

# Hunting for (energy) demanding practices using big & medium sized data

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@dataknut

Engineering & Environment (Energy & Climate Change)

# The engineering 'nexus'



# The engineering 'problem'



# The engineering 'epiphany'



## Architectural Science Review

Publication details, including instructions for authors and subscription information:

<http://www.tandfonline.com/loi/tasr20>

## Buildings don't use energy: people do

Kathryn B. Janda <sup>a</sup>

<sup>a</sup> Environmental Change Institute, Oxford University , Oxford, UK

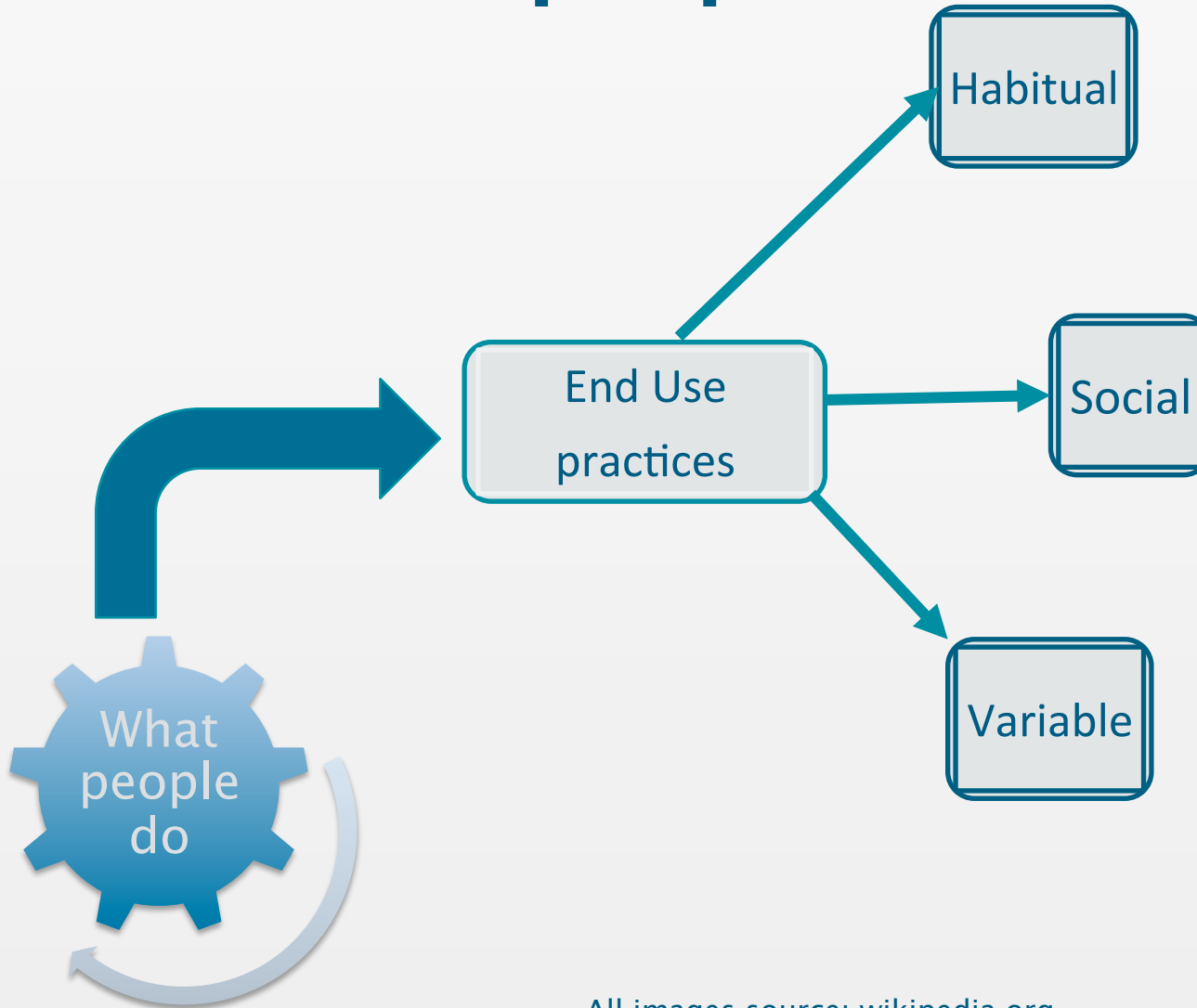
Published online: 09 Jun 2011.

<http://dx.doi.org/10.3763/asre.2009.0050>



And you can say the same about water...

# So what *do* people do?



We first make our *practices* then our *practices* make us. ~ John Dryden



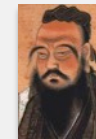
Chaos breeds life, order breeds *practices*. ~ Henry Adams



In any family, measles are less contagious than (bad) *practices*. ~ Mignon McLaughlin

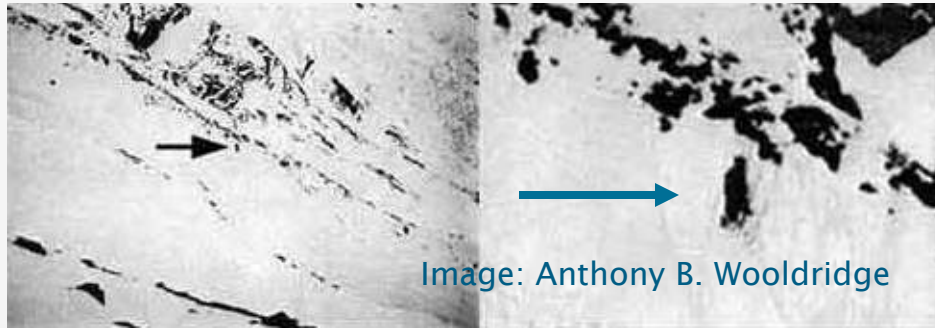


Nothing so needs reforming as other people's *practices*. ~ Mark Twain



Men's natures are alike; it is their *practices* that separate them. ~ Confucius

# Practices, proxies & marks



*(an empiricist's response)*

*"The recurrent enactment of specific practices leaves all sorts of "marks" – diet shows up in statistics on obesity; heating and cooling practices have effect on energy demand, and habits of laundry matter for water consumption. Identifying relevant "proxies" represents one way to go."*

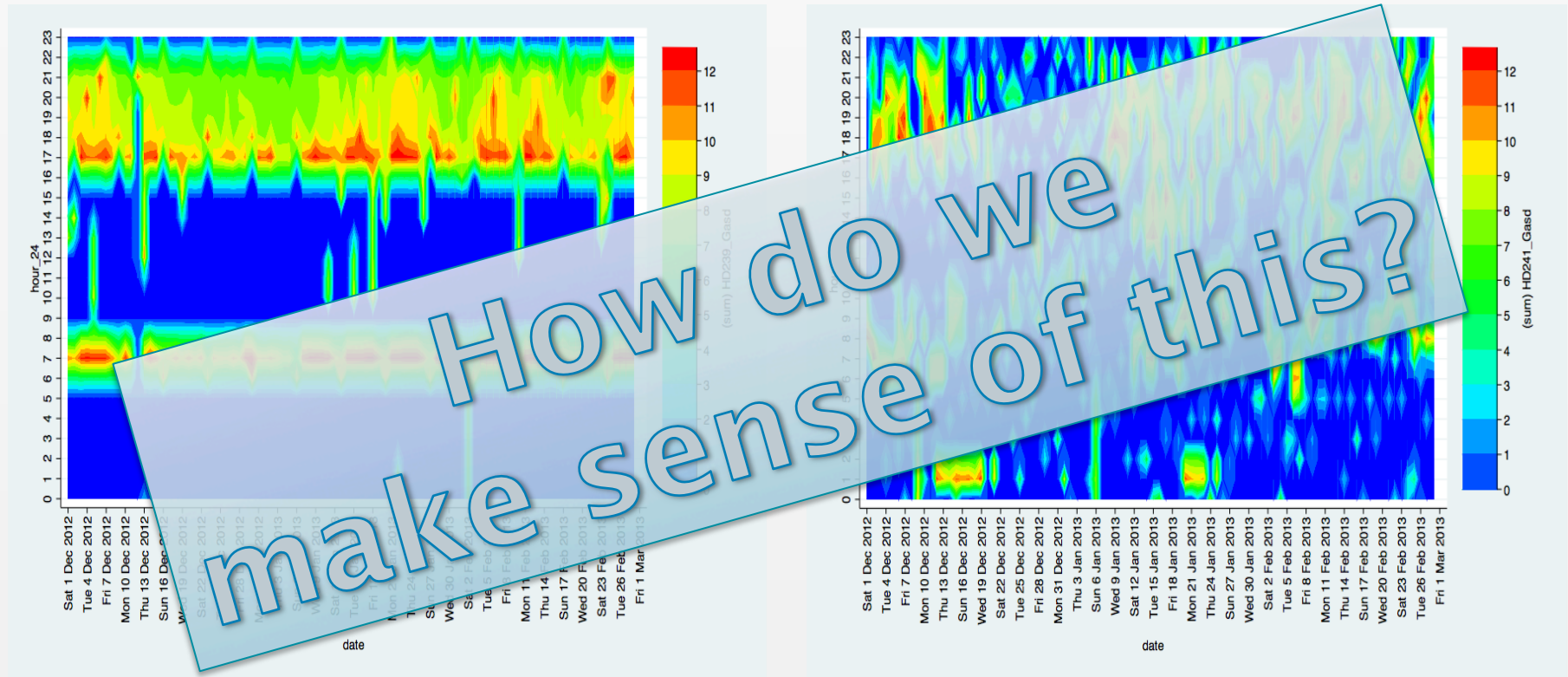
*Social Practices Research Group Discussion Paper*

