

COPING WITH SURPRISE AND UNCERTAINTY

A resilience perspective on social-
ecological systems dynamics

Brian Walker

Social systems, ecosystems, and social-ecological systems are all **self-organising systems** (complex adaptive systems)

Self-organisation is due to interacting feedbacks

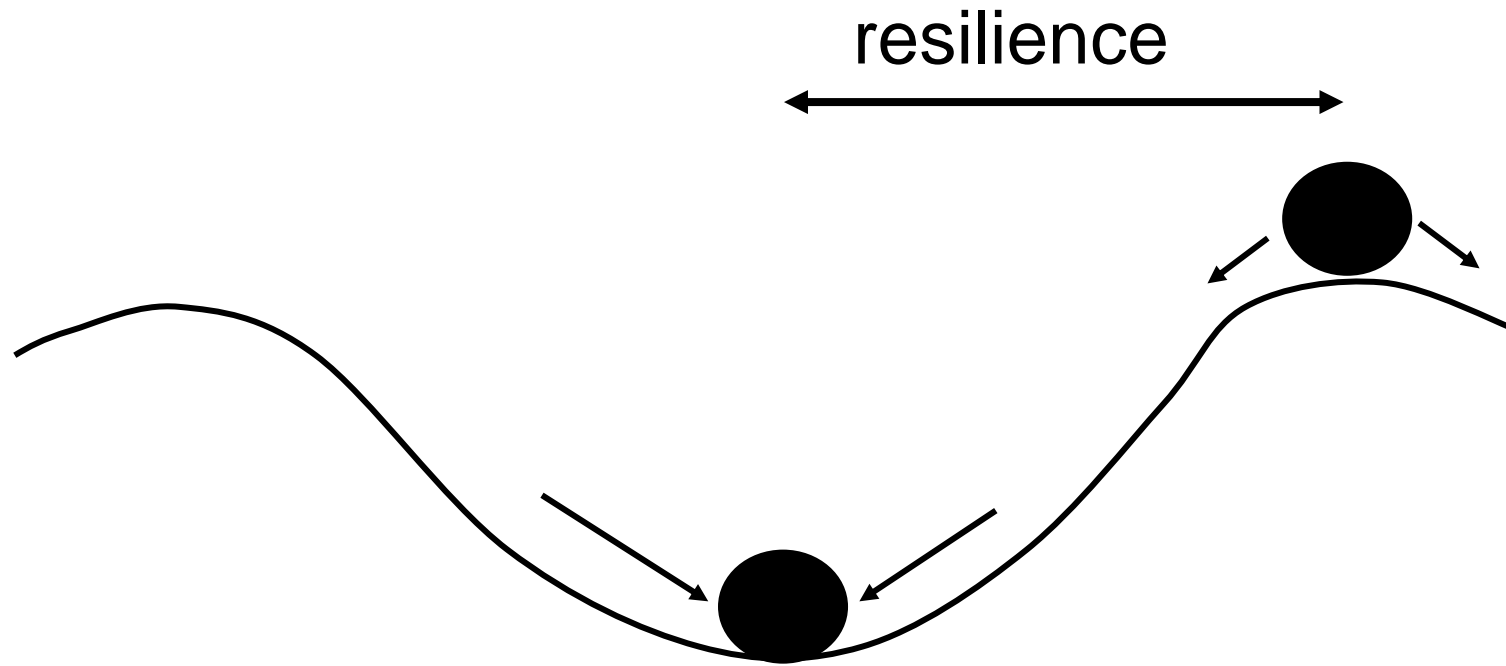
- change some part of a system - feedbacks from it will change
- change a feedback - other parts of the system will change

There are *limits* to the amount of change (disturbance) that can be absorbed; limits to self-organising capacity

this puts a focus on *thresholds* ('tipping points') between alternate states, or 'regimes', of a system

