WHY DO WE MAKE MISTAKES?

Jacob de Boer

VU VRIJE UNIVERSITEIT AMSTERDAM

LOOKING FURTHER

SEA PALACE AMSTERDAM

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The human error…..

We make one mistake per hour (NASA)

Three categories:

Active errrors:
e.g. missed return in tennis or orange traffic light

Thinking errors:
wrong judgment of situation, e.g. wrong exit on highway

Not-follow-up errors:
e.g. taking short cut, ignoring max. speed sign

Why do we make mistakes?

1. We surround ourselves with kindred spirits
2. We want to be ‘liked’, so we are not critical
3. We overestimate ourselves
4. ‘Cognitive resonance reduction’: we change the truth
5. ‘Belief perseverance’: we believe in a ‘fixed’ world
6. We ignore information that changes our perspective
7. We want fast answers

How to reduce errors?

- Become conscious of mistakes
- Listen to arguments
- Accept ‘a different truth’
- Prepare, read, think, use checklists
- Accept mistakes that were made, study it and learn from it
- **Be open to others on your mistakes**

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Evaluation of VU results PCBs/OCBs for the UNEP ILS

- PCB & OCP results both show several deviations in Z-scores
- Deviations of PCB results seems more random than OCP results

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PCBs

Reporting error:
PCB 153 and 138 **were switched** because the order is different in our spreadsheet compared to the reporting sheet of UNEP

Chromatographic problems:
More detailed look into the chromatograms also revealed that the GC-MS system used for measuring the samples was not optimal:

- Whole system was not at best sensitivity
- Column had been in use for a long time

We re-analyzed the UNEP samples (biota and sediment) together with external reference samples:
CRM 682 (mussel) and CRM 329 (sediment)

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Results re-analysis PCBs

Z-scores

	UNEP ILS biota		CRM 682	UNEP ILS sediment		CRM 329
	official	Re-analyzed		official	Re-analyzed	
PCB 28	-3.7	0.5	2.7	-4.5	-2.4	0.5
PCB 52	-0.4	0.4	1.1	1.6	3.6	-1.3
PCB 101	-0.3	0.5	n.a.	5.4	3.9	-0.7
PCB 153	-1.7	3.0	-0.5	4.2	2.0	2.1
PCB 138	6.6	0.3	0.7	6.3	1.0	0.8
PCB 180	1.0	0.1	-0.7	4.7	2.6	0.6

n.a. = not available

red numbers = no assigned value, mean value is used

green = close to LOQ

OCPs

Calculation error:

The internal standard is calculated as a normal compound and recovery is calculated based on the difference with the *added concentration*

Calculated recovery is used to correct for found concentrations

Problem occurs if the *added concentration* used in the spreadsheet differs from the one used in the GC-MS program (different dilution factor)

In our case 10 ng was used in the GC-MS program and subsequently 20 was calculated the calculation spreadsheet

This means when 9 ng is calculated with the GC-MS program (9/10 = 90% rec) and this is used in the spreadsheet it corrects the results for 9/20 = 45% rec
Leading to too high concentrations and wrong z-scores!

Example p,p'-DDD

The end volume of the extract is 0.5 ml
The sheet calculates: IS = 10 ng in 0.5 ml = 20 ng/ml

Concentration in fish sample:

13.61 ng / 1.7765 g = 7.66 ng/g

Assigned value = 4.7 ng/g

Z-score = (7.66 – 4.7)/(0.125 x 4.7)

Z-score = 5.04

Unsatisfactory!

6.80 ng / 1.7765 g = 3.83 ng/g

Assigned value = 4.7 ng/g

Z-score = (3.83 – 4.7)/(0.125 x 4.7)

Z-score = -1.48

Satisfactory!

