



**University of  
Nottingham**

UK | CHINA | MALAYSIA

# Hearing loss and fatigue

Graham Naylor

Hearing Sciences, School of Medicine



- What is fatigue?
  - The ‘protective function’ of fatigue
  - The role of motivation
  - Transient and Persistent fatigue
    - Recovery
    - Fatigue and activity
- Hearing loss and fatigue - evidence from research
  - Does hearing loss cause increased fatigue?
  - Do hearing devices help to reduce fatigue?
- Conclusion - implications for clinical practice



University of  
**Nottingham**

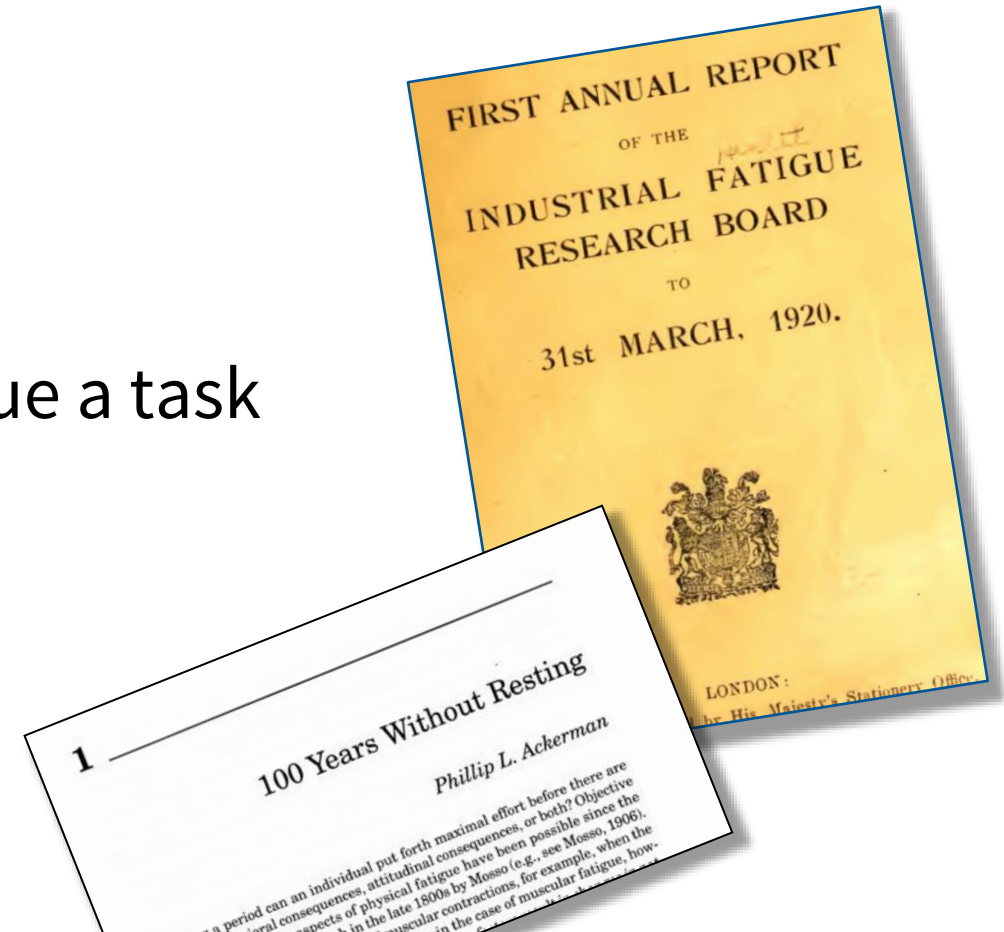
UK | CHINA | MALAYSIA

# What is fatigue?



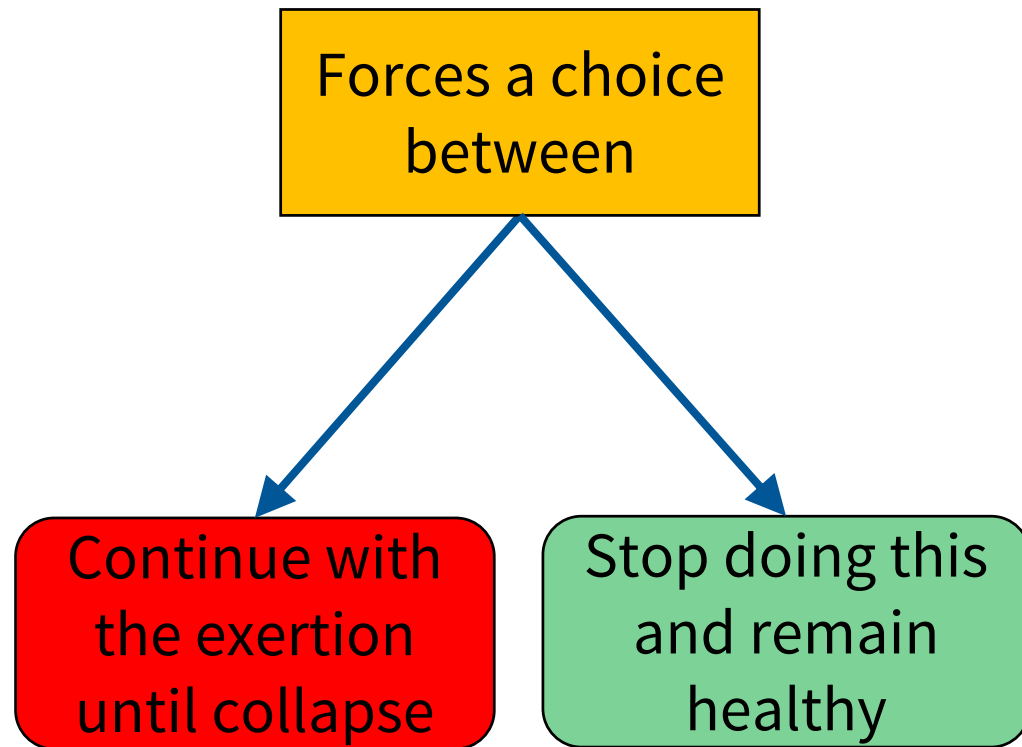
# Defining fatigue

- 100 years of fatigue research – still no clear definition!
- Physical – Mental – (Emotional)
- A mood or feeling of **tiredness, exhaustion or lack of energy,**  
a **reduced desire or motivation** to continue a task
- We all know what fatigue is!