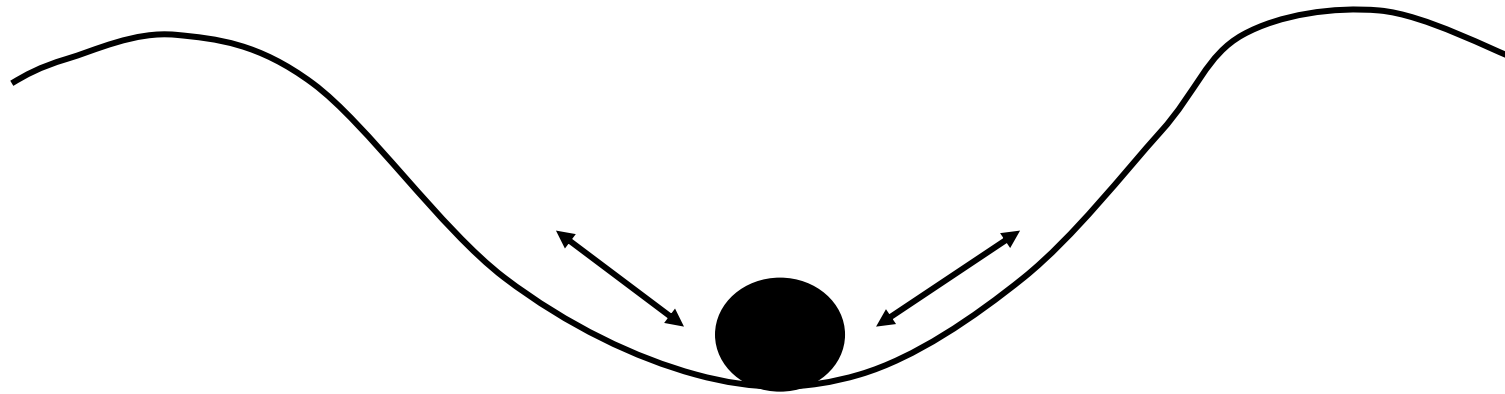
Resilience:

"the ability of a system to absorb disturbance and re-organise so as to retain the same structure, function, feedbacks and (therefore) identity"



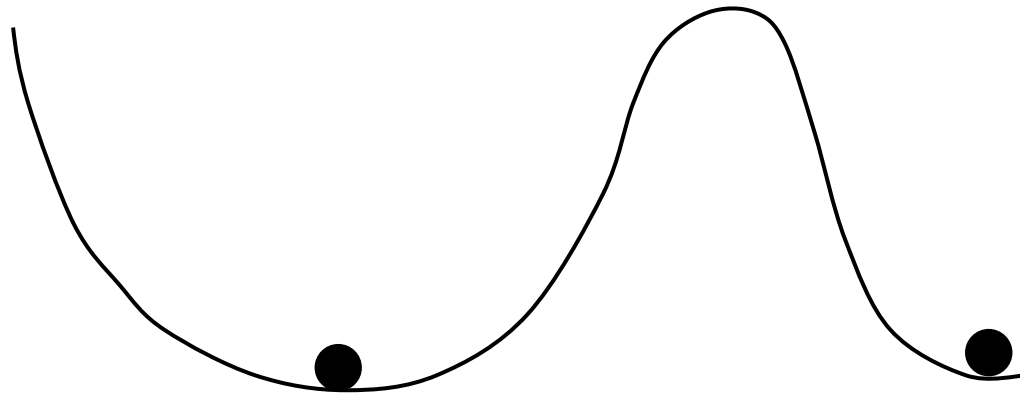
Ball-in-a-basin metaphor for stability and resilience

The human body



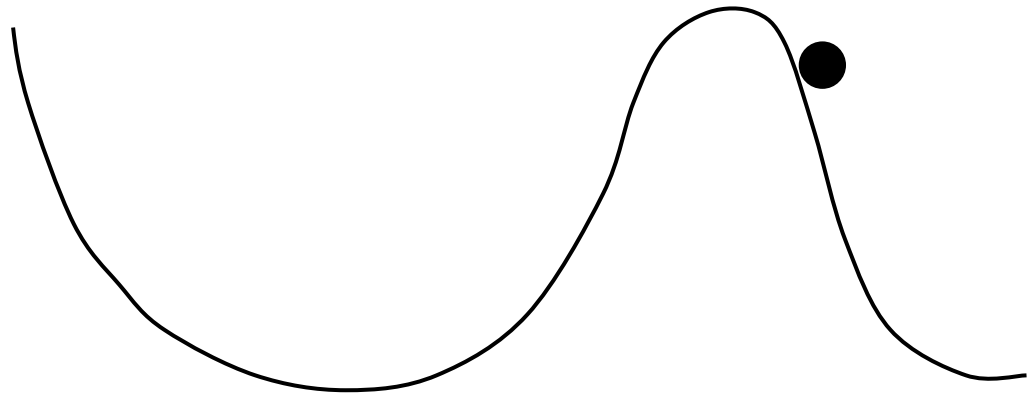
The "live basin of attraction"

