Cross-border research on brown bear: from genetics to human dimensions

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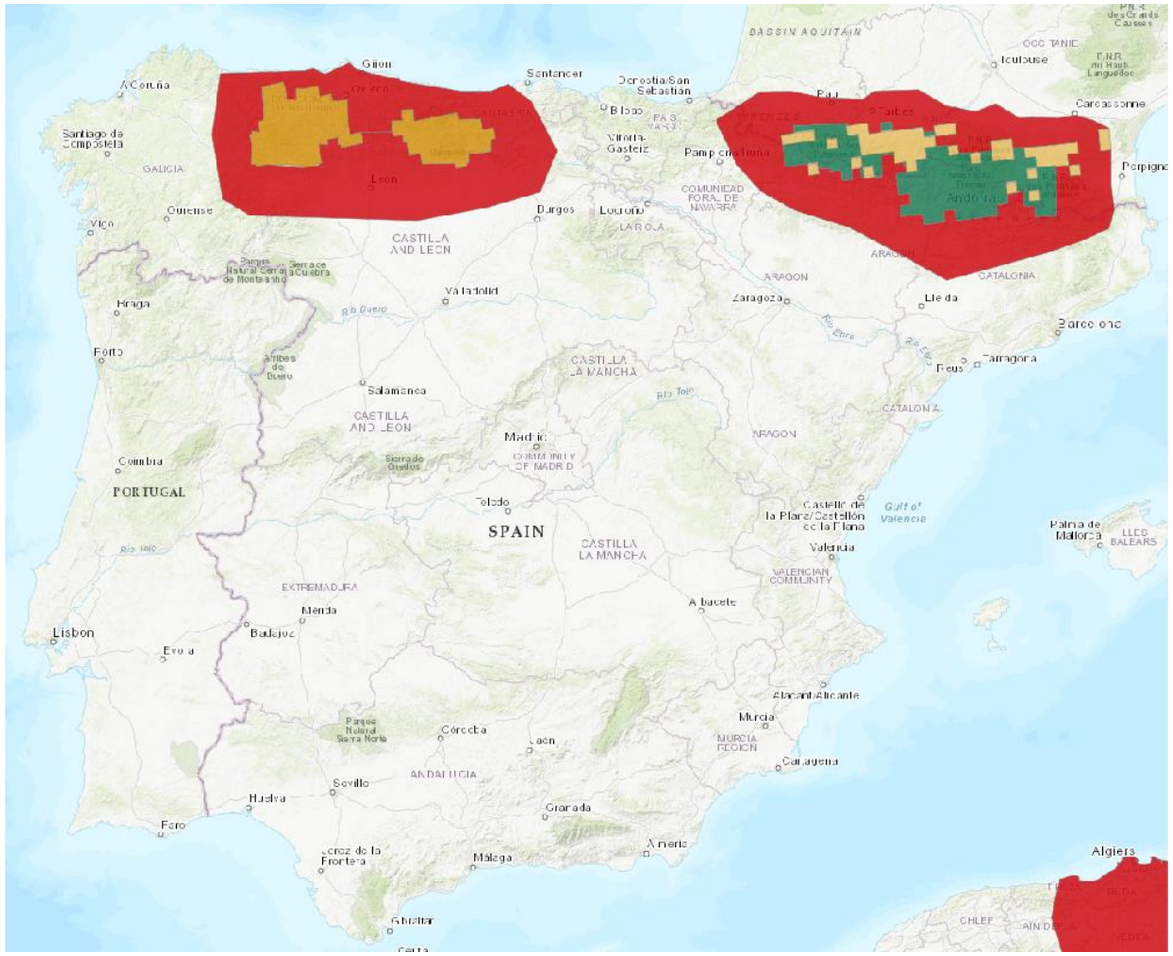
Unidade vida selvagem

fapar

The protagonist: the ”Iberian brown bear”

- Iberian or Portuguese and Spanish wildlife?
- Two brown bear populations in Iberia: Pyrenees and Cantabrian mountains.
- The Cantabrian (sub)population(s) is the only extant Iberian population with no allochthonous contribution.
- Both Iberian populations are threatened (EN, IUCN Red List), currently recovering from several centuries of decline.



IUCN Red List (2017)