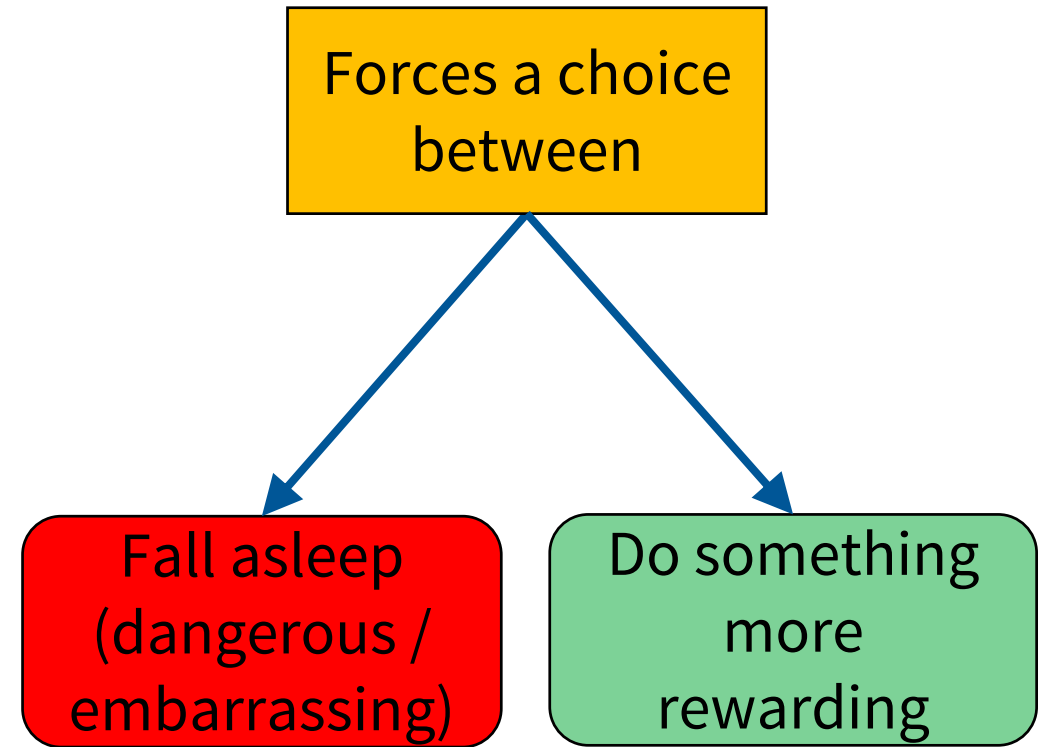


# The 'protective function' of fatigue

- Physical fatigue protects the organism from physical collapse



- Mental fatigue is a warning sign "Stop doing this, or you will fall asleep"

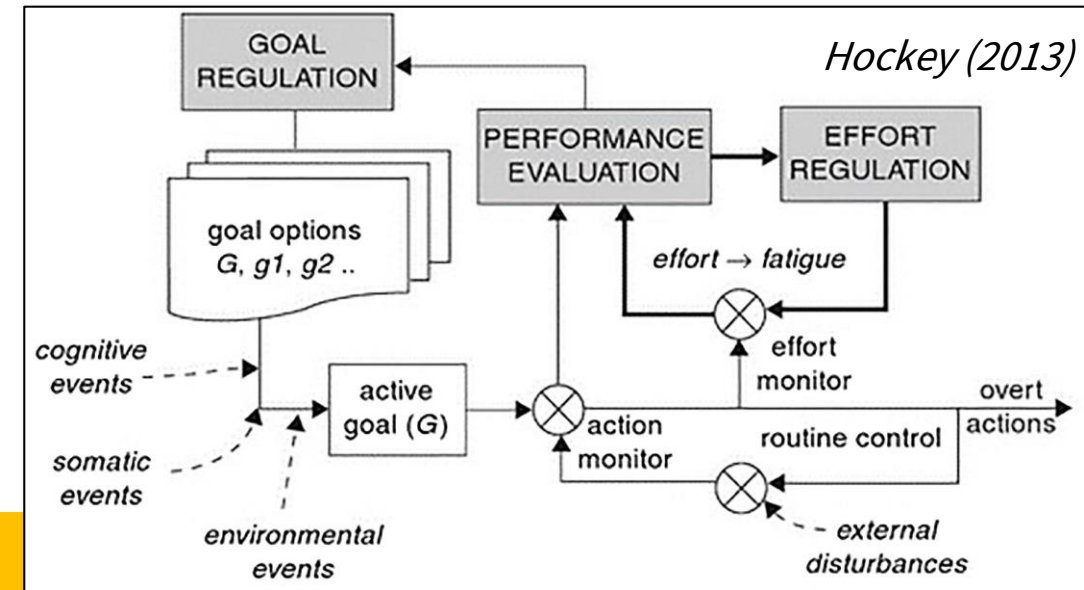


## ‘Motivational control theory of fatigue’

- We are constantly choosing to pursue one goal among several alternative goals
- Choice is made by looking at
  - Potential reward
  - Effort required to achieve it
  - Value of the reward vs. effort

... for all current alternative goals

- Fatigue is the realisation that the reward for achieving the current goal is not worth the effort required





Fatigue did not save  
Phidippides – why not?