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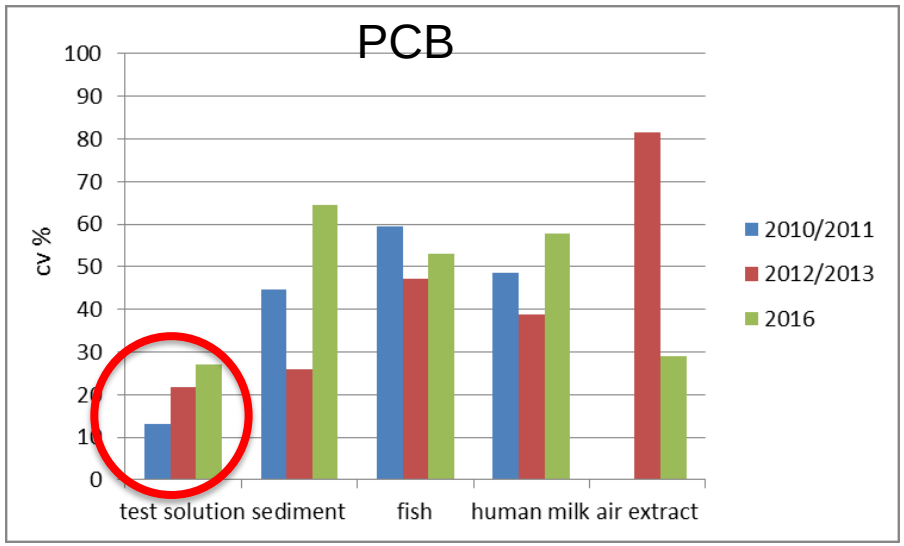
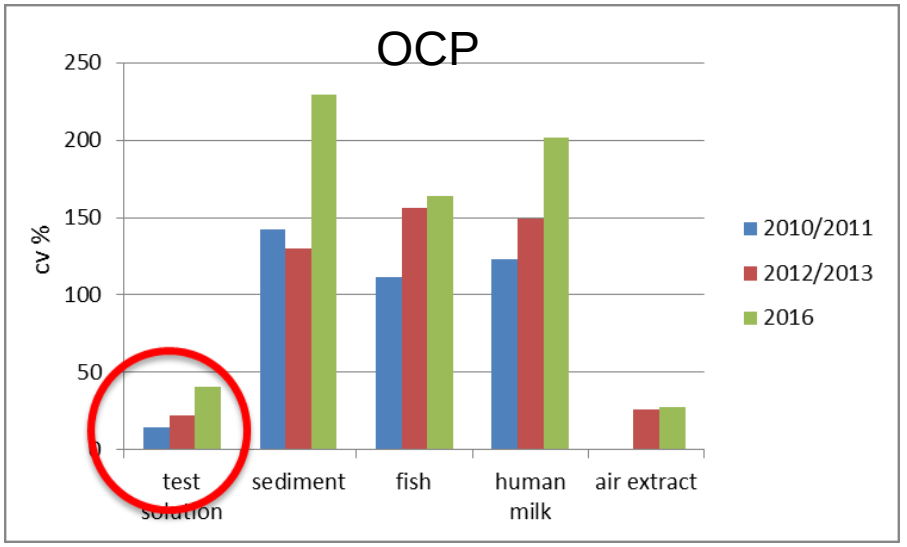
Which mistakes did we make?

1. We surround ourselves with kindred spirits
2. We want to be ‘liked’, so we are not critical
3. We overestimated ourselves
4. ‘Cognitive resonance reduction’: we change the truth
5. ‘Belief perseverance’: we believe in a ‘fixed’ world
6. We ignored information that changes our perspective
7. We wanted fast answers

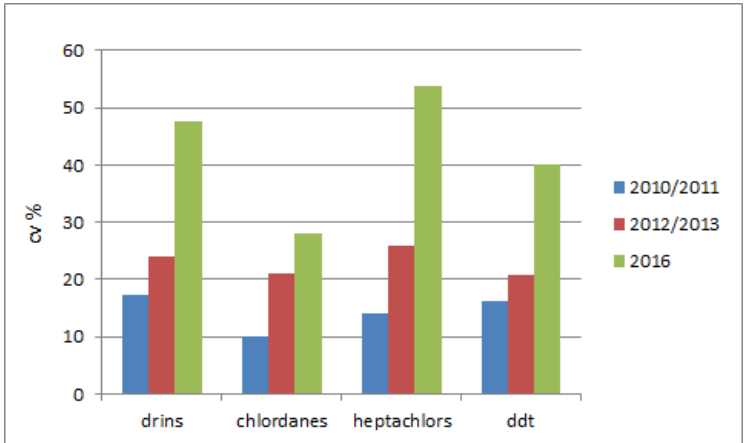
DISCUSSION ITEMS

- Standard solutions: e.g. Table 2, OCPs, CV 15-75%, why?