The stage: a shared landscape

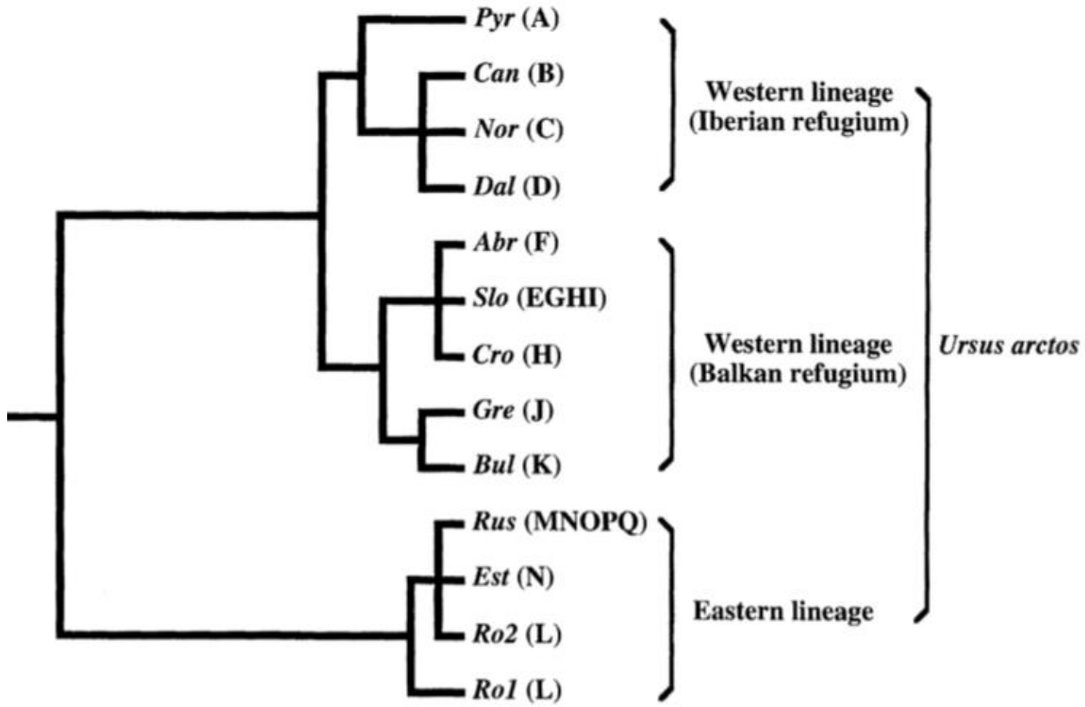
The partnership: how it started?

A field team (FAPAS - Spain)

A lab team (UVS-UA - Portugal)

After decades studying the Cantabrian Brown bear, what was known? Well, a lot!

- Iberian populations are more closely related with Northern Europe populations.
- The two Cantabrian subpopulations were historically isolated and genetically differentiated.
- The conservation status of these subpopulations was a consequence of isolation and also from a difficult coexistence with humans.



Nores & Naves (1993)
Taberlet & Bouvet (1994)
Pérrez et al (2010)
Gonzalez et al (2016)

Purroy (2017)
Caussimont & Hartasánchez (2017)

Taberlet & Bouvet (1994)

What we wanted to know?

- How were the two Cantabrian sub-populations related (phylogenetically) with other Iberian/European populations? *(by hypothesis, these would be a single phylogenetic unit or at least sister groups)*

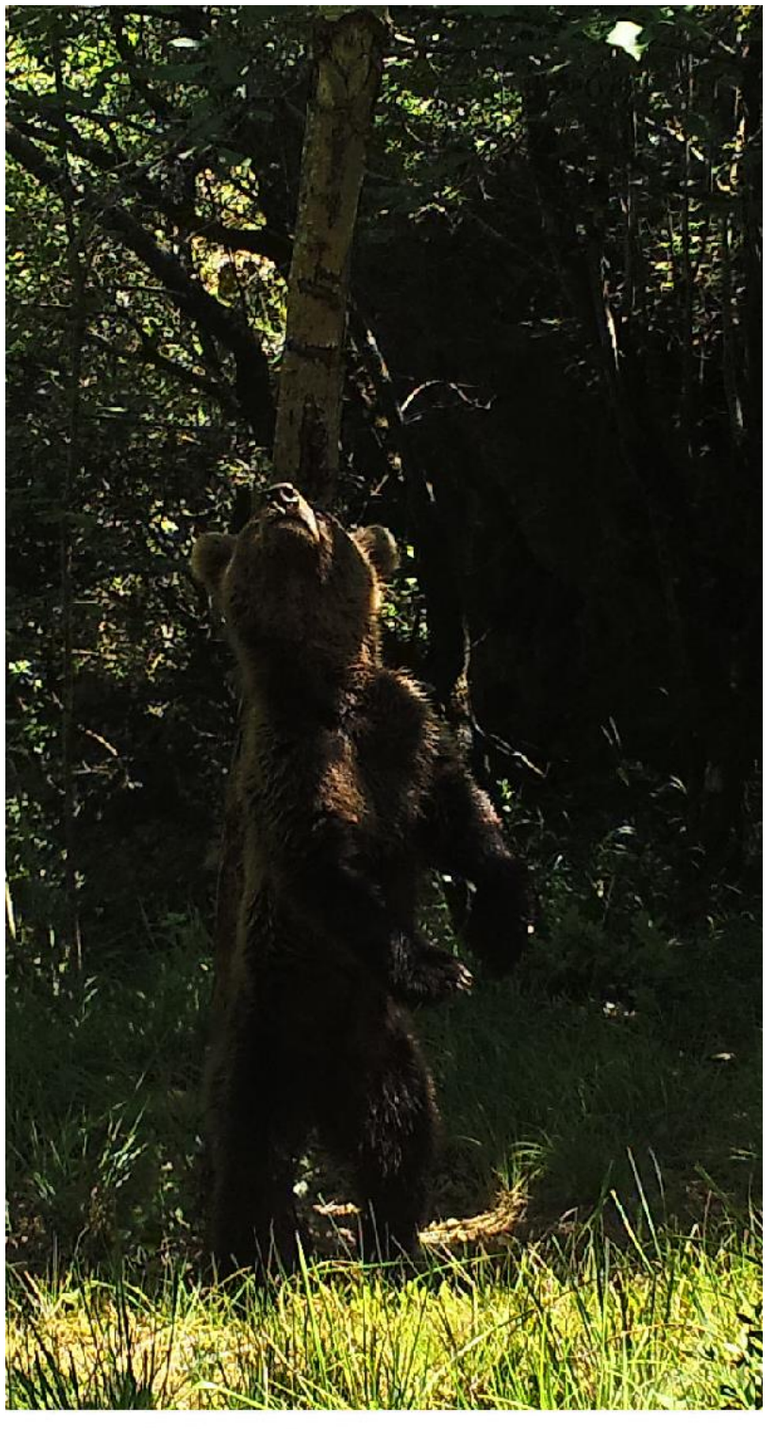
- Would the pattern of genetic structure identified with the nuclear markers be detectable with mitochondrial (matrilineal) markers? *(brown bear is a species with female philopatry)*