- He was motivated  
beyond safety

Motivation can neutralize  
fatigue

- But only temporarily



*'Phidippides giving word of victory'*  
- Luc-Olivier Merson, 1869



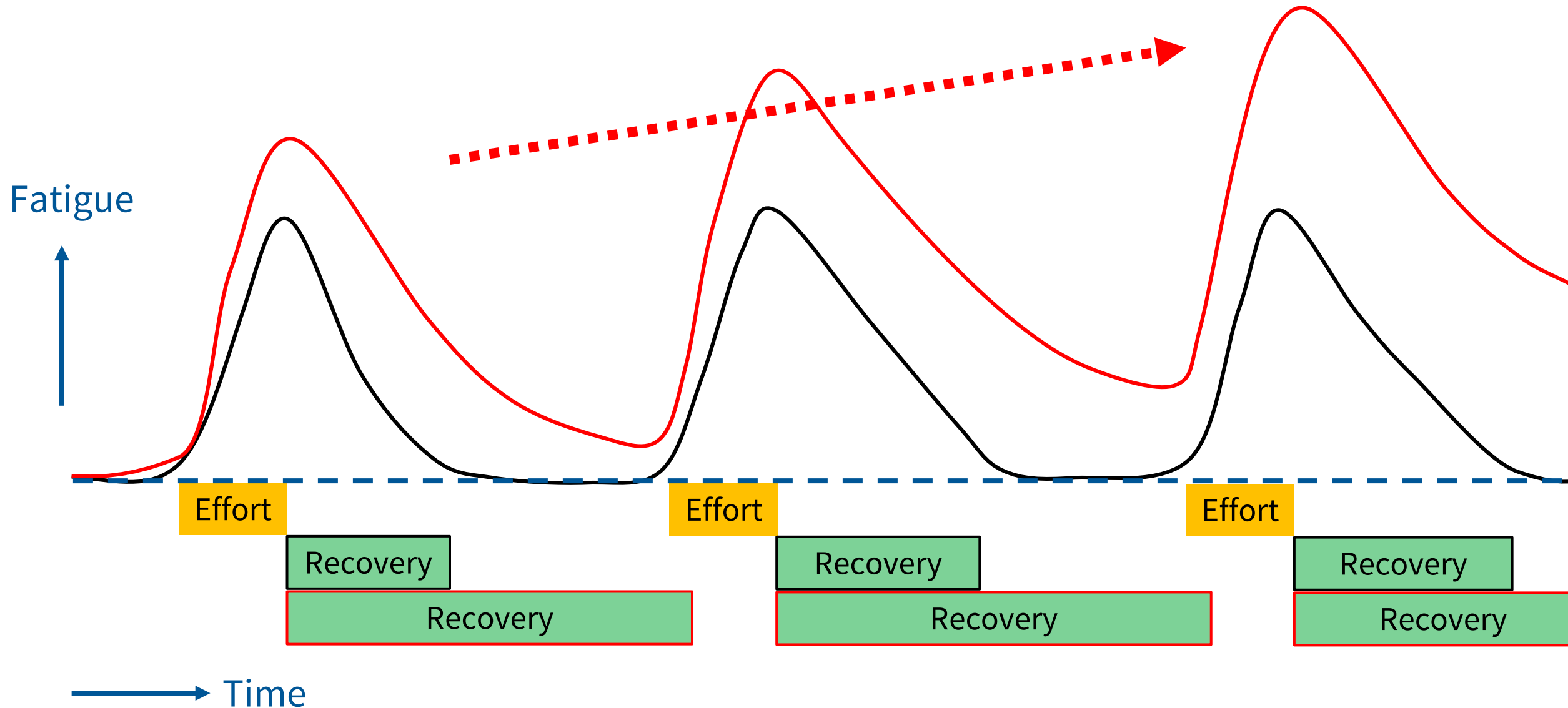
University of  
**Nottingham**

UK | CHINA | MALAYSIA

# From transient fatigue to persistent fatigue



# Transient to persistent fatigue – lack of recovery





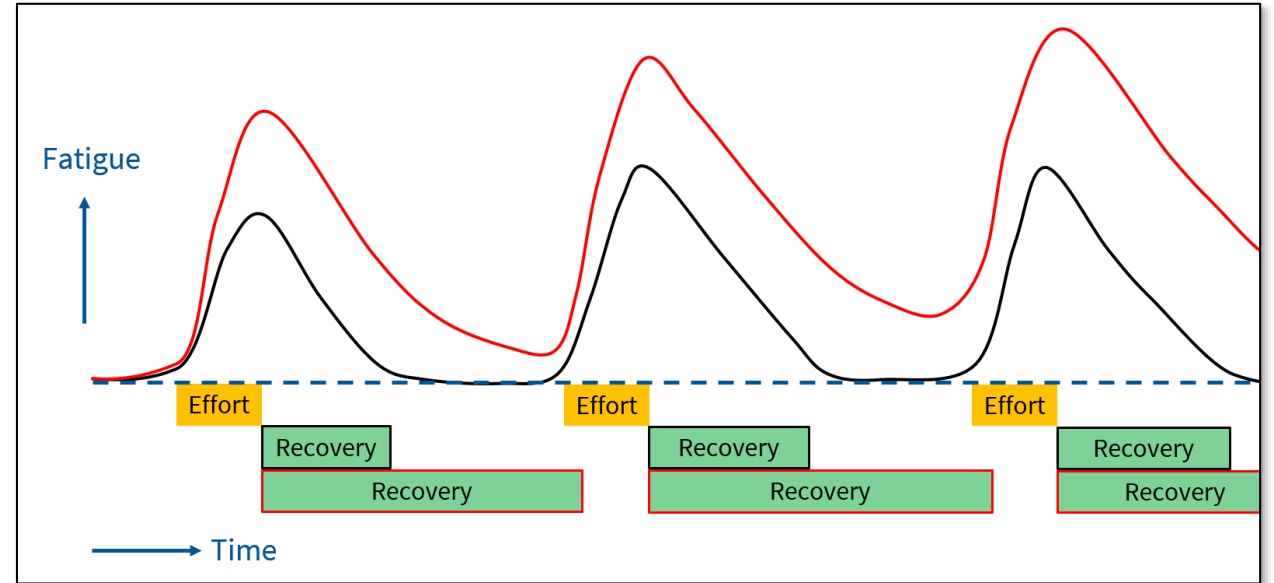
# Persistent fatigue and activity

## Two solutions to persistent fatigue

1. Make each effortful event less fatiguing
2. Make effortful events less frequent

... sounds familiar?

Withdrawal





University of  
**Nottingham**

UK | CHINA | MALAYSIA