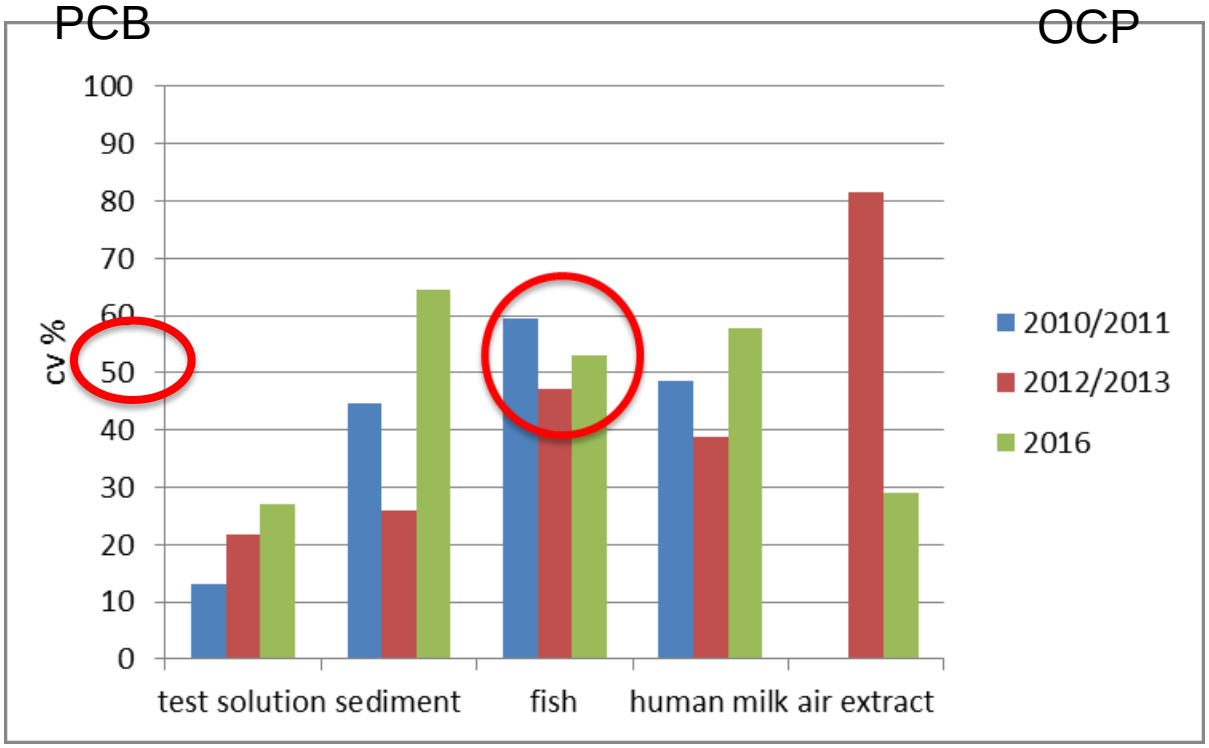


Figs. 61-63

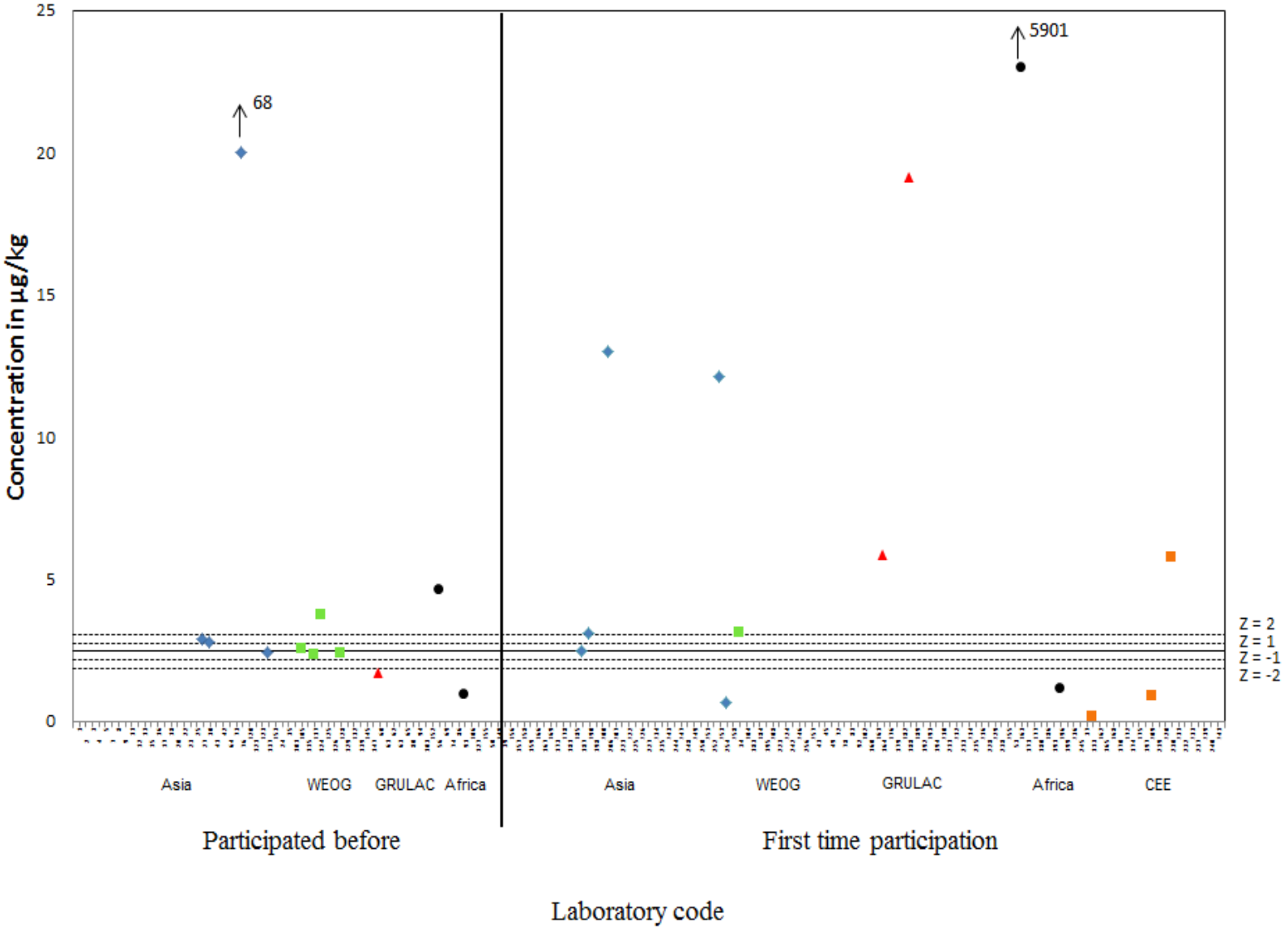


DISCUSSION ITEMS

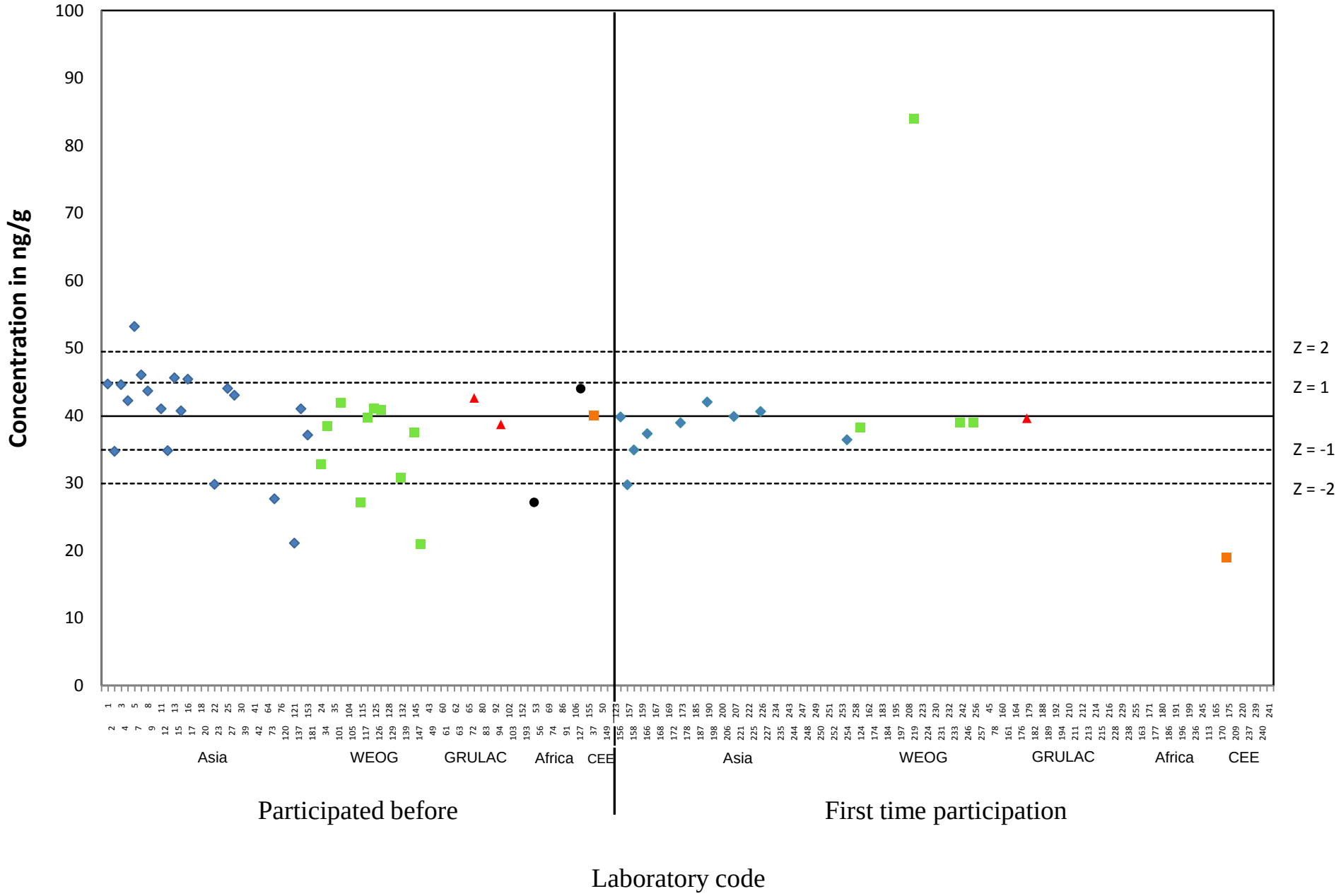
- Fish: e.g. PCB, Fig. 61, CV ca. 50%, why?



Dieldrin in Fish First Participation



2,3,7,8-TeCDD test solution vs experience



Discussion Groups

- Three (or more) suggestions to improve results
- Suggestions to improve ILS
- Highlights of this exercise

POSSIBLE ERRORS AND PROBLEMS

- Chromatography
- Extraction
- Clean Up
- Calculation
- Validation
- Contamination
- Staff quality
- Instrumentation (e.g. ECD/MS)
- Lack of (C)RMs
- Analytical standards
- Planning issues

How can we achieve CVs of 25%?

VU