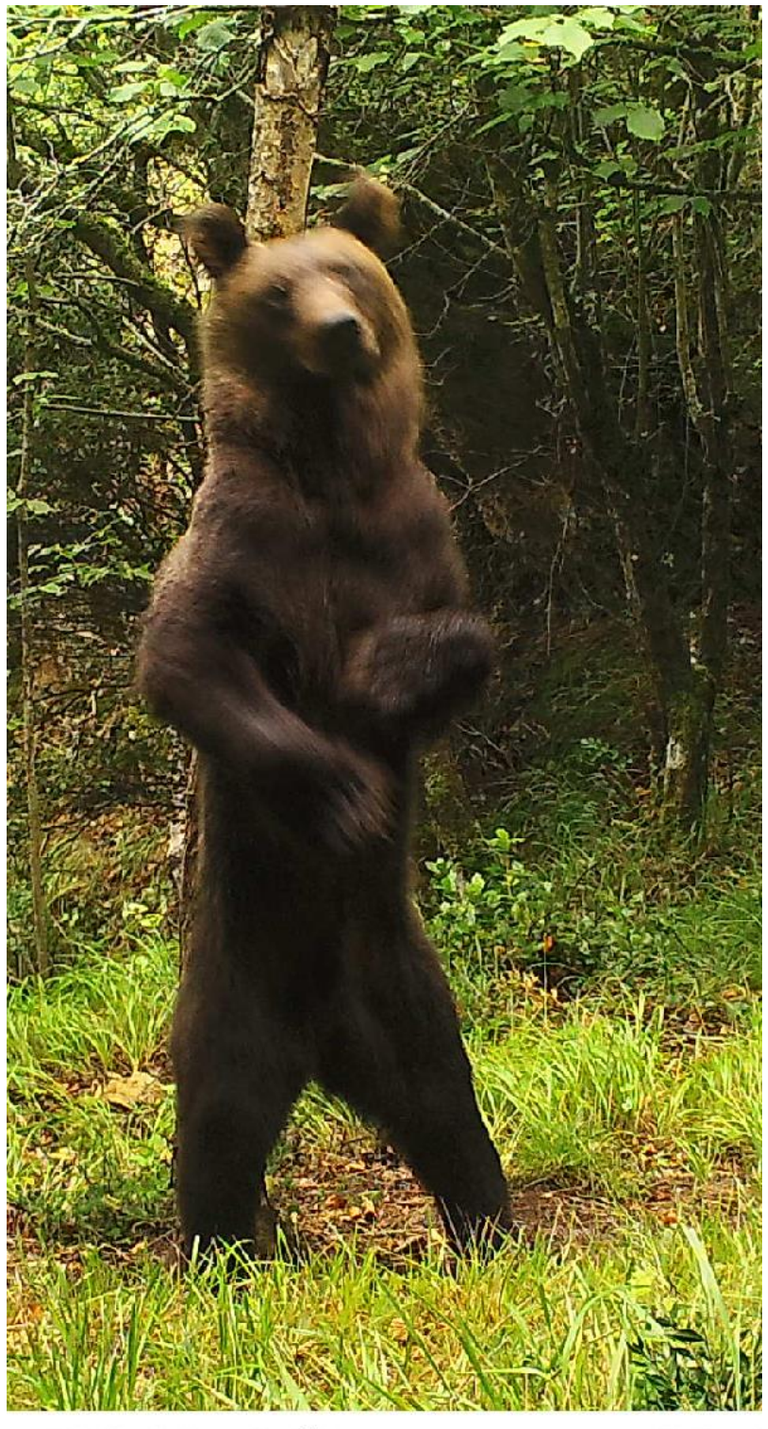
- Were there still evidences of the past populational decline (and reduced levels of diversity) in these populations? *(most recent accounts at the time still pointed on this direction)*

- Were there evidences of ongoing gene (or bear) flow among the two subpopulations? *(most recent accounts at the time also suggested that connectivity was being re-established)*

How did we ”capture” bears on the Cantabrian mountains?

Bears, too, are creatures of habit...



