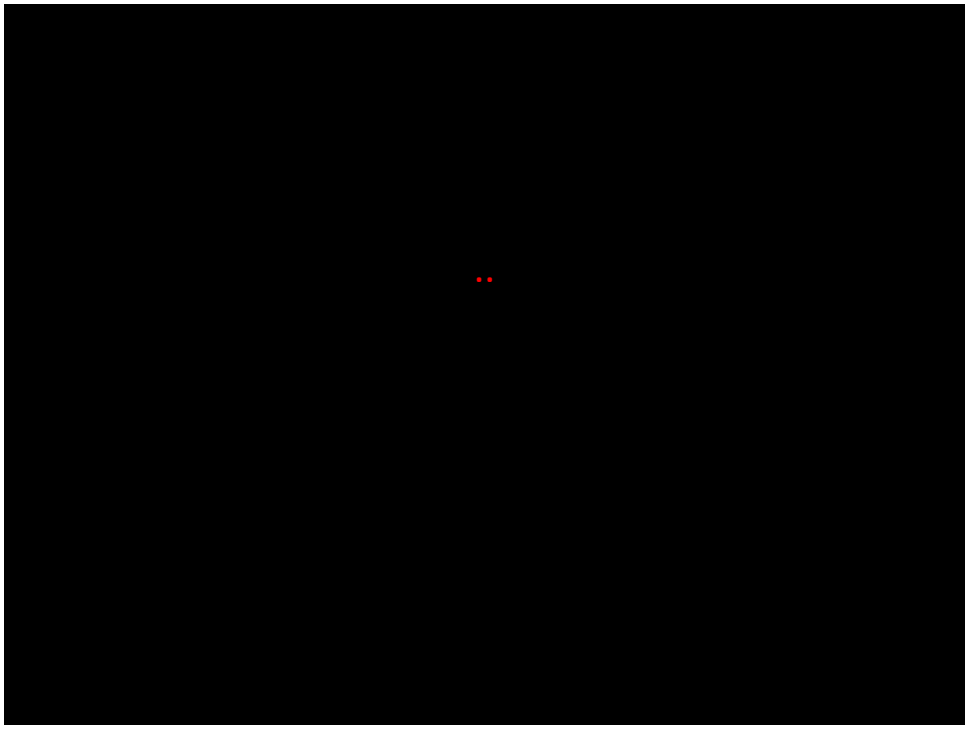

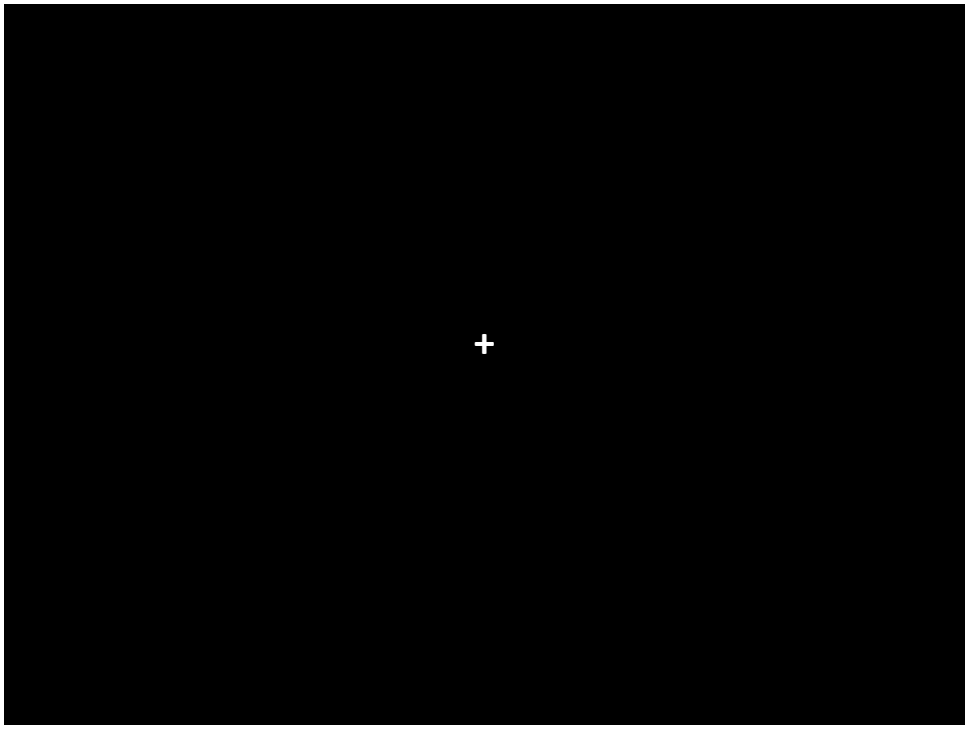
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