[www.sprg.ac.uk](http://www.sprg.ac.uk)





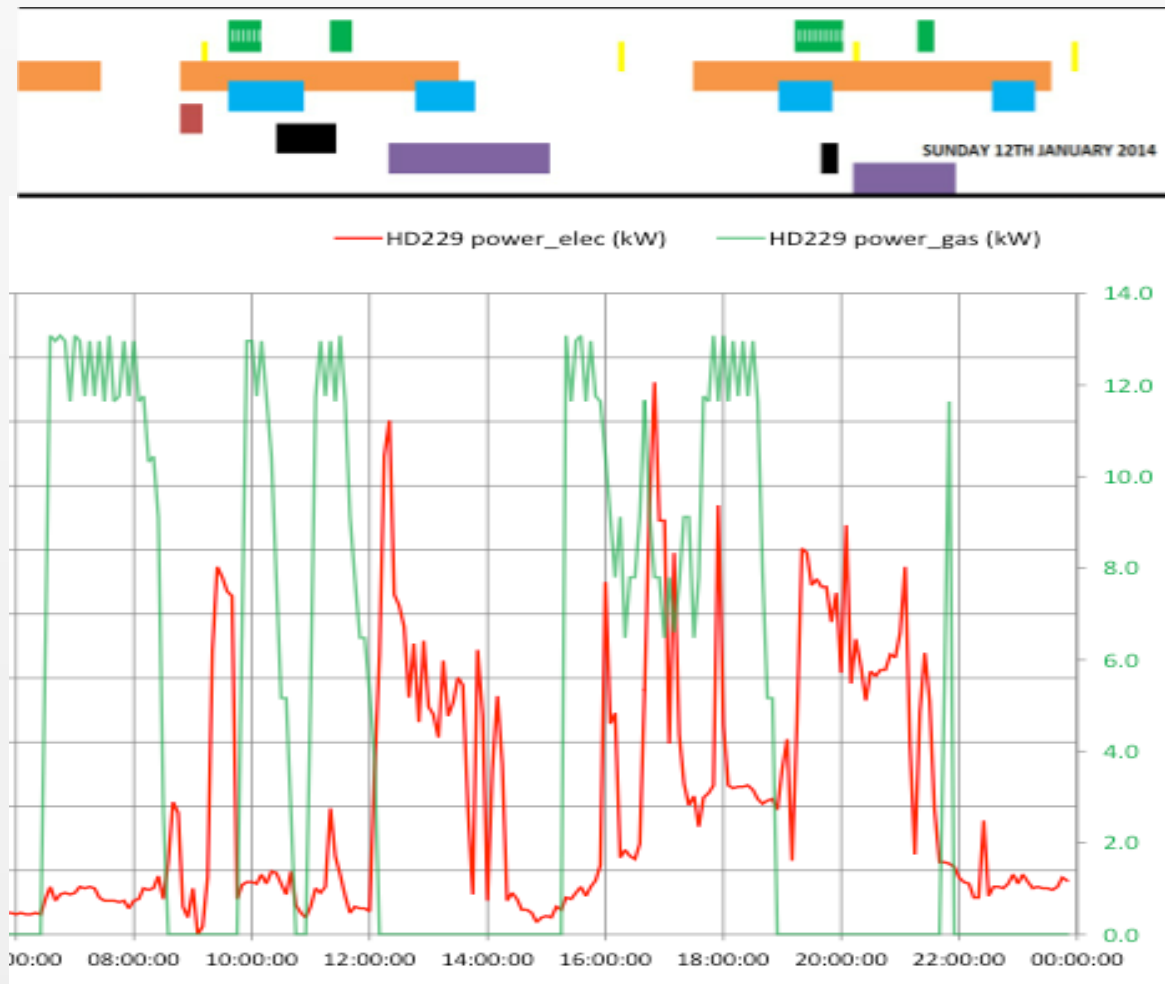
# Energy footprints...



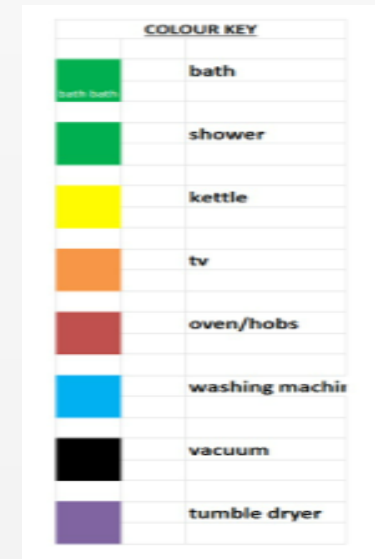
- Gas consumption per 5 minutes, identical dwellings in South East UK, same street, both couples with 3 children, male partner working, female partner not
- December 2012 – February 2013

Source: EPSRC DANCER Project baseline gas consumption monitoring - <http://www.dancer-project.co.uk/>

# By linking 'big' & 'little'



Source: Small scale energy diary and consumption monitoring study lead by Kathryn Buchanan, University of Essex <http://www.dancer-project.co.uk/>



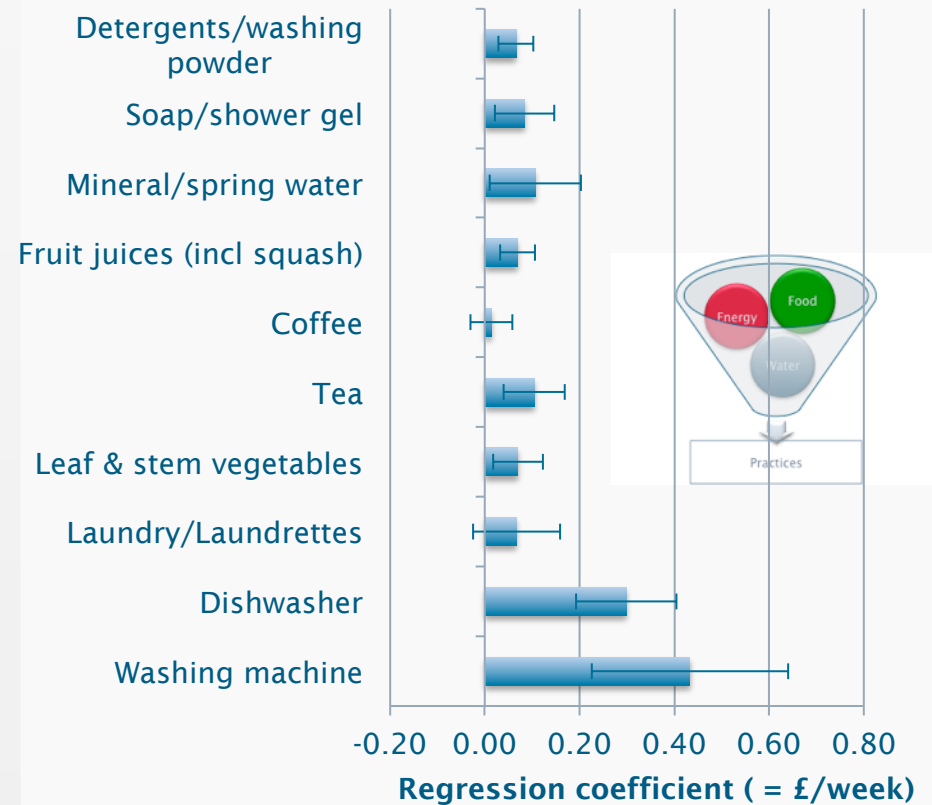


# But how do we scale up?

What correlates with water 'demand'?

