Expert Judgment: misconceptions and fallacies
or
9 Theses on Expert Judgment

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1. Expert Judgment is NOT Knowledge

Scientific method – NOT EJ methods - produces agreement among experts

EJ is for quantifying ....not removing..... uncertainty.

Ask Experts only about UNCERTAINTY wrt possible measurements

Not every problem is an EJ problem

2. Experts CAN quantify uncertainty as subjective probability

TU DELFT Expert Judgment database *45 applications:*	# experts	# variables	# elicitations
Nuclear applications	98	2,203	20,461
Chemical & gas industry	56	403	4,491
Groundwater / water pollution / dike ring / barriers	49	212	3,714
Aerospace sector / space debris /aviation	51	161	1,149
Occupational sector: ladders / buildings (thermal physics)	13	70	800
Health: bovine / chicken (*Campylobacter*) / SARS	46	240	2,979
Banking: options / rent / operational risk	24	119	4,328
Volcanoes / dams	231	673	29079
Rest group	19	56	762
TOTAL	*521*	*3688*	*67001*

Including 6700 calibration variables

Study	Variables of interest	calibration variables
Dispersion	Far-field dispersion coeff's	Near-field tracer exper'ts
Environmental transport	Transfer coeff's	Cumulative concentrations
Dose-response models	Human dose response	Animal dose response
Investment pricing	Quarterly rates	Weekly rates
PM$_{2.5}$	Long term mortality rates	Short term mortality ratio's

Calibration questions for PM$_{2.5}$

In London 2000, weekly average PM$_{10}$ was 18.4 μg/m^3. What is the ratio:

$$\frac{\text{\# non-accidental deaths in the week with the \textbf{highest} average PM}_{10}\text{ concentration (33.4 μg/m}^3\text{)}}{\text{Weekly average \# non-accidental deaths.}}$$