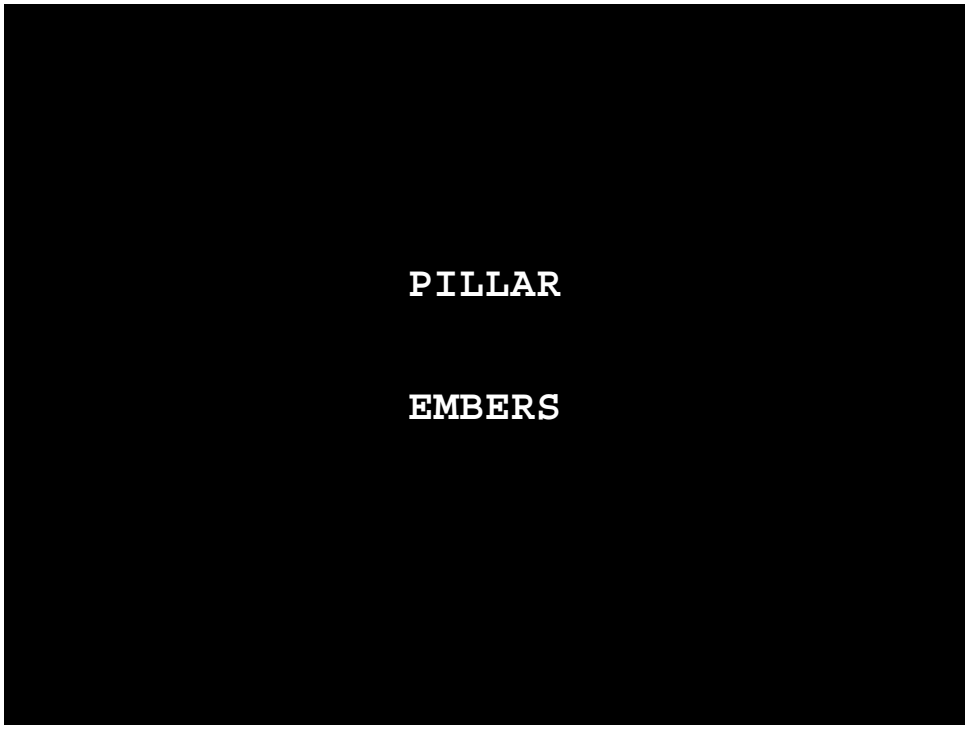
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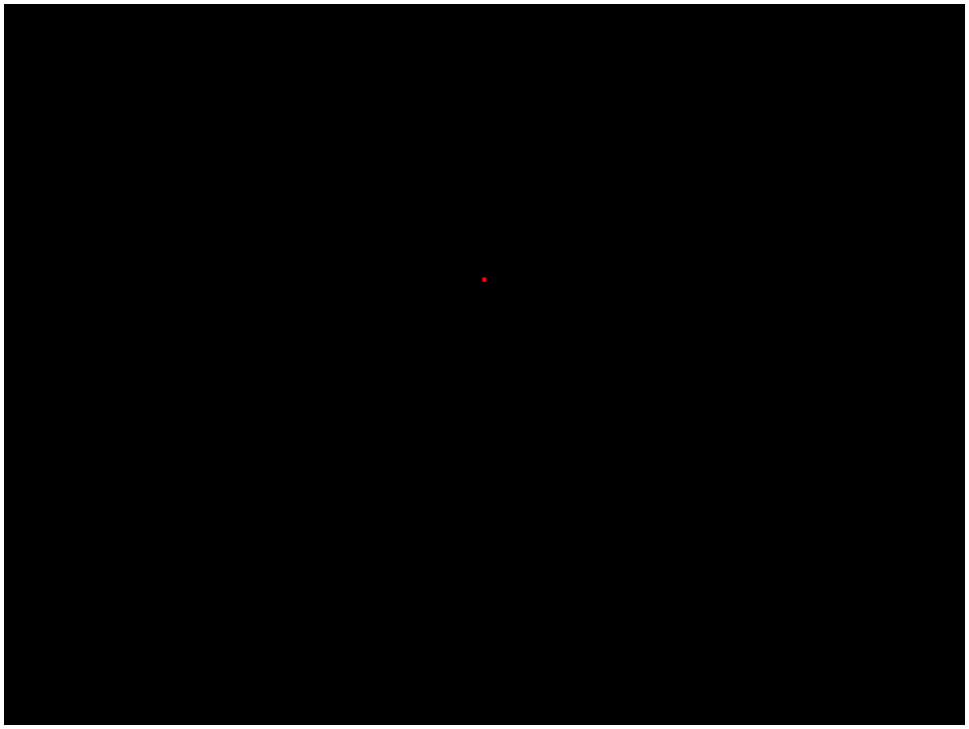