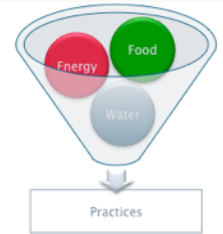
Tried

Expenditure  
Surveys



Data: UK Living Costs and Food Survey 2002-2009 (n = 38,630)  
Wide range of controls  
<http://link.springer.com/article/10.1007/s11269-012-0117-y>

# DEMANDing Practices?

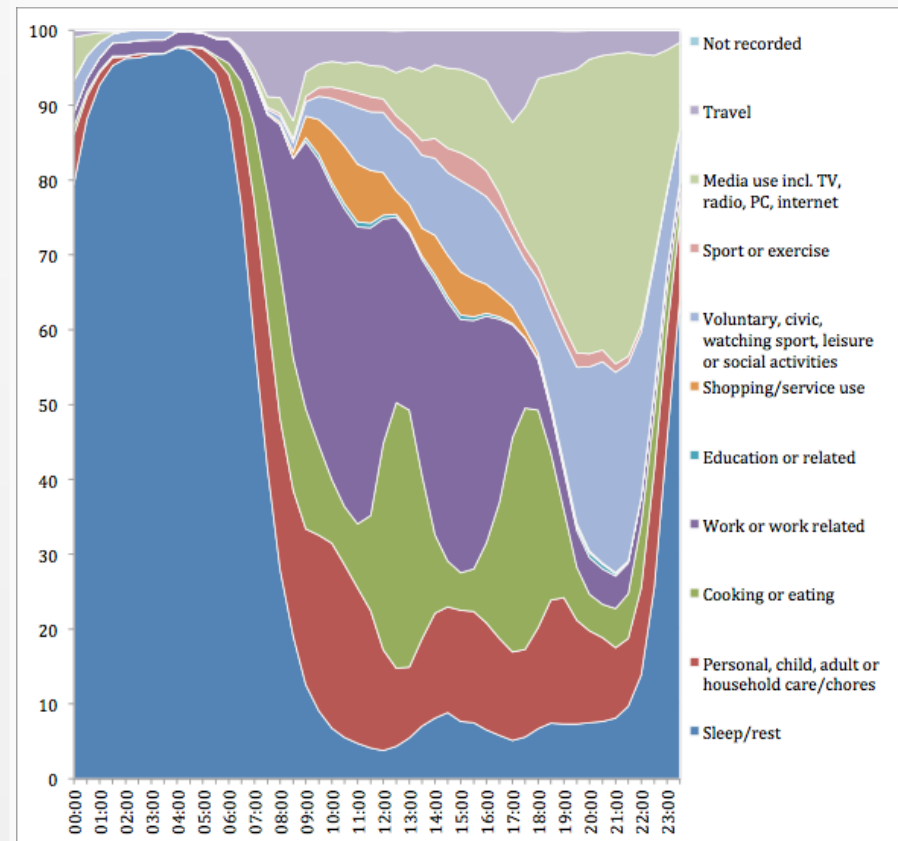


UK, 1974

Tried & tested

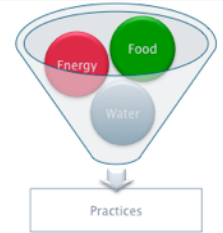
Expenditure  
Surveys

Time Use Surveys



# How do we 'detect' change?

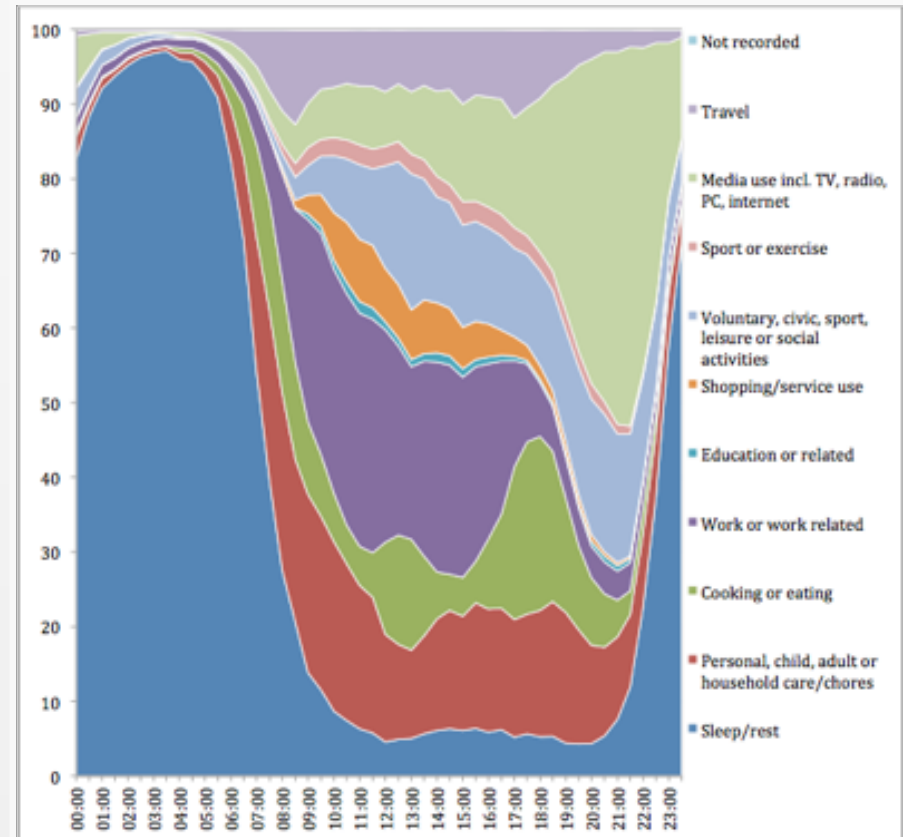
UK, 2005



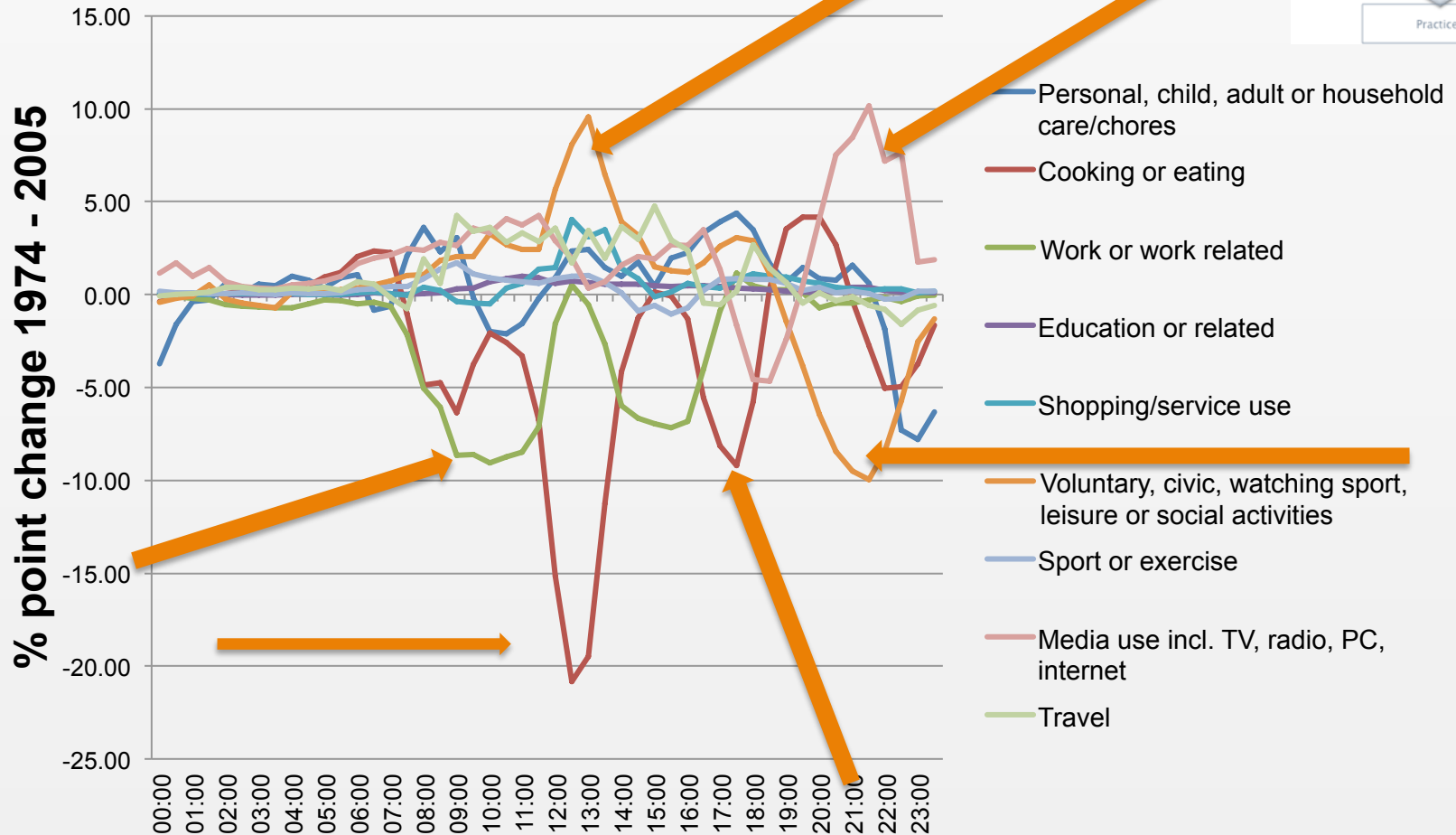
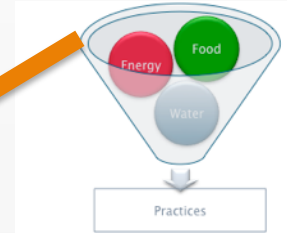
Tried & tested