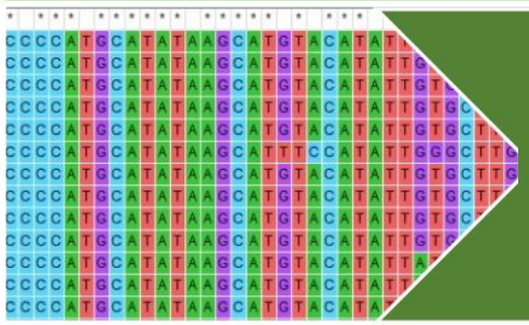


And then, the subsequent laboratory analysis

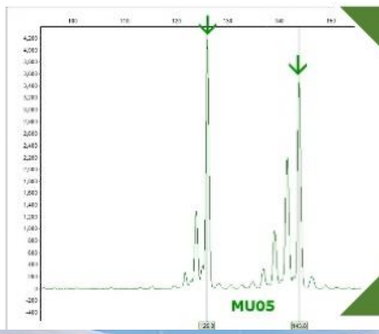
Sampling

DNA Isolation

DNA Extraction



Sequencing and…

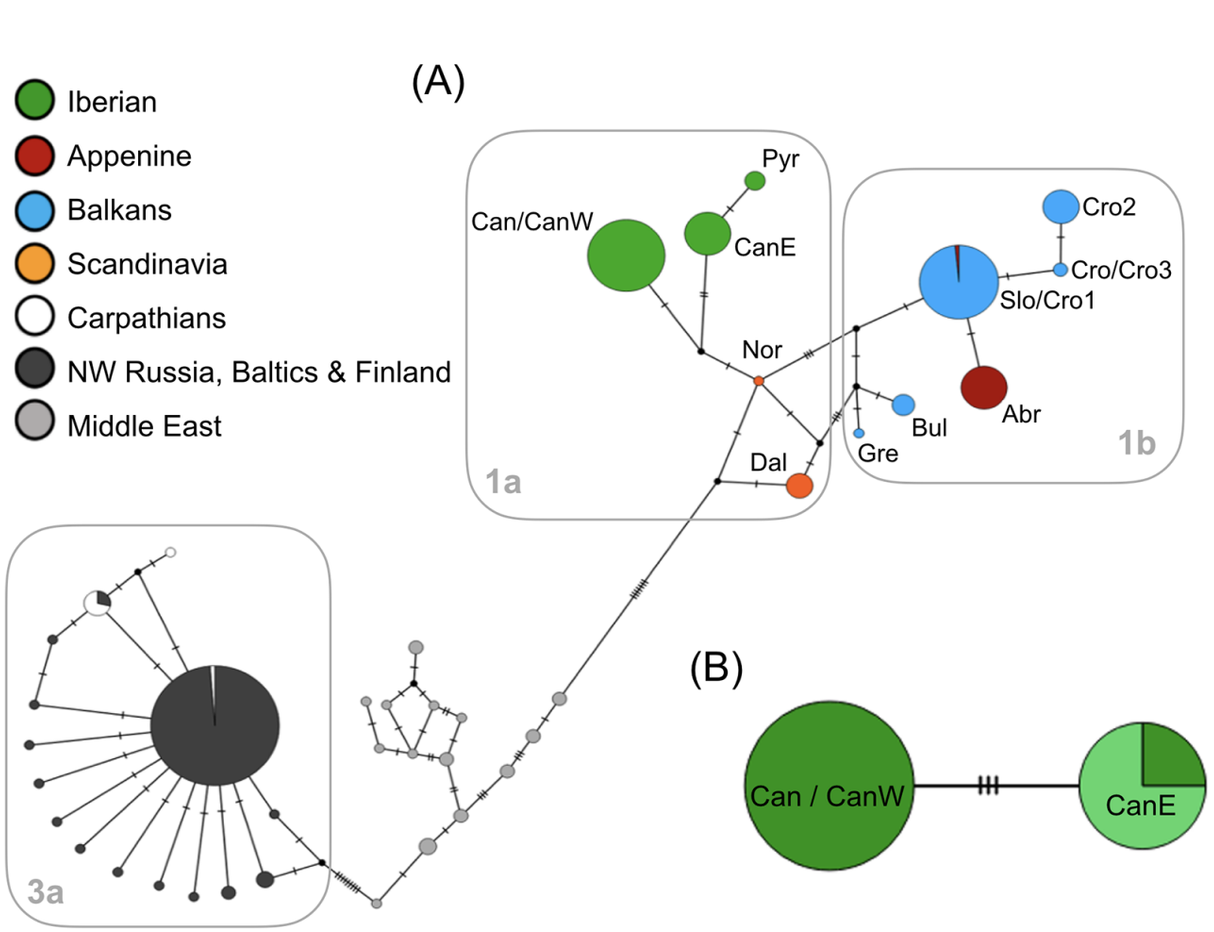


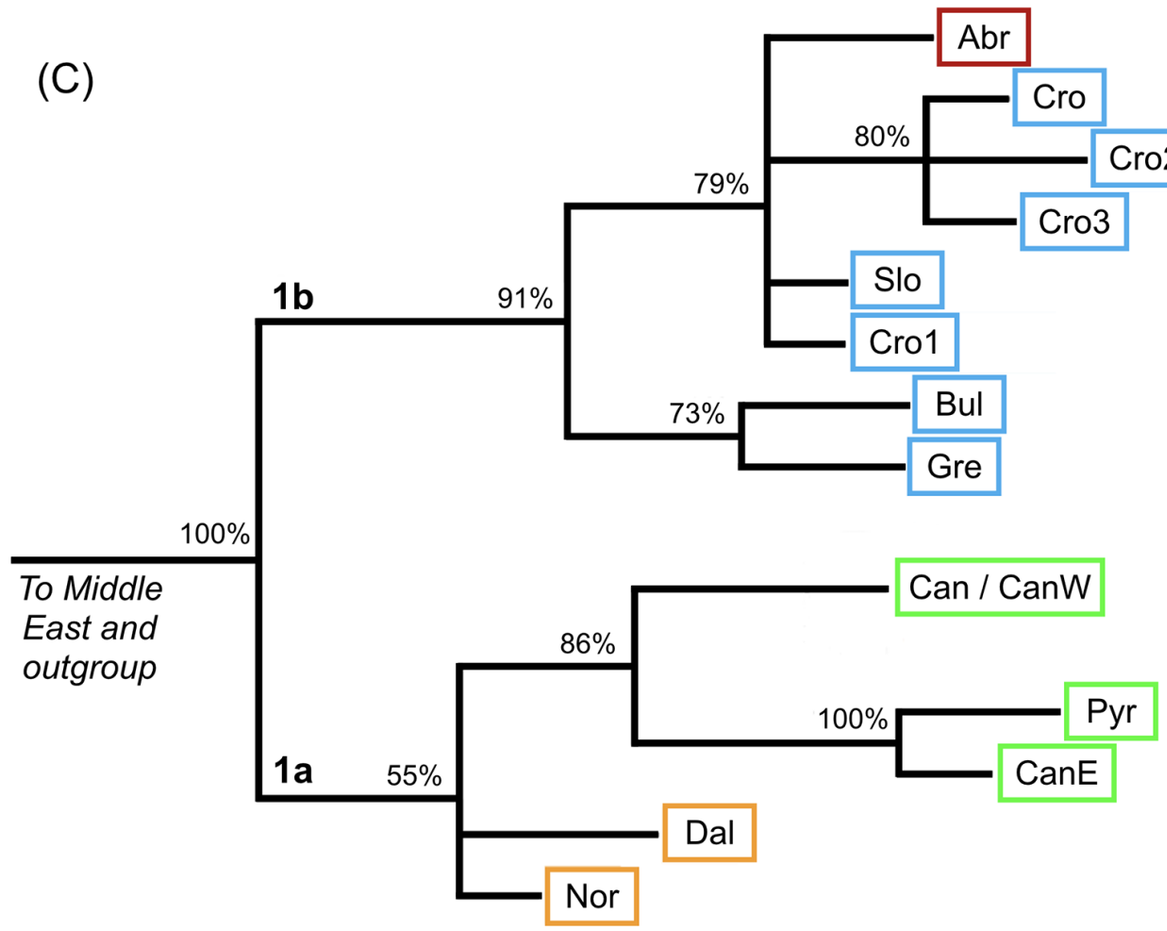
Fragment Analysis