# Let's talk about hearing!

Evidence from research



# Does hearing loss lead to increased persistent fatigue?

- Yes: Likelihood of severe fatigue is 2-4 times greater than normal population
  - ... but 'average' fatigue is not much higher than normal
  - ... and no clear trend with severity of hearing loss (!)
- Great variation from person to person (with hearing loss)
  - Some experience no persistent fatigue
- Emotional fatigue also important for some
- Tinnitus may give increased fatigue (? Sleep disturbance)

“Frustration I think does make me tired”

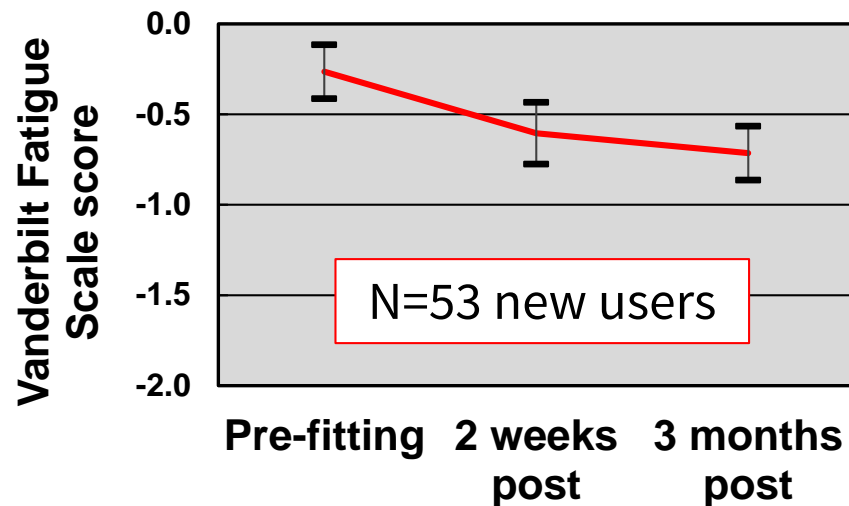
*Hornsby & Kipp (2016),  
Holman et al. (2019),  
Langguth (2011),  
Burke & Naylor (in review)*