Expenditure  
Surveys

Time Use Surveys

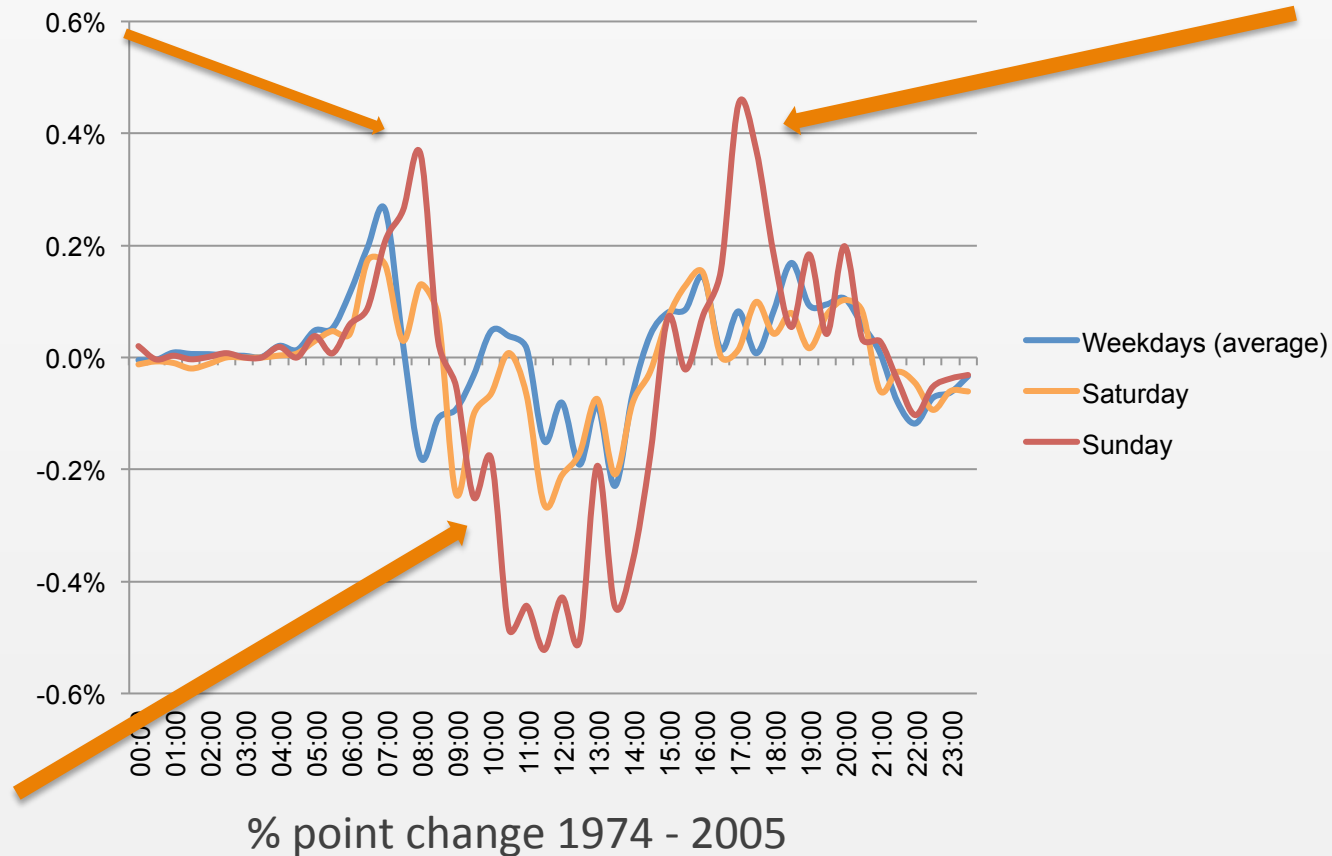
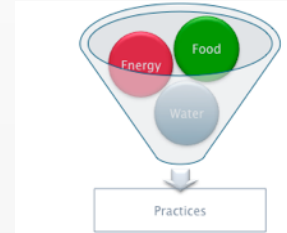


# Evolving 'practices'?



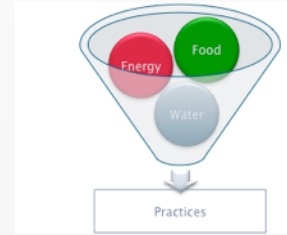
Source: MTUS 1974-2005, author's calculations, weighted

# In detail: cooking @ home

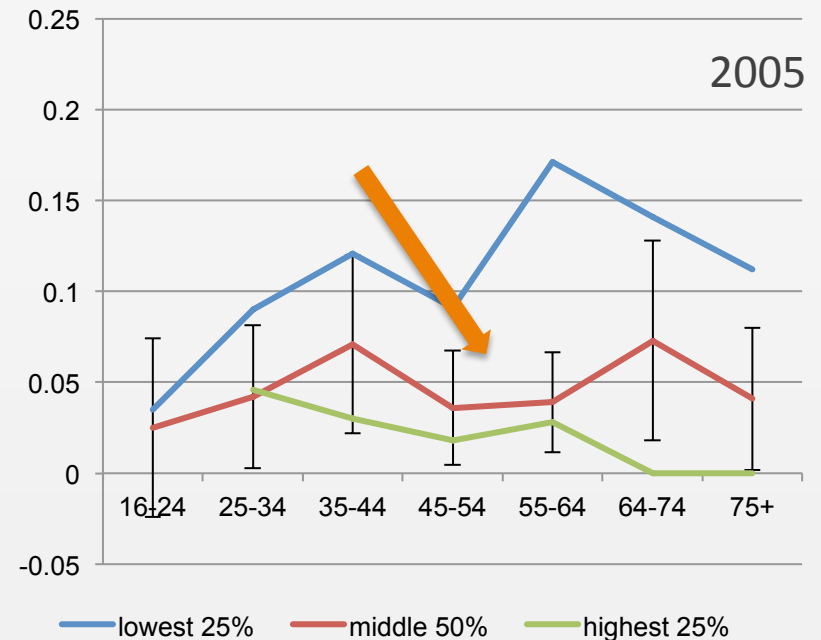
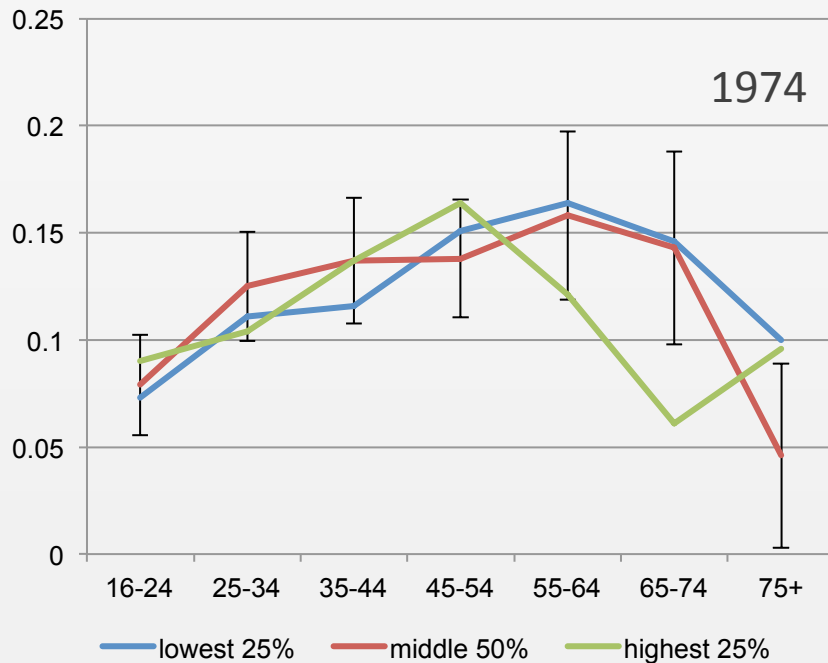