What we found out?

- There are actually (at least) two mtDNA haplotypes (CanW and CanE) in the Cantabrian subpopulations (only one has been reported).

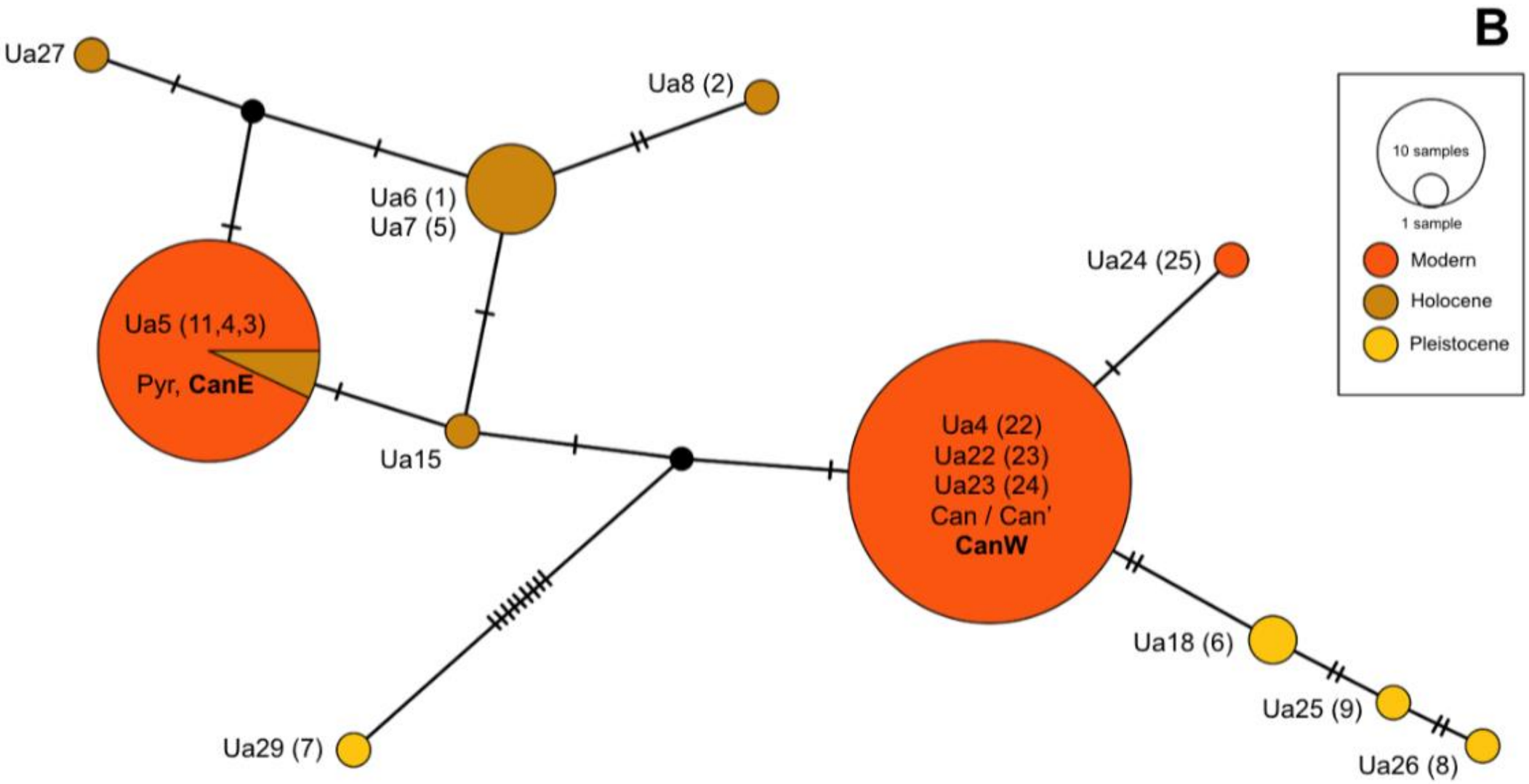
- These haplotypes show strong spatial structure but were not sister groups.