5% :_____ 25%:_____ 50% :_____ 75%:_____95%:_____

Range graphs

```
Lnahi
   1                             <>]
   2                            <*>]
   3                  [----<----*---->---]
   4 [-------------<-----------------*-------------------->------------------------]
   5                             |
   6                            [<*-->----]
Real::::::::::::::::::::::#:::::::::::::::::::::::::::::::::::::::::::::::::::::::::::
                         0.9066
       0.75                                                                    1.5

Lcvhi
   1                            [>]
   2                          [<*-->-]
   3                   [-------<--------*------->-----]
   4 [----------<----------------------*---------------------->--------------]
   5                          [*]
   6                          [-<-*----->----------]
Real:::::::::::::::::::::#::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::
                        0.957
       0.85                                                                    1.3

Anahi
   1                          [--<-*---->--]
   2                       *>]
   3                      [--<--*-->---]
   4 [-----------------<--------------*--------->------------------------------]
   5                          |
   6                         [*------->-----]
Real:::::::::::::::::::::::#:::::::::::::::::::::::::::::::::::::::::::::::::::::::::::
                         1.01
       0.6                                                                    1.8

Acvhi
   1                              [---<*----------->-]
   2                          [<*->-]
   3                     [----<----*---->---]
   4 [-----------------<--------------*------->------------------------------------]