Source: MTUS 1974-2005, author's calculations, weighted

# In detail: Sunday lunch



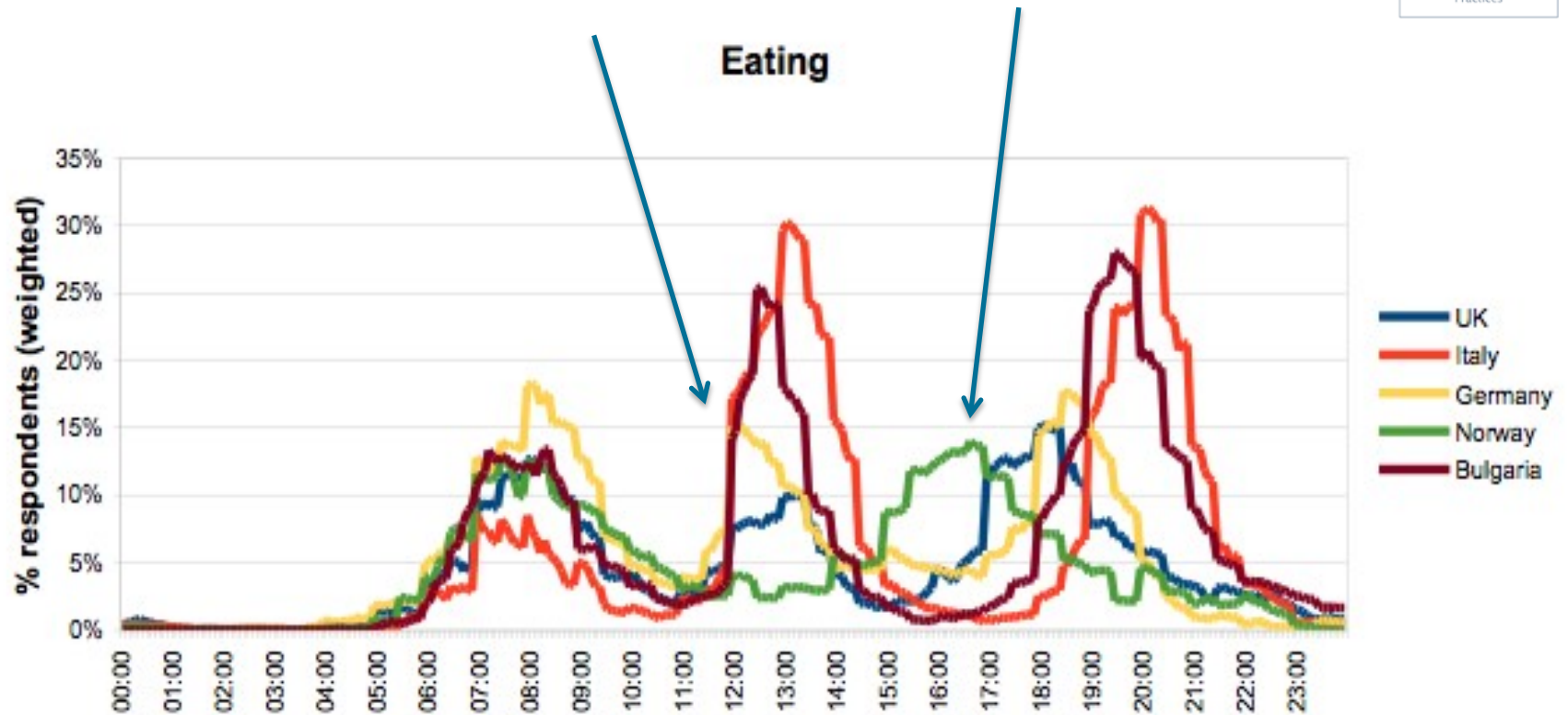
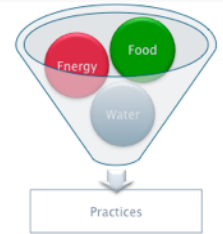
Mean number of half hours in which food prep at home on Sunday 11:00 – 14:00 was reported



Source: MTUS 1974-2005, author's calculations, weighted

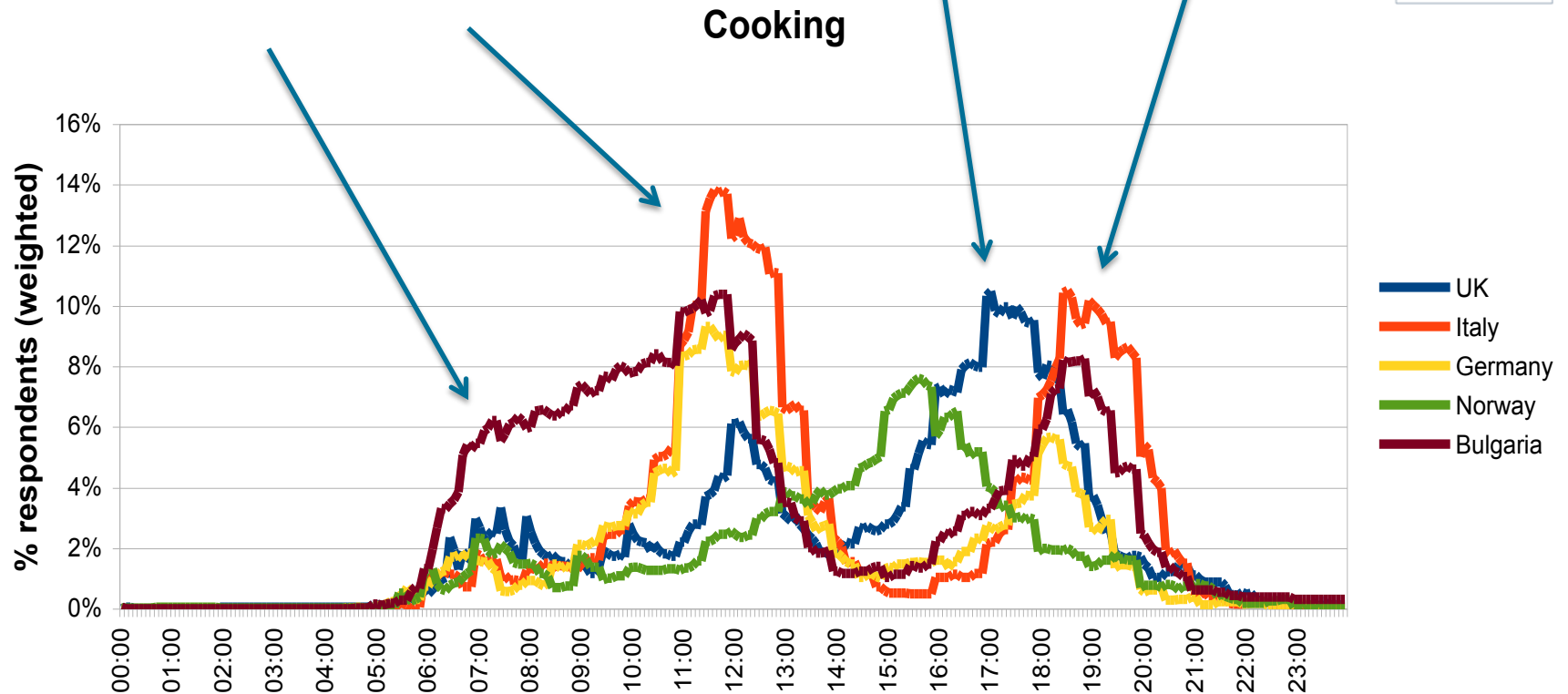
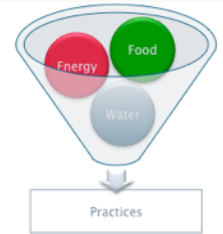