Cognitive process → Anxiety/Worry

Attentional Bias Findings

Heightened attentional bias to fire-related information tended to predict higher levels of anxiety (p=0.077)

Interpretation Bias

- The tendency to preferentially resolve ambiguity in one particular way
- Related to anxiety: people with clinical or subclinical levels of anxiety dysfunction show a negative interpretation bias (Mathews, 2011)

Interpretation Bias Assessment

- Present ambiguous scenarios

  e.g. "You hear that the forecast for the coming fire season leaves the fire fighters very motivated."

- Measure 1: How (un)pleasant is this situation?
- Measure 2: Ask what people remember:
  - "You hear that the fire fighters are motivated because the forecast for the next fire season predicts few fires."
  - "You hear that the fire fighters are motivated because the forecast for the next fire season predicts a lot of fires."

Cognitive process → Anxiety/Worry

Attentional Bias Findings

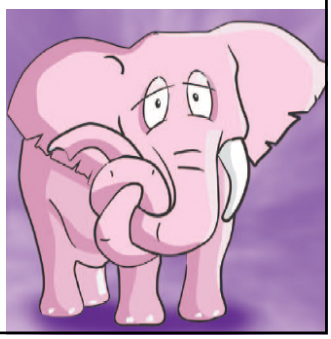
Heightened attentional bias to fire-related information tended to predict higher levels of anxiety ($p=0.077$)

Interpretive Bias Findings

Heightened interpretive bias revealed by ratings of ambiguous fire info predicted higher levels of anxiety and worry ($p<0.05$)

Memory Bias

- Tendency to remember one particular type of events better than others
- Mixed evidence for anxiety linked memory bias favouring negative information
  (MacLeod & Mathews, 2004)
- Negative memory bias is a robust characteristic of clinical and subclinical depression



Memory Bias
Assessment

- Present unambiguous positive and negative events

  E.g. i "You are watching a very interesting television documentary on how controlled burning helps to reduce fuel load in the bush."

  E.g. ii "You realise that you don't have a proper bushfire emergency plan, when you watch a television documentary on how a good fire plan can save lives and houses."
- Afterwards, check memory for the scenarios.

Attentional Bias Findings

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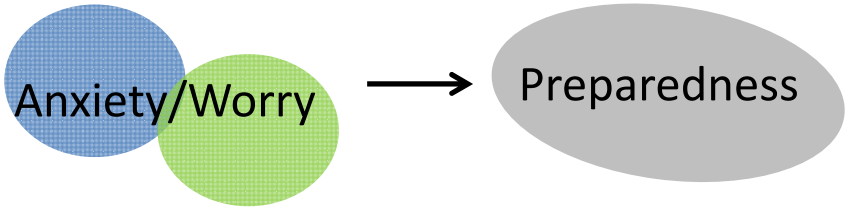
Interpretive Bias Findings