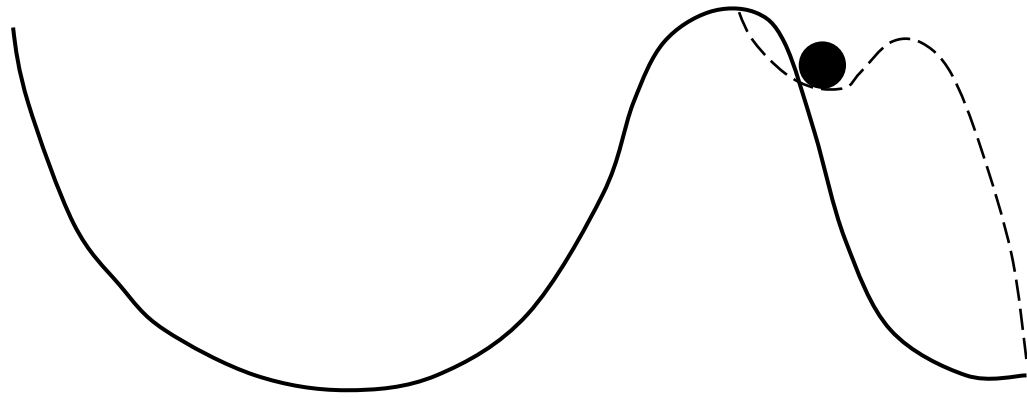
(T. Buchman, Washington Univ, St Louis - pers comm.)

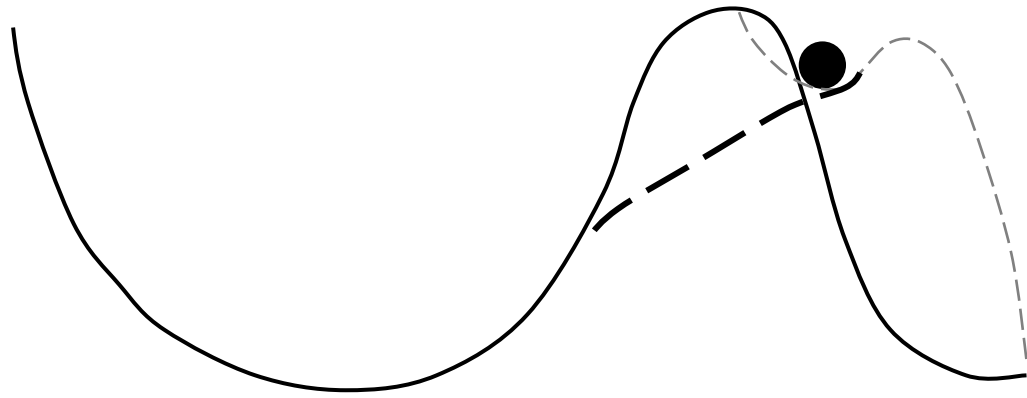


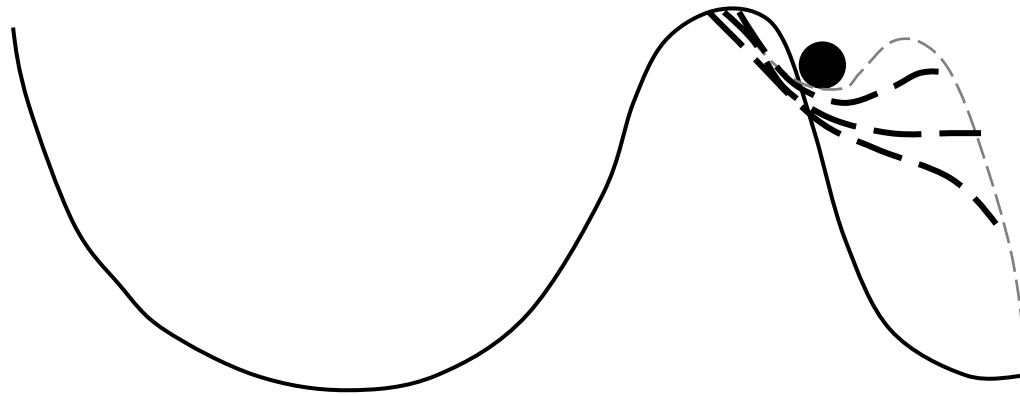
live
attractor

death
attractor









An experiment (with rats)

- self-organising systems remain resilient through being able to change, and to probe their boundaries
- constraints from a higher level can prevent adaptive developments

Multiple interacting thresholds

What are the interacting thresholds in a complex, multi-scale, health system?

Three related trade-offs in resilience

- i) resilience ('redundancy') vs. efficiency
- ii) building resilience at one scale can reduce it at another
- iii) 'specified' resilience vs. 'general' resilience (the HOT model)

what determines general resilience?