# ‘Cultural’ practices?



E-Living Time Use Diary 2001 (weekdays)  
% persons reporting

# 'Cultural' practices?



E-Living Time Use Diary 2001 (weekdays)  
% persons reporting

# More radically...

Tried & tested

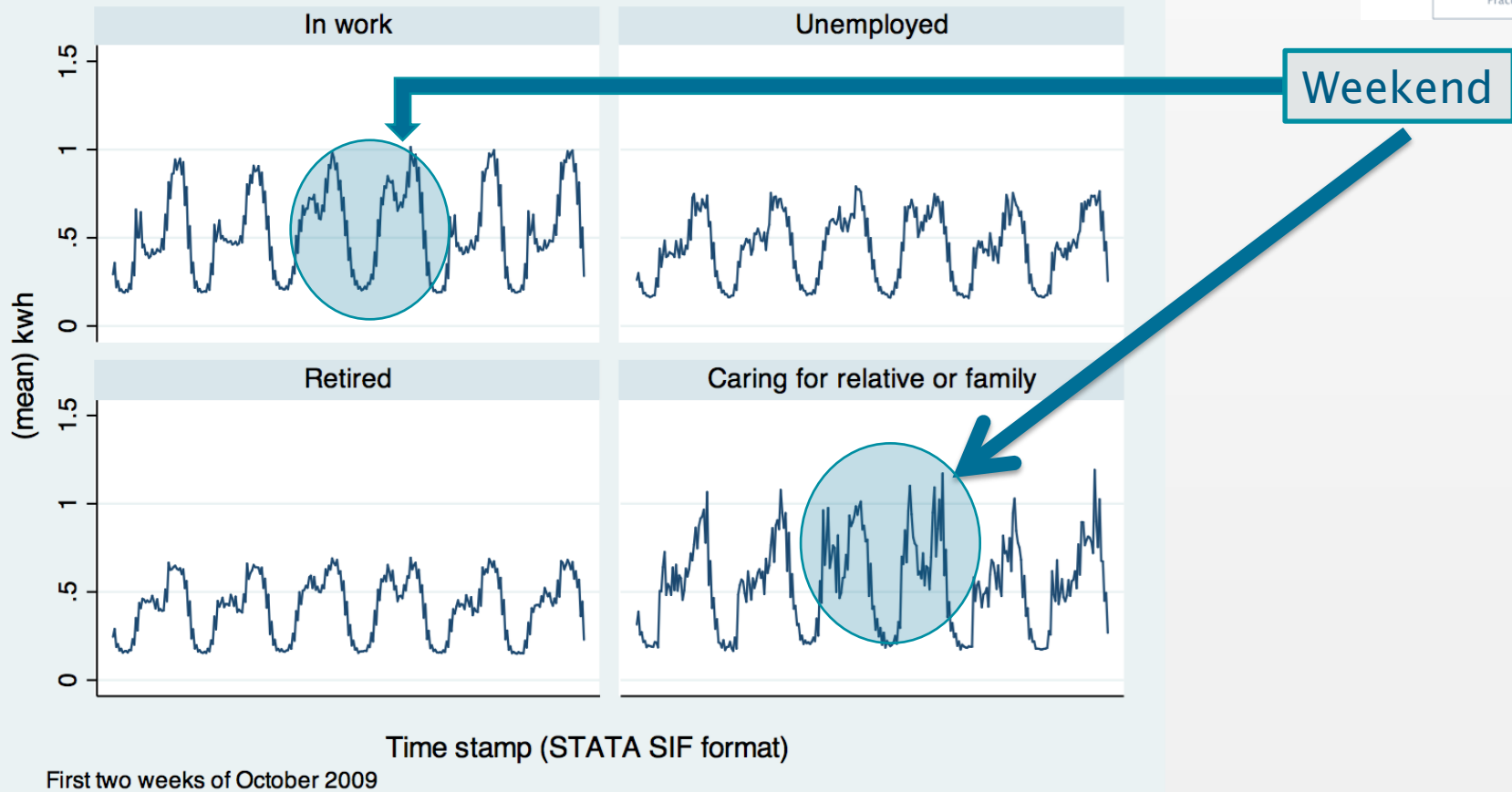
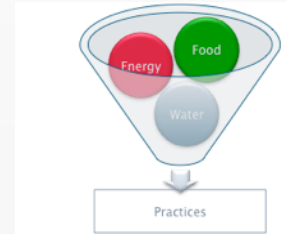
Expenditure  
Surveys

Time Use Surveys

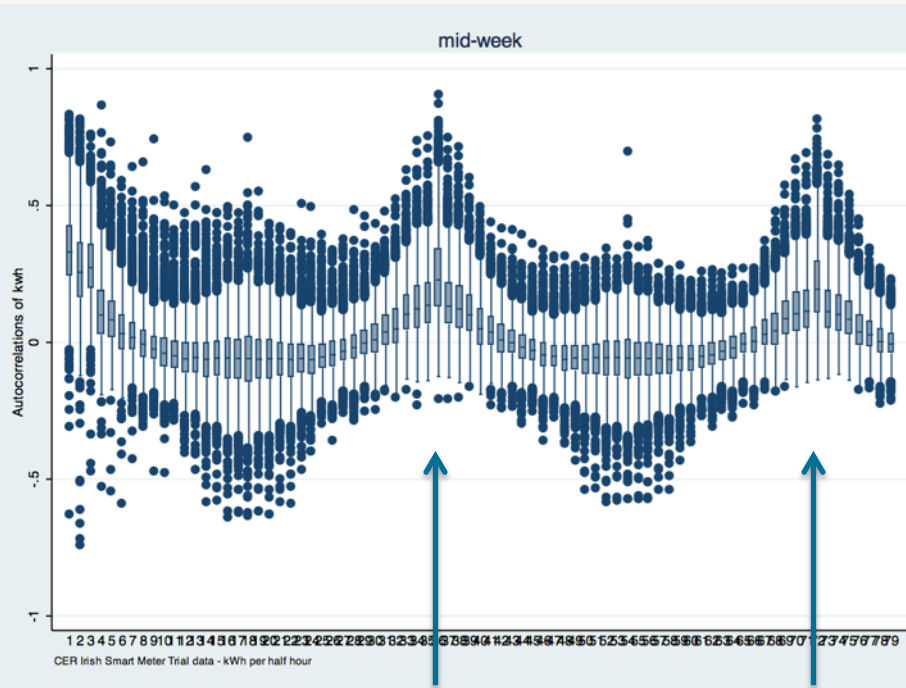
Less tried & rarely  
tested

TechnoTraces

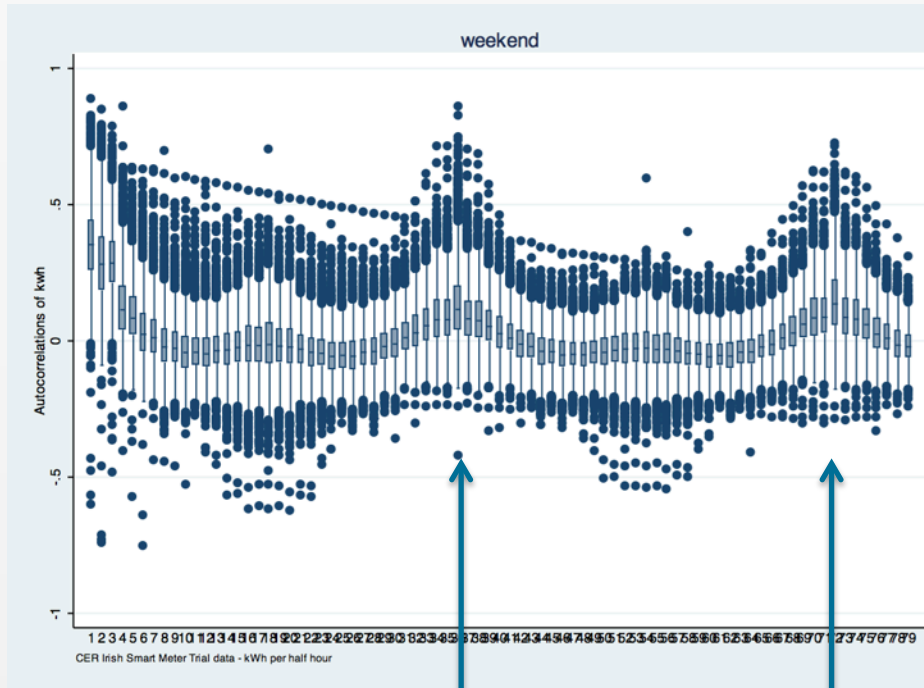
# Traces of habit?