   5                          []
   6                          [<-*--------->-------------]
Real::::::::::::::::::::::::::::::::::#::::::::::::::::::::::::::::::::::::::::::::::
                                    1.071
       0.75                                                                    1.5

Analo
   1                          [-<-*->-]
   2                             [<-*]
   3                           [---<--*-->-----]
   4 [-----------<----------------*---------------------->----------------]
   5                             <]
   6                          [-------<--*]
Real:::::::::::::::::::::::::::::::::::::::#:::::::::::::::::::::::::::::::::::::::::
                                          1.105
       0.4                                                                    1.5

Acvlo
   1                      [--<-*--->--]
   2                         [--<-*>]
   3                        [----<---*-->-----]
   4 [---------<------------------*-------------------->-------------]
   5                             *]
   6                      [---<---------------*->----]
Real:::::::::::::::::::::::::::::::::::::::::::::#:::::::::::::::::::::::::::::::::::
                                               1.124
       0.45                                                                    1.45
```
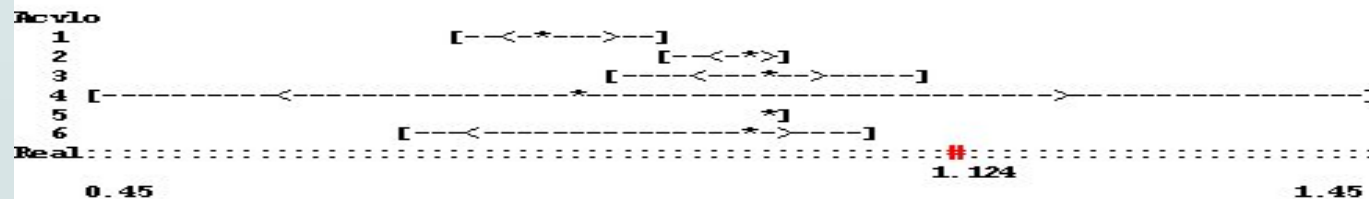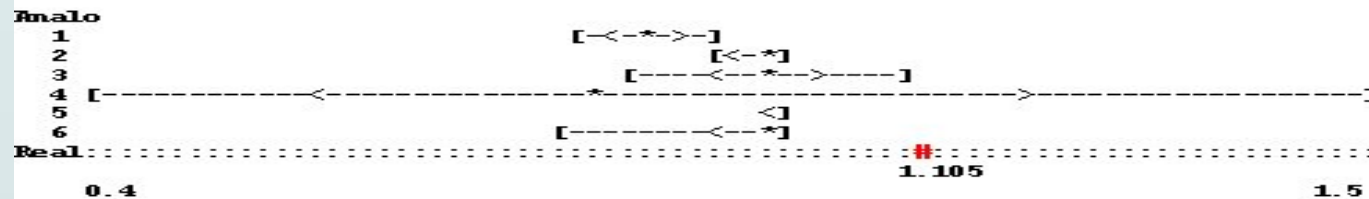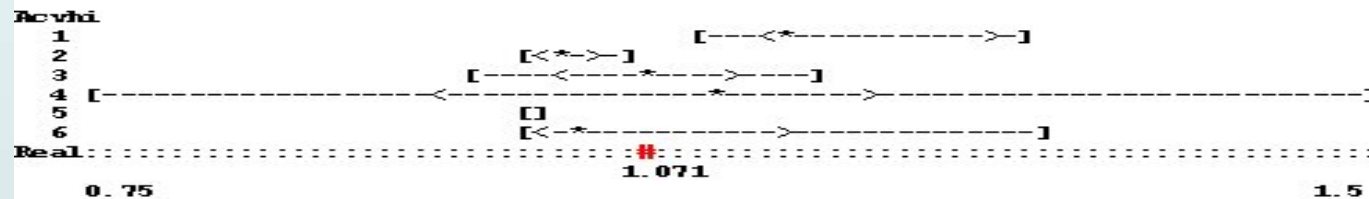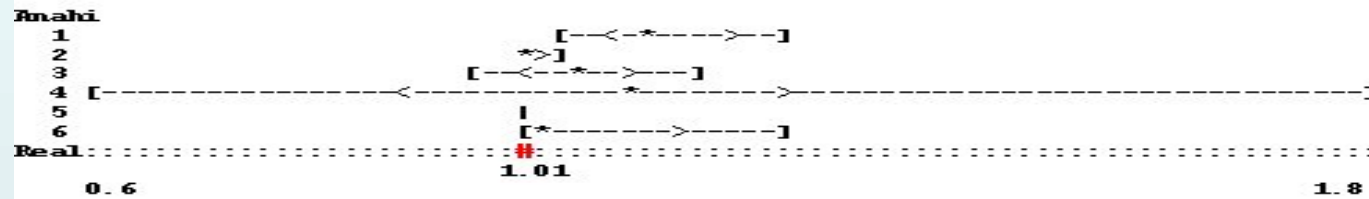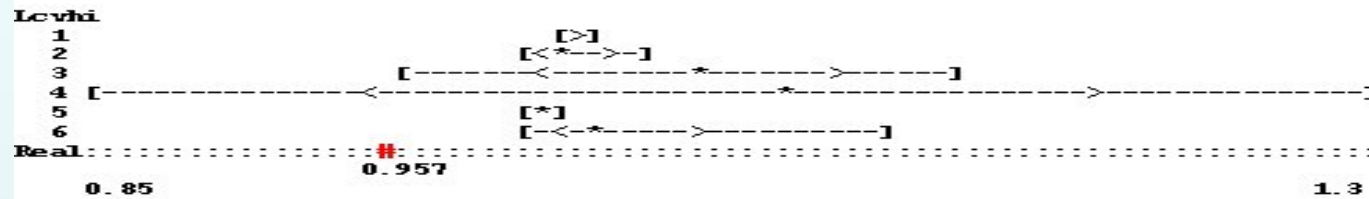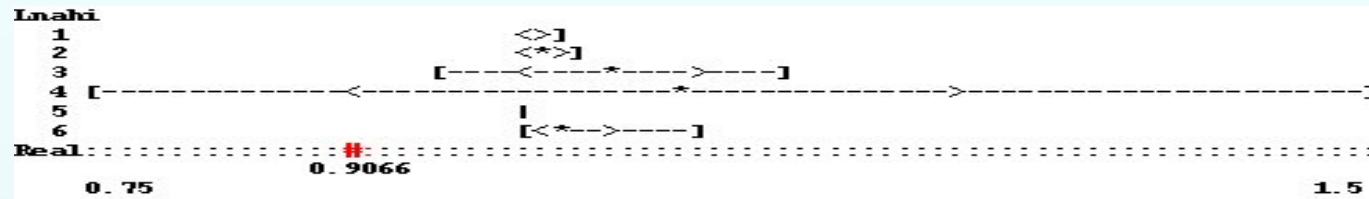
3. Experts don't agree
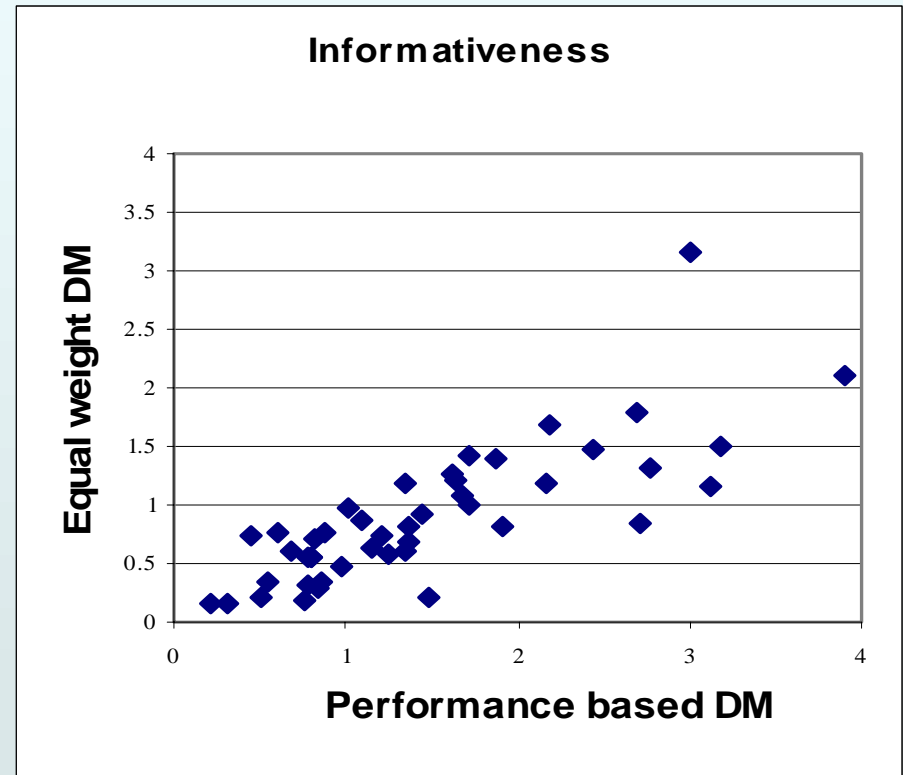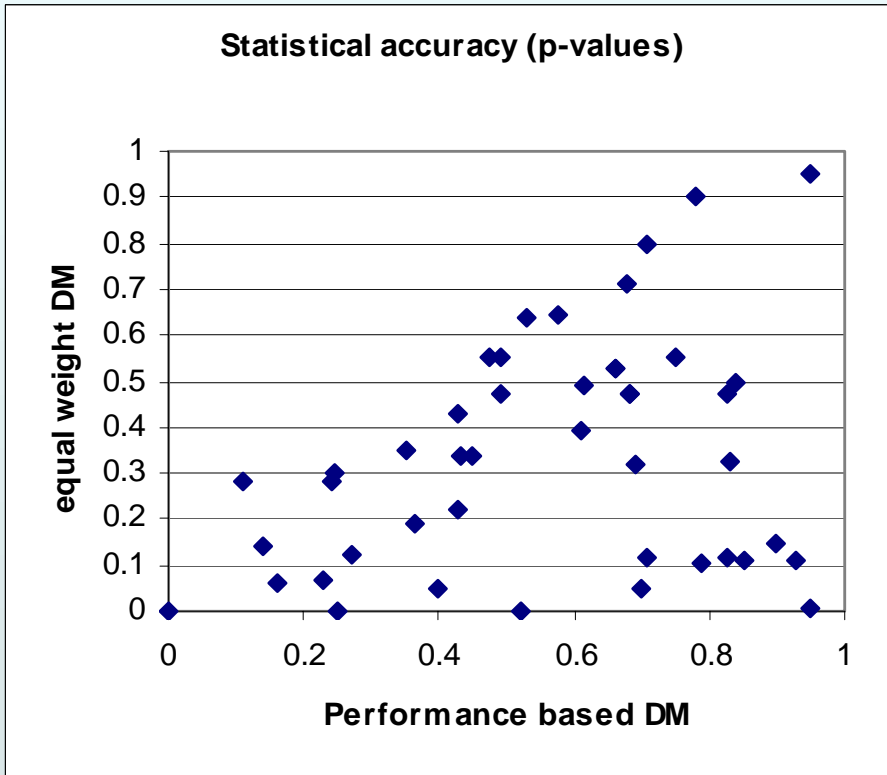
EU-USNRC Dispersion