What is the meaning of that?

- Most likely, the divergence among the two haplotypes is not “recent”... *(more reasons to protect the Cantabrian brown bear!)*

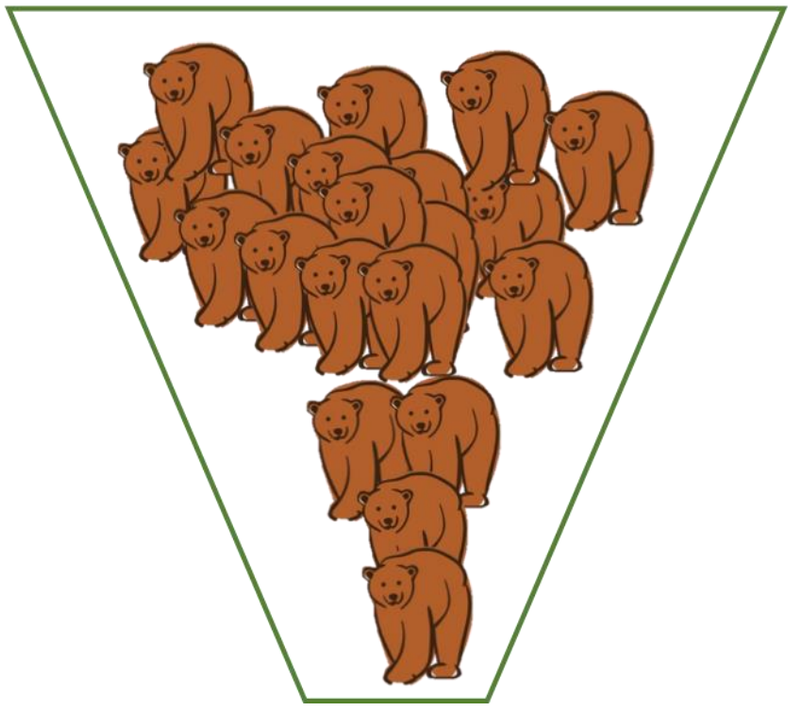


Historical haplotypes sampled by Valdosiera et al (2010)

And some results that add up to the known pattern…

Low genetic diversity
both in the Cantabrian population and the two subpopulations

Significant evidences for genetic (population) bottlenecks



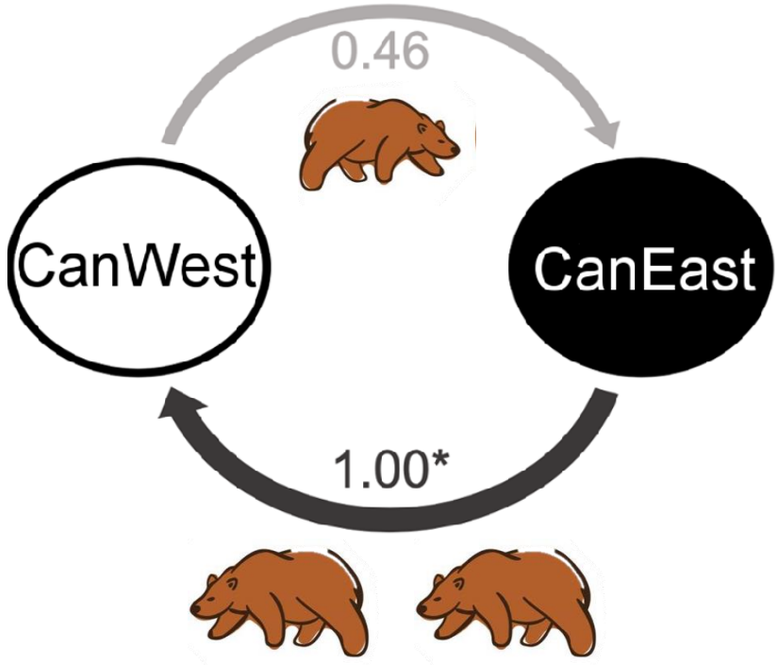
Low effective population sizes
Western - 50 genotypes
Ne= 24.7