# Demanding rhythms



Mid-week



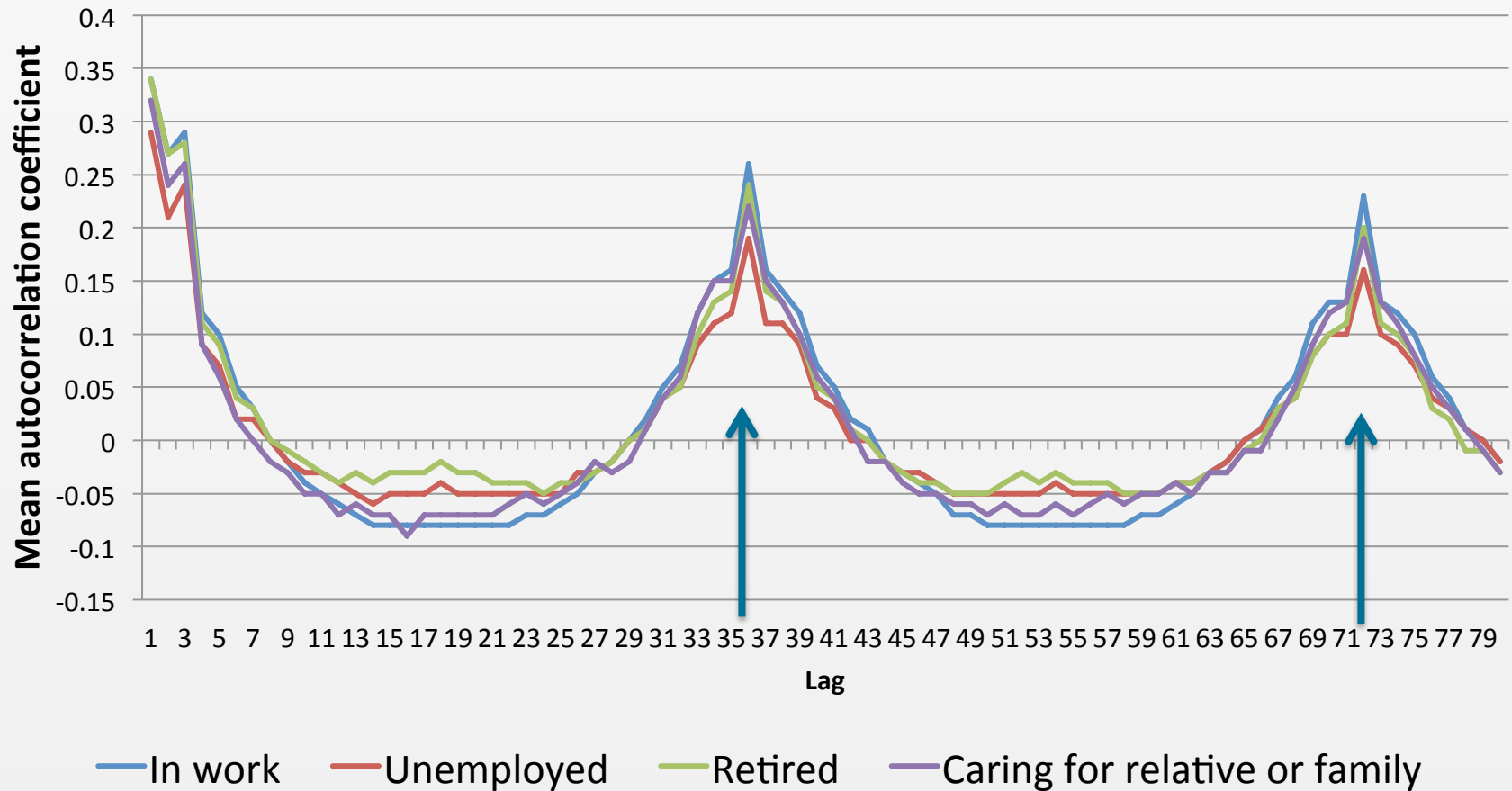
Weekend

Autocorrelation analysis of lagged consumption

2,839,200 half hourly electricity consumption records from 4,225 households, October 1-14, 2009

Data available from: <http://www.ucd.ie/issda/data/commissionforenergyregulationcer/>

# Demanding rhythms: mid-week



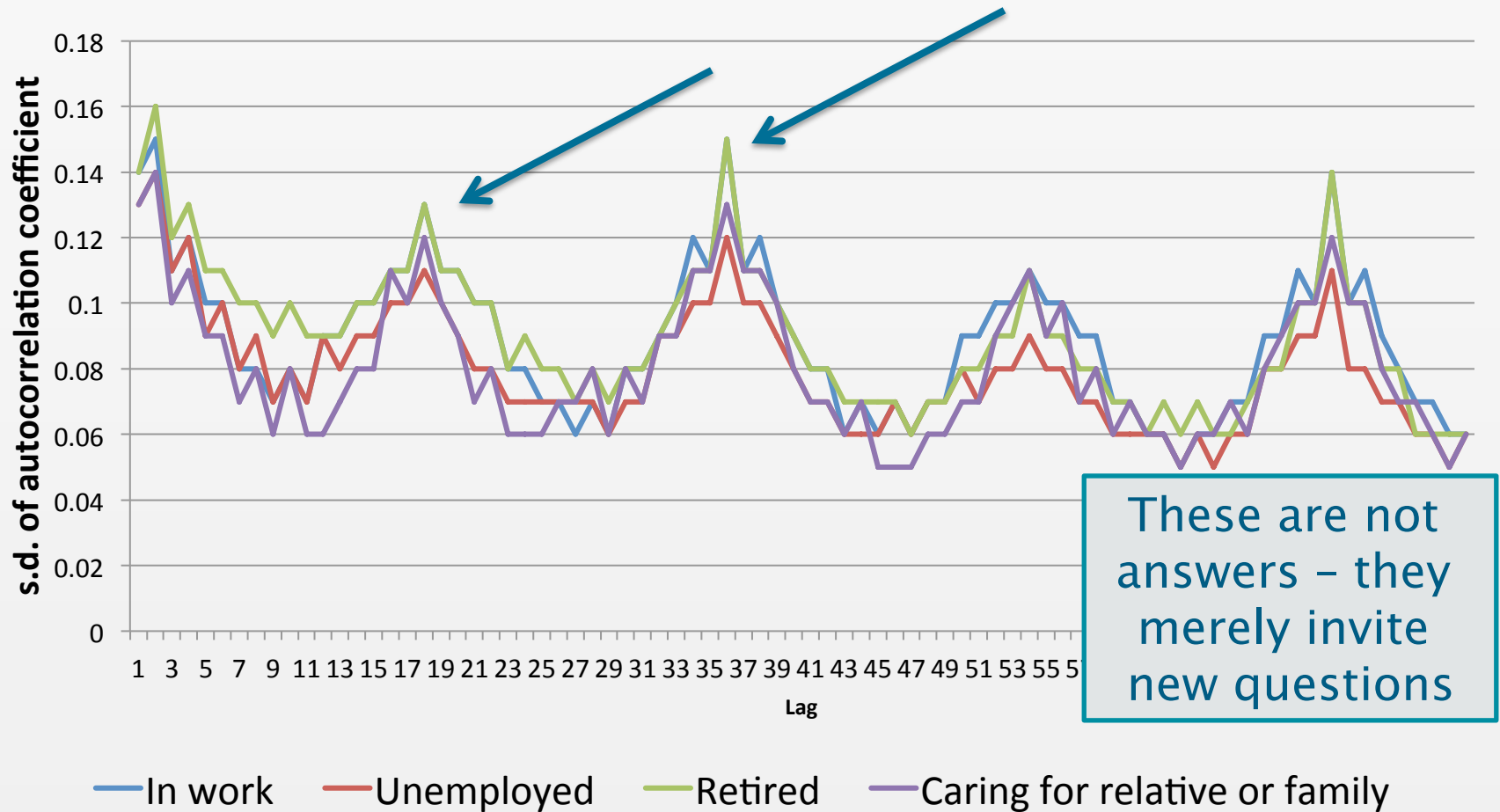
Autocorrelation analysis of lagged consumption

2,839,200 half hourly electricity consumption records from 4,225 households, October 1-14, 2009

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# Demanding rhythms: mid-week