- diversity
- modularity (degree of connectedness)
- tightness of feedbacks
- openness - immigration, inflows, outflows
- reserves and other reservoirs (seedbanks, nutrient pools, memory)
- overlapping institutions

**resilience
or
transformation?**

if a shift into a “bad” regime has happened or is inevitable, the only option is *transformation*

“transformability” - capacity to transform into a different kind of system; a new way of making a living; new defining variables

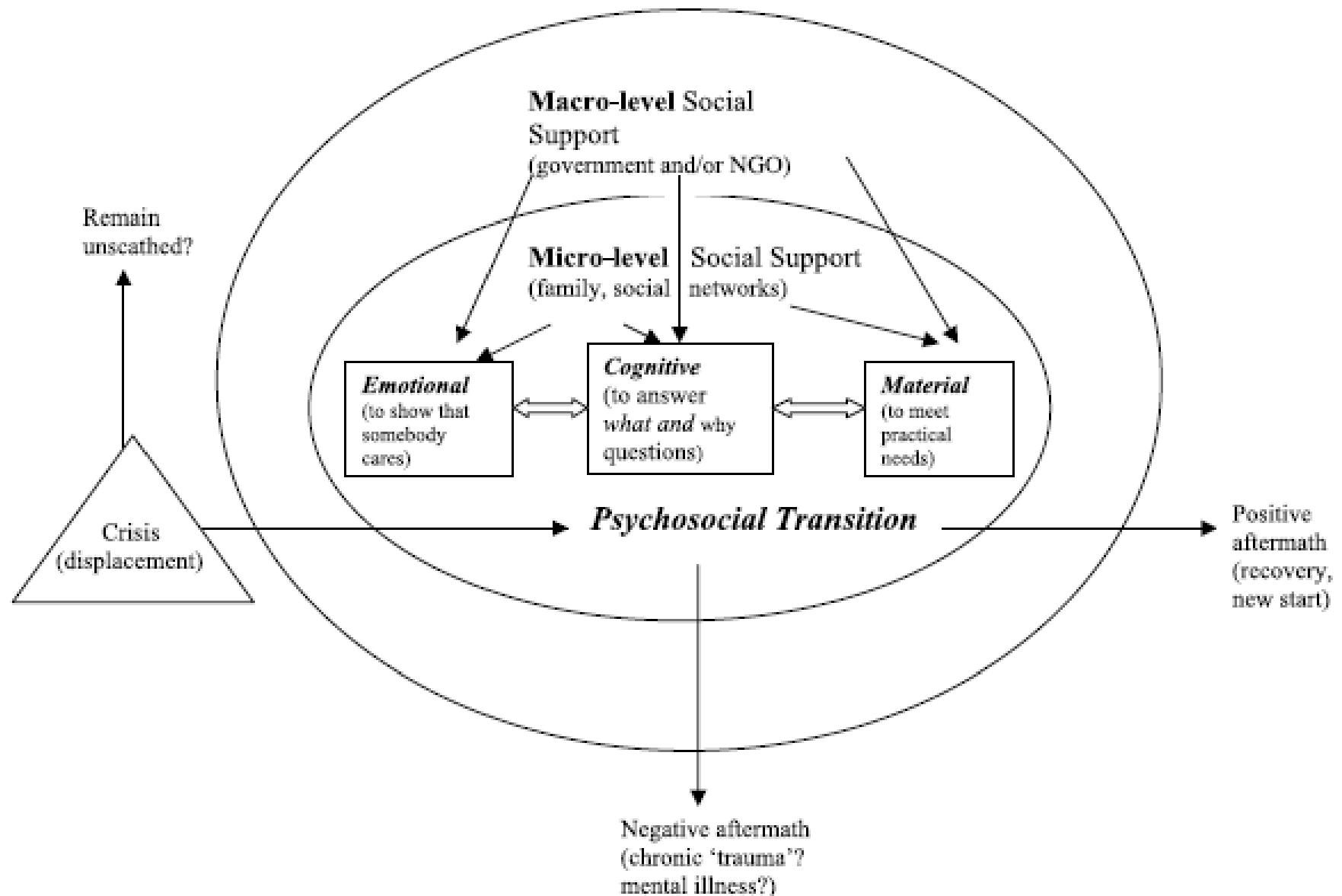
where do we need to build resilience?

where do we need transformative change?

how does this apply to Australia's
health system?

A resilience approach to the future

- promote and sustain diversity, of all kinds
- restrict control of environmental / ecological variability
- encourage learning, innovation and experiments
- don't try to aim for some, particular "optimal" state
- aim to avoid states that are *not* wanted and let the system self-organise within the range of acceptable states (learn about thresholds)
- understand and include cross-scale effects
- enhance general resilience and embrace change
- maintain transformability
- avoid top-down, command-and-control policy / management
- beware of partial solutions



(acknowledgements to Prof. A.Almedom)