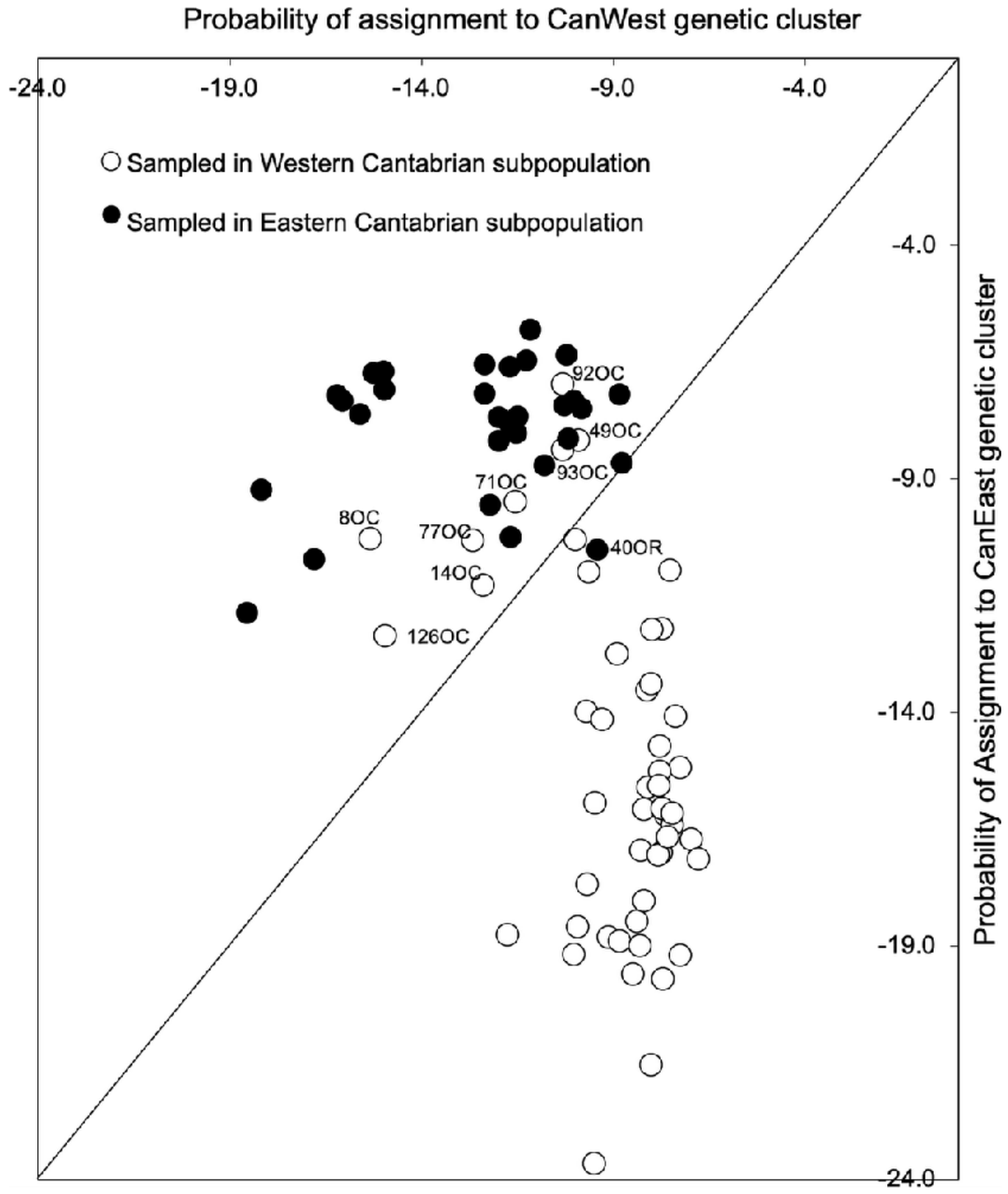
Eastern - 30 genotypes
Ne=1.8

- And high levels of inbreeding, particularly in the most vulnerable eastern subpopulation.

Evidences of ongoing migration and gene flow

- While migration patterns are dynamic, there are evidences of gene (and bear) flow among the two subpopulations.





But what is the relevance for cross border management and conservation?

- Non-invasive sampling provides a large amount of information with minimum disturbance.

- Current body of knowledge on the Cantabrian populations helps to identify and trace the (most likely) sources of brown bears entering Portugal.

- Polymorphic nuclear markers (e.g. SNiPs or microsats) are very useful in individual-based approaches and information on mtDNA haplotypes might be useful for inferring source populations and interpret sex-biased dispersal.