CARMA campylobacter

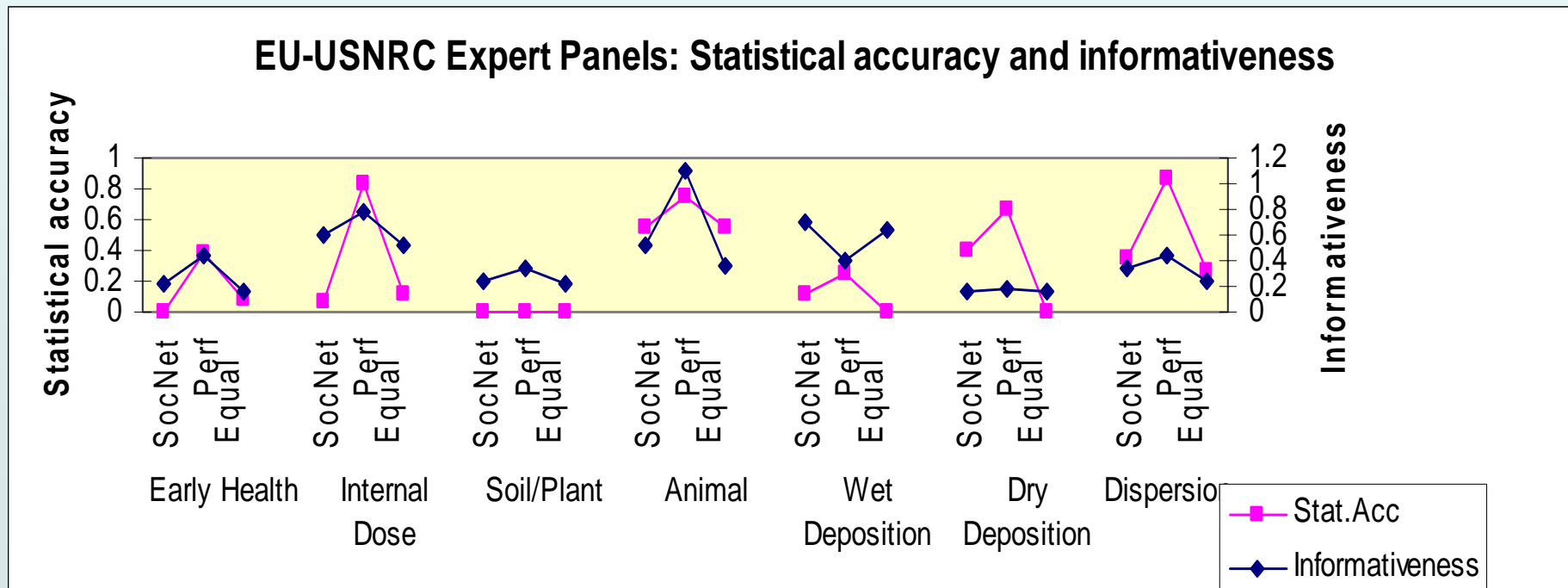# 4. Experts are NOT always overconfident

EU-USNRC dry deposition

real estate return

Opening Price AEX

5. We CAN do better than equal weighting

Statistical accuracy (p-values)

Informativeness

6. Citation-based (Social Network) weights do NOT perform better

EU-USNRC Expert Panels: Statistical accuracy and informativeness

7. Experts like performance assessment

Ask them

**Separate
scientific assessment of
uncertainty
from
decision making**

8. "Uncertainty from random sampling ...omits important sources of uncertainty" NRC(2003)

All cause mortality, percent increase per 1 µg/m^3 increase in PM$_{2.5}$

	Amer Cancer Soc. (reanal.)	Six Cities Study (reanal.)	Harvard Kuwait, Equal weights (US)	Harvard Kuwait, Performance weights (US)
Median/best estimate	0.7	1.4	0.9657	0.6046
Ratio 95%/5%	2.5	4.8	257	63

9. The choice is NOT whether to use EJ;

but:

do it well or do it badly?