Heightened interpretive bias revealed by ratings of ambiguous fire info predicted higher levels of anxiety and worry ($p<0.05$)

Memory Bias Findings

Heightened selective memory for negative fire-related information predicted higher levels of worry ($p<0.05$)



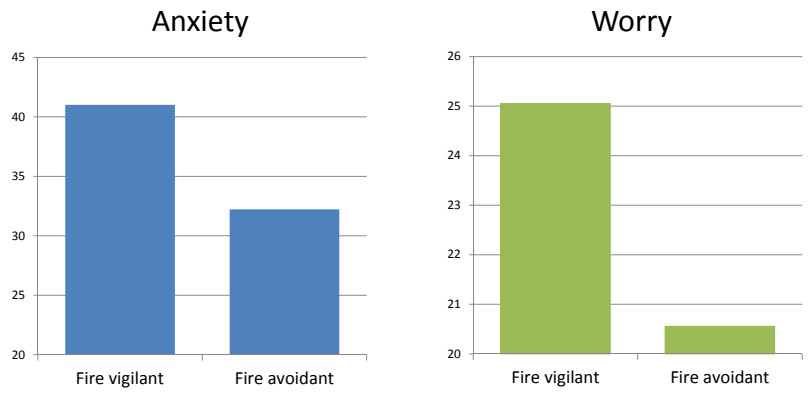
- As in Study 1, anxiety level did predict worry level, as worry was positively correlated with level of anxiety.
  $r(35)= .73, p < .001$
- Again as in Study 1, anxiety did not directly predict be the preparedness measures, as this correlation was not statistically significant.
  $r(32)= .31$, ns
- However, once more, worry was found to be related to preparedness, as the worry measure was significantly correlated, in a positive manner, with preparedness intentions.
  $r(32)= 0.45, p < .05$