- But only… when the brown bear becomes a resident rather than a tourist in Portugal. *Meanwhile, the path must be prepared…*

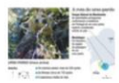
Natureza

Temos um urso em Portugal! E agora?

Foto: Reuters

RELACIONADAS

Biólogo defende plano ibérico de gestão das populações de urso-pardo

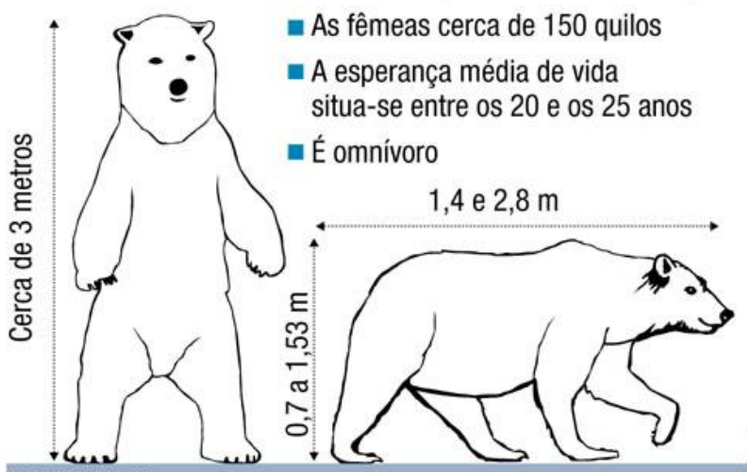


A rota do urso-pardo em Portugal

URSO-PARDO (Ursus arctos)

Adulto

- Os machos pesam mais de 200 quilos
- As fêmeas cerca de 150 quilos
- A esperança média de vida situa-se entre os 20 e os 25 anos
- É omnívoro



INFOGRAFIA JN

A rota do urso-pardo

Parque Natural de Montesinho
As autoridades portuguesas confirmaram a existência em Portugal de um urso-pardo, espécie considerada extinta no país

Montalegre
Em fevereiro há registo da passagem de um urso-pardo

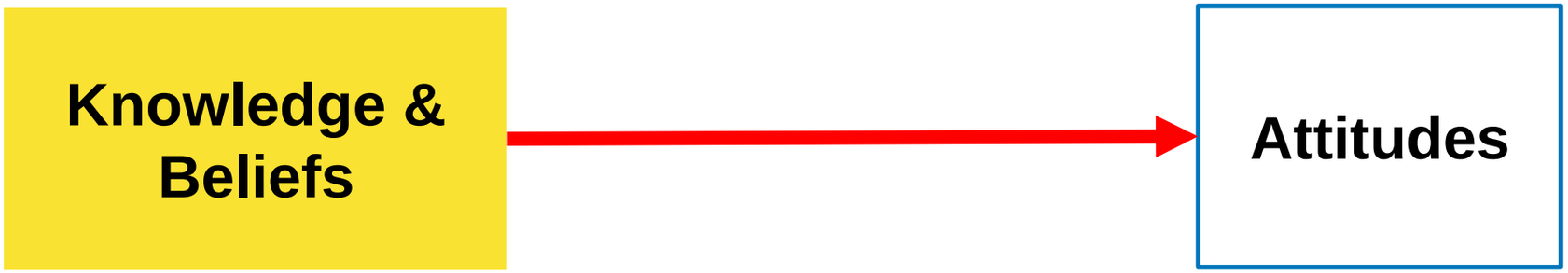
A população cantábrica de urso-pardo, em Espanha, divide-se em duas subpopulações. A ocidental tinha em 2018 cerca de 280 indivíduos e abrange zonas de Lugo, León e Astúrias. A oriental tinha à volta de 80 ursos que habitam a área de Palência, León, Cantábria e Astúrias

https://www.boredpanda.com/adopted-bear-russian-family-stepan

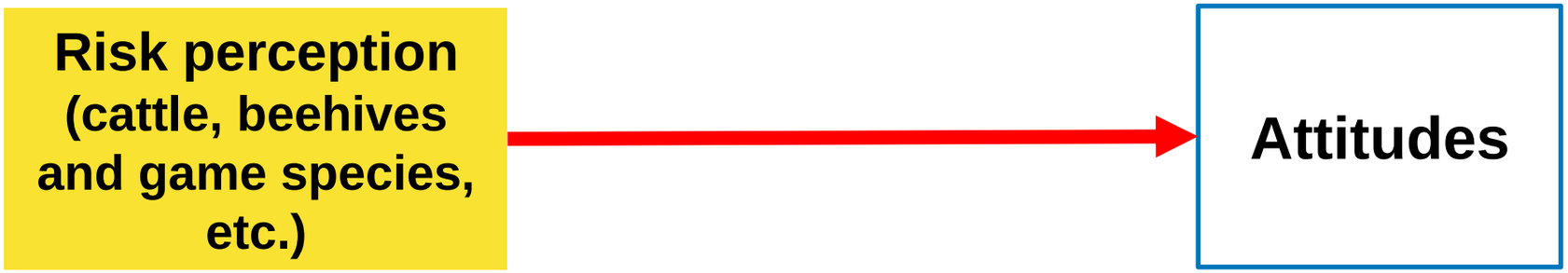
Hypotheses…

H1: Knowledge vs Attitudes