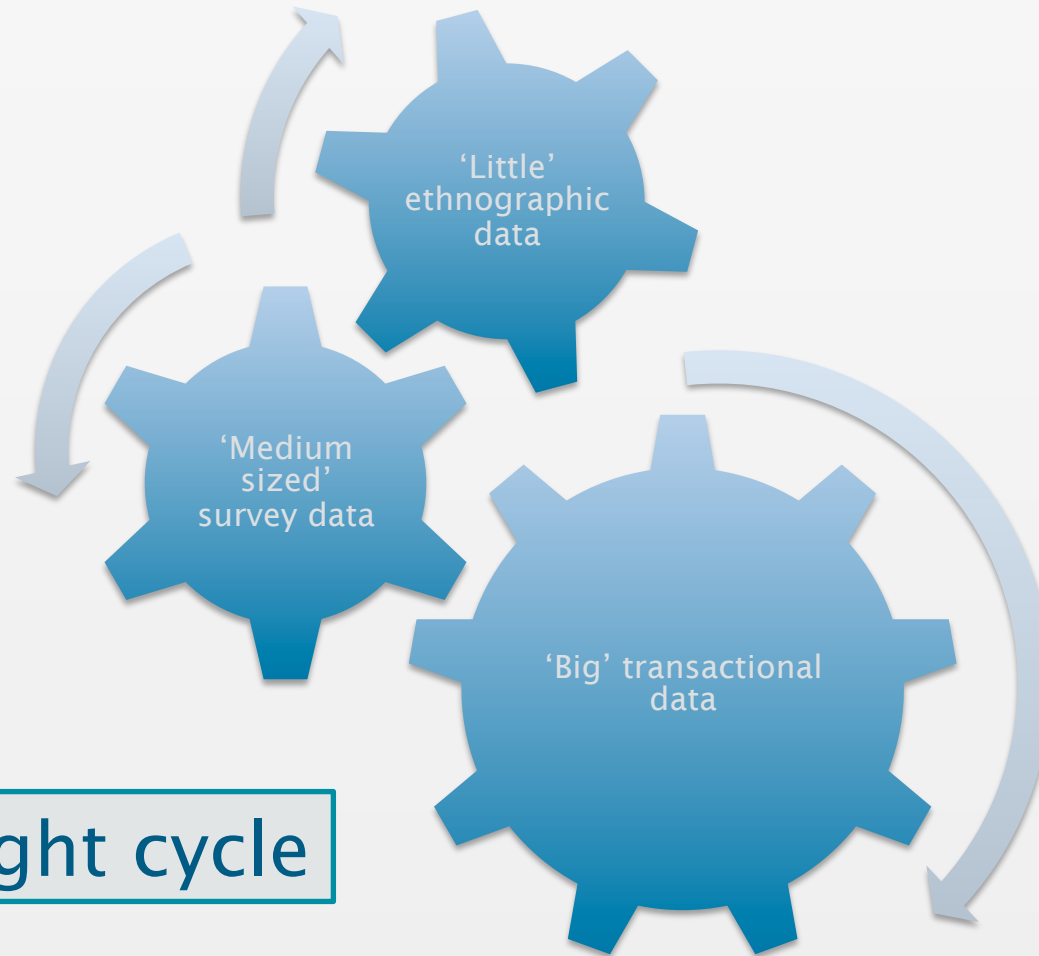


Autocorrelation analysis of lagged consumption

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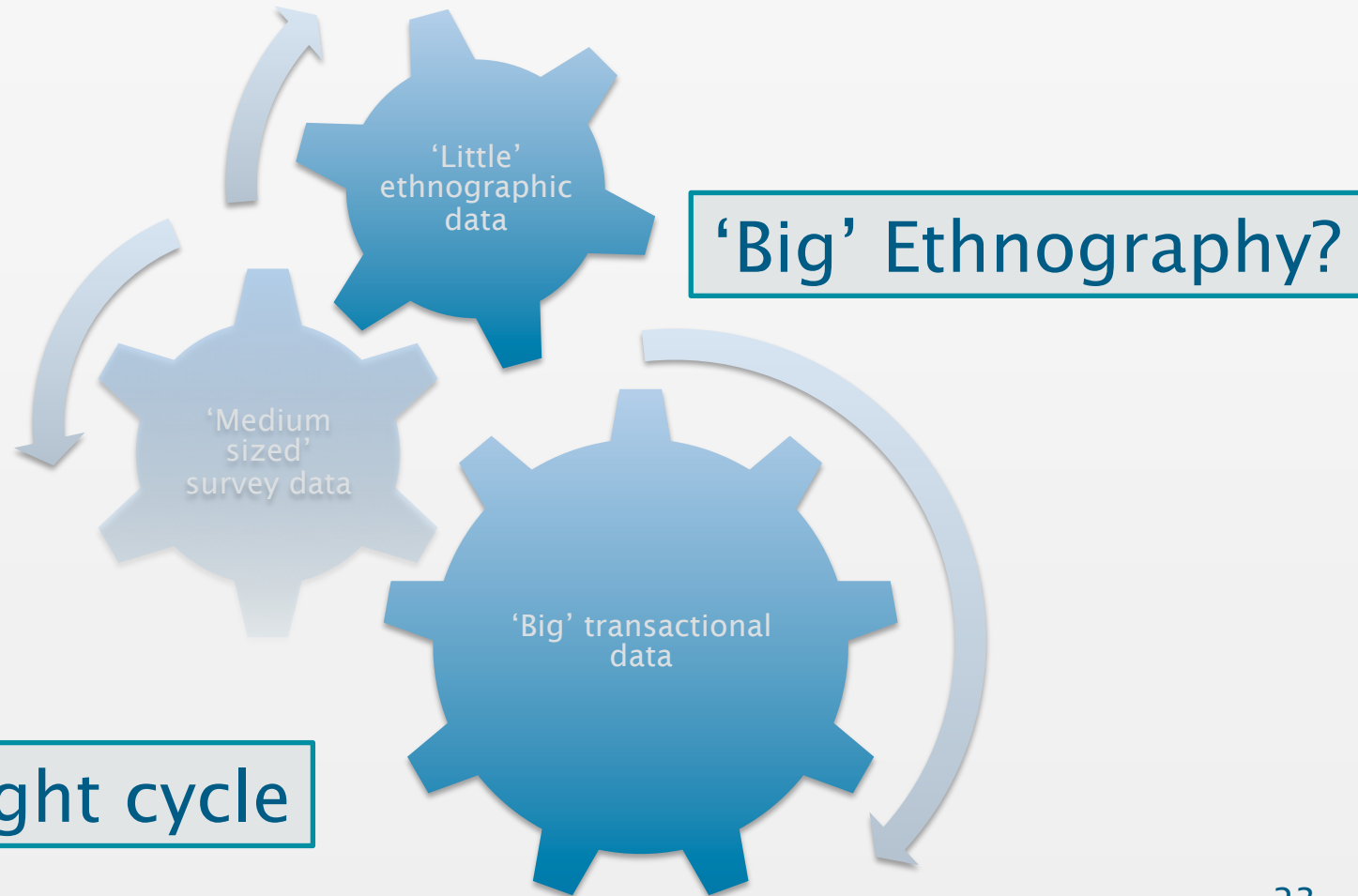
Data available from: <http://www.ucd.ie/issda/data/commissionforenergyregulationcer/>

# Post-disciplinary challenges



The insight cycle

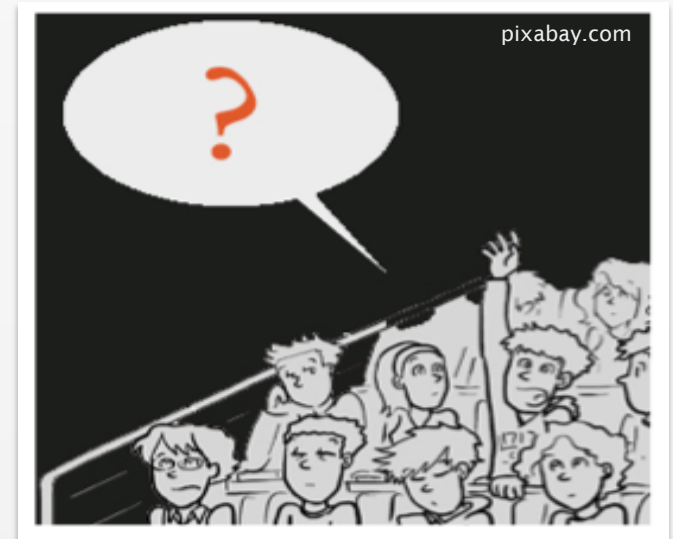
# Post-disciplinary challenges



# Thank you

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With thanks to:

- [SPRG](#)
- [DEMAND](#)
- [SAVE](#)