Key clusters of participants

Attentional patterns

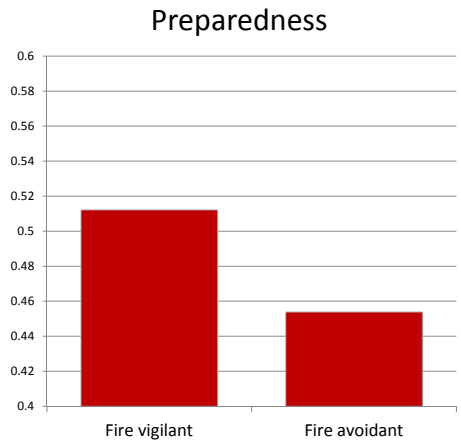
Key clusters of participants

Emotional patterns



Key clusters of participants

Preparedness patterns



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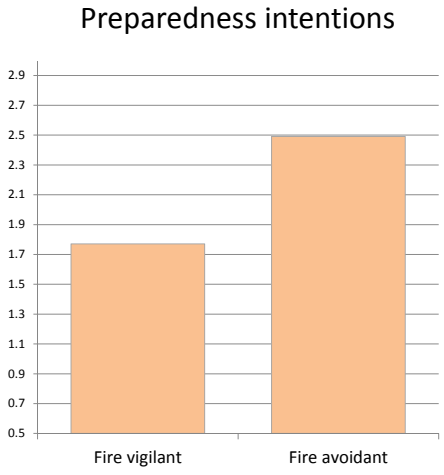
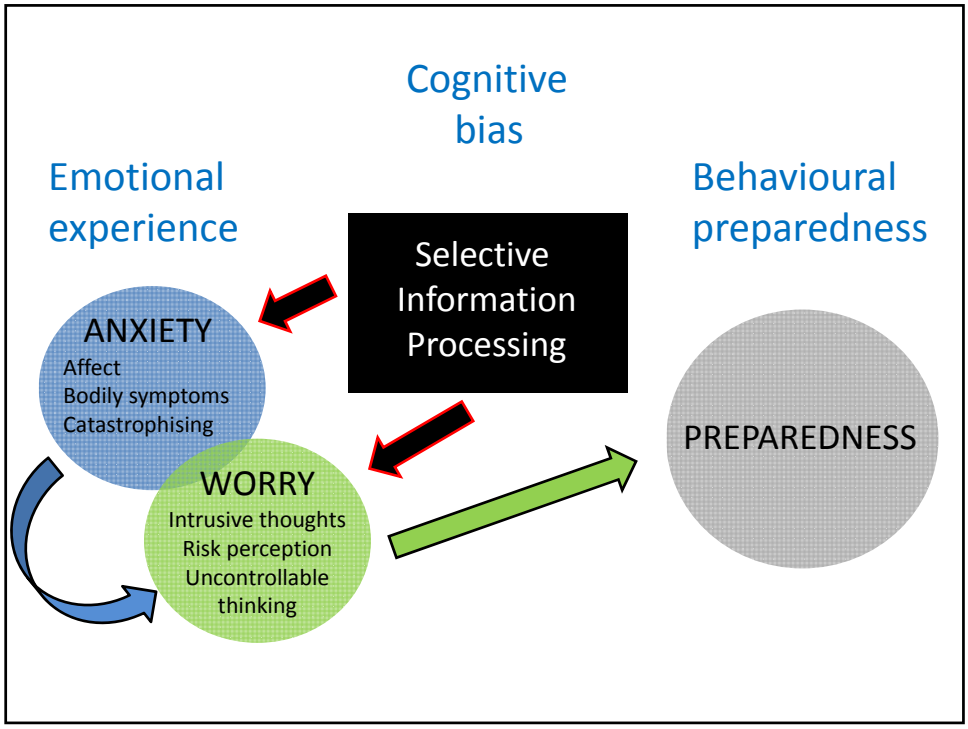
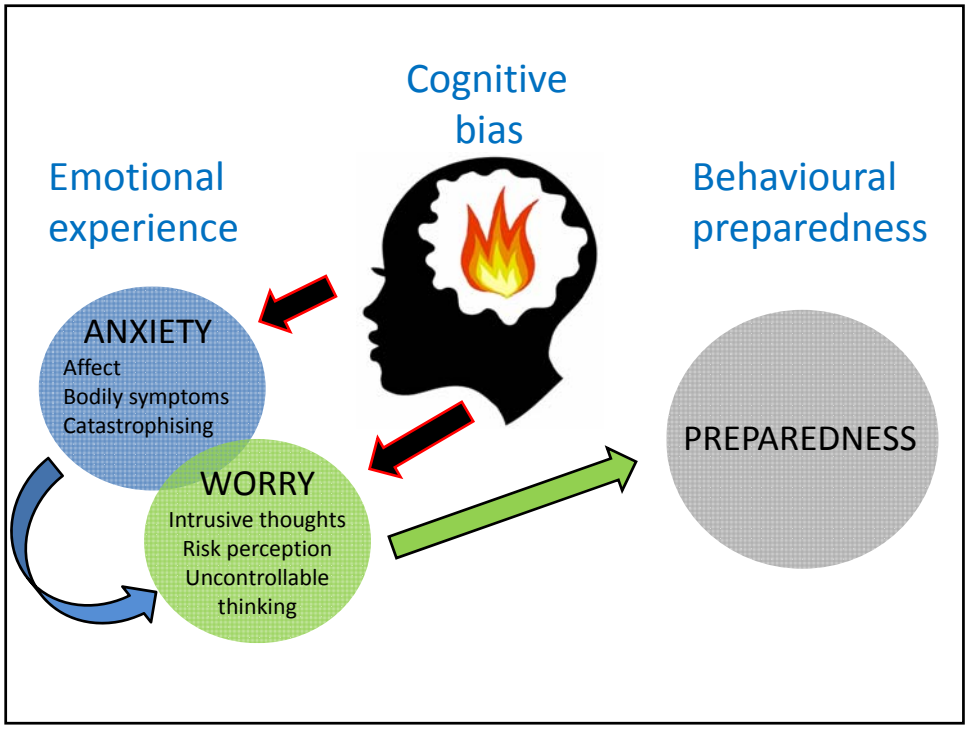