## Cochlear implants ...

- Reduce persistent fatigue ✓

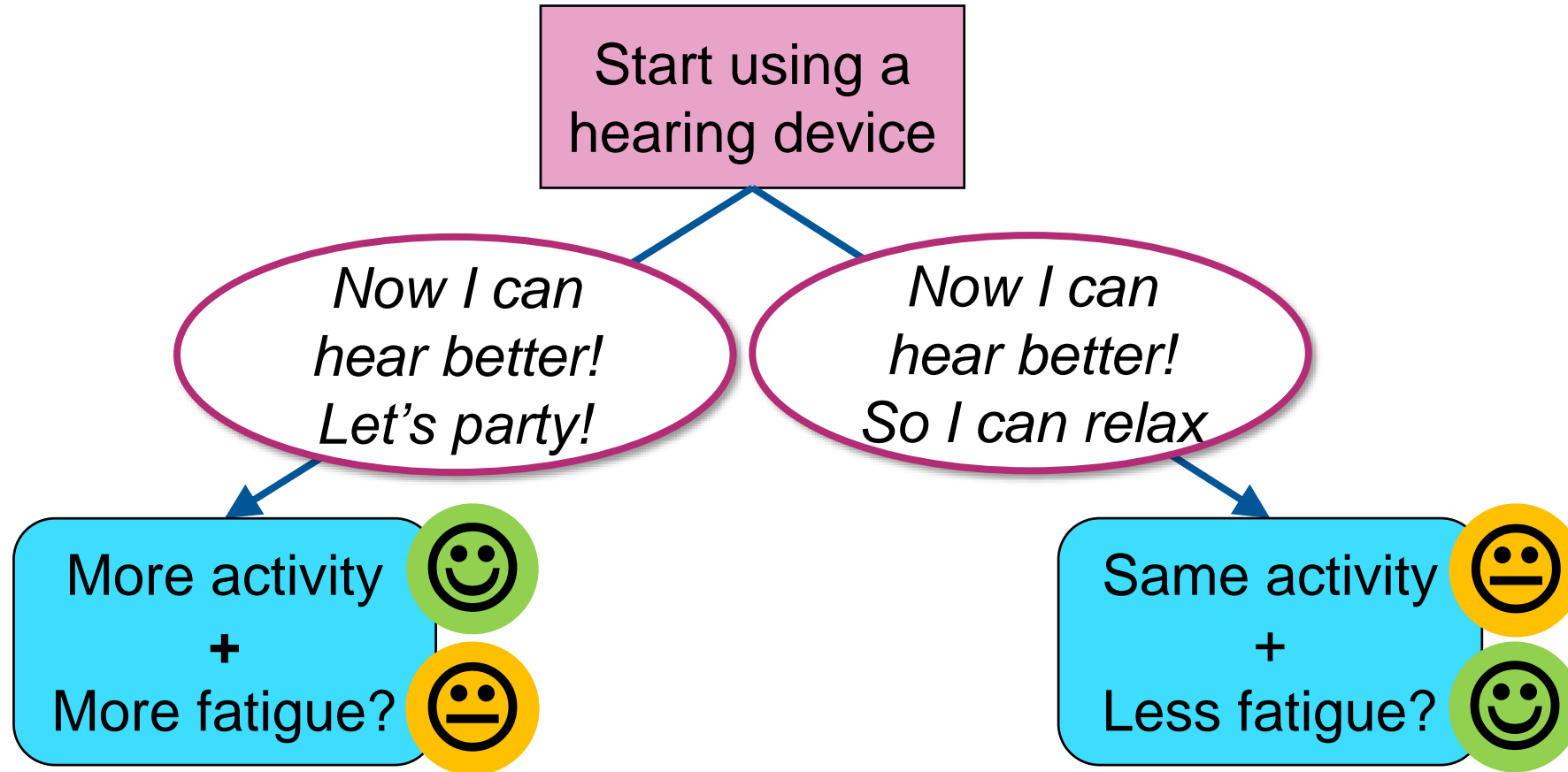
## Hearing aids ...

- (Laboratory data) Reduce likelihood of transient fatigue ✓
- (Preliminary field data) Reduce listening-related persistent fatigue (✓)



*Chung et al. (2012),  
Hornsby (2013),  
Harkonen et al. (2015),  
Alhanbali et al. (2016),  
Holman et al. (in review)*

# Potential complication – changes in activity



*... more research is needed*



University of  
**Nottingham**

UK | CHINA | MALAYSIA

# Conclusions

Fatigue is complex (effort, motivation, activity)

- Manifests in diverse ways – individual differences

People with hearing loss experience hearing-related fatigue as

- Mental fatigue - a result of effortful listening
- Emotional fatigue – a result of frustration and coping
- ... and some people experience none!

Hearing devices can probably reduce fatigue

- ... or support more active lifestyle

Your conversation  
with clients:

You can help them  
understand it

Each one is different

What are their  
priorities for well-  
being?





University of  
Nottingham

UK | CHINA | MALAYSIA

Thank you for your  
attention!

# Hearing loss and fatigue

Graham Naylor

Hearing Sciences, School of Medicine