Cognitive bias
Emotional experience
Behavioural preparedness
Selective Information Processing
ANXIETY
Affect
Bodily symptoms
Catastrophising
WORRY
Intrusive thoughts
Risk perception
Uncontrollable thinking
PREPAREDNESS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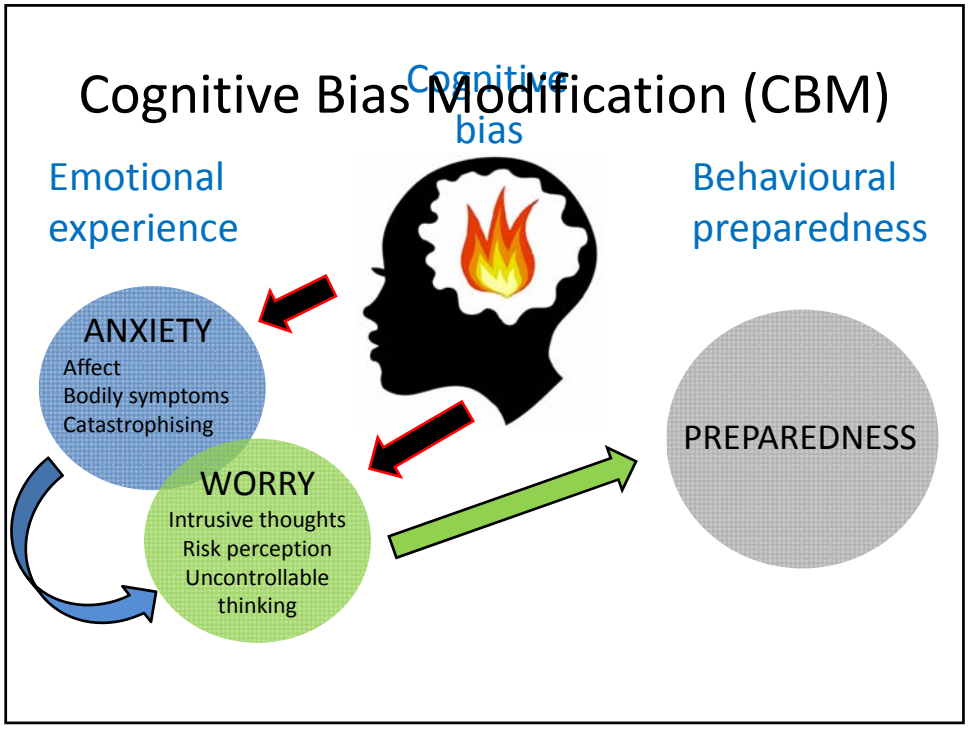


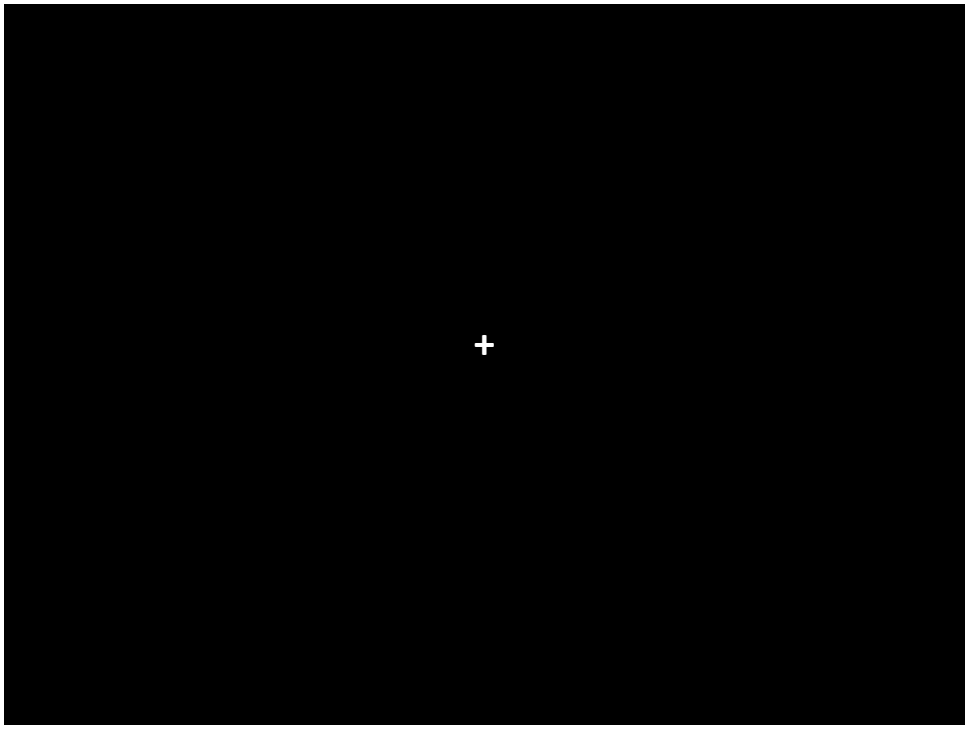
Cognitive Bias Modification (CBM)

Basic Approach

Amend the cognitive assessment task by introducing a contingency designed to ***alter*** selective processing and give extended exposure to this bias modification procedure.

Cognitive Bias Modification for Attention (CBM-A)

Amends the dot probe task such that all the probes now appear only in locus of the fire threat word (train threat vigilance) or only in opposite locus (train threat avoidance).



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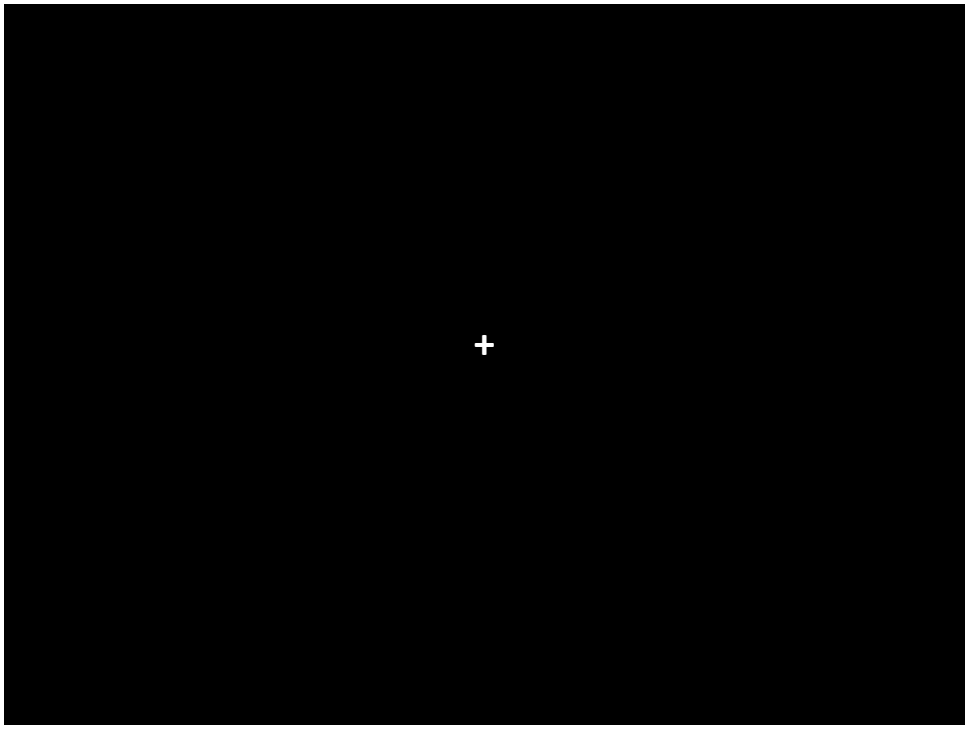

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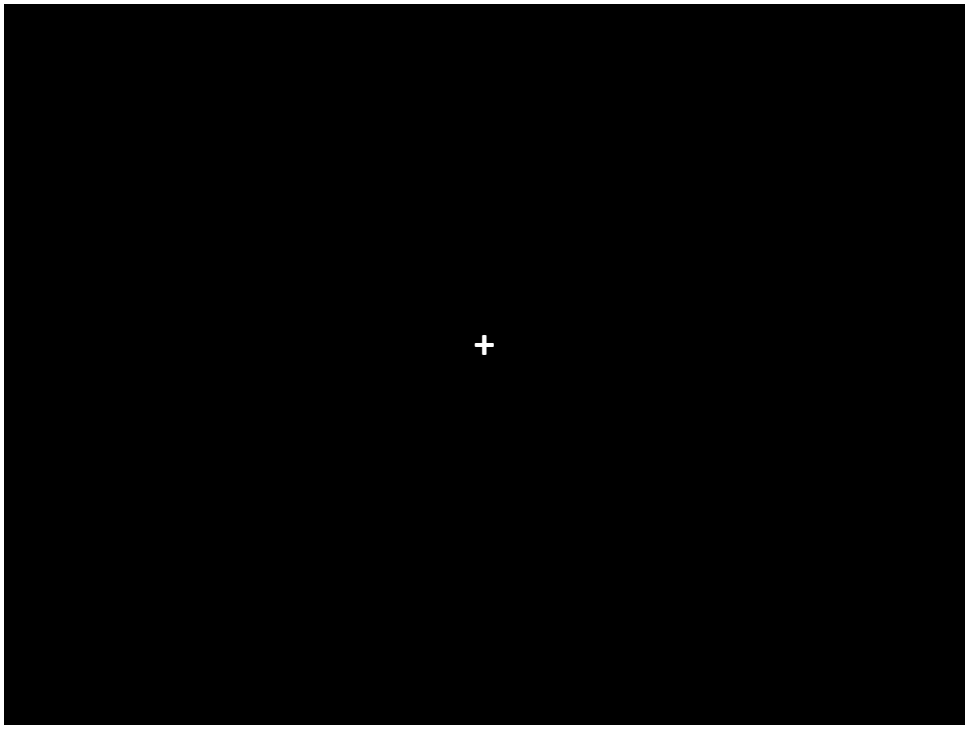

INFERNO

REPEATS

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Cognitive Bias Modification (CBM)

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Amend text comprehension tasks such that ambiguous information now must always be interpreted as high fire threat (train threat interpretation) or always as low fire threat (train benign interpretation).

The predicted fire risk for the coming summer is very different from the risk levels seen in recent years, so it can be expected that bushfires will be pr-b-b-e.

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Recent random inspections of fire preparation activities in the run up to summer have surprised local authorities, who report that most people's preparation has been ina-equ-te.

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Three Aim of Current Studies

Determine functional role of cognitive biases through CBM

Establish whether attentional bias, interpretive bias, and other forms of cognitive selectivity, causally contribute to emotional experience by directly manipulating such bias using CBM techniques and observing impact on emotional experience in bushfire exposed participants.

Seek to influence preparedness through CBM

Establish whether the direct modification of attentional bias, interpretive bias, and other forms of cognitive selectivity, through CBM techniques, can increase bushfire preparedness intention and behaviour.

Enhance efficacy of media adverts through CBM

Establish whether the direct modification of attentional bias, interpretive bias and other forms of cognitive selectivity can enhance the beneficial impact of media adverts promoting preparedness behaviour through communication of threat.

Methods of CBM Delivery

Delivery Method One: Using On-line Computer Software

We have now programmed our cognitive assessment tasks and bias modification tasks for on-line delivery, to reach greater numbers of participants in bushfire exposed communities .

Delivery Method Two: Using Smart Phones

We have recently produced our first smart phone application for delivering attentional bias assessment and modification, and are migrating our interpretive bias tasks to this platform also .

Delivery Method Three: Laboratory-based Procedures

We will continue to complement our on-line and smart phone studies with lab based studies to refine our ability to develop CBM procedures that effectively alter cognitive bias and enhance preparedness.

Current Studies

General Structure of Current Studies

- CBM phase (Attention or Interpretation)
- Emotional video with threat message
- Assess impact of CBM on immediate emotional response to the video threat message
- Assess impact of CBM on preparedness intention evoked by the video threat message
- Follow-up continuing impact of CBM on subsequent emotional experience and preparedness actions

Current Studies

General Structure of Current Studies

Most Recently Commenced Study

Internet delivered bushfire community study

- CBM-A
- South Australia bushfire warning video adverts
- Assess emotional impact, safety behaviour intention, subsequent intrusive worry, & behavioural action

Thank you for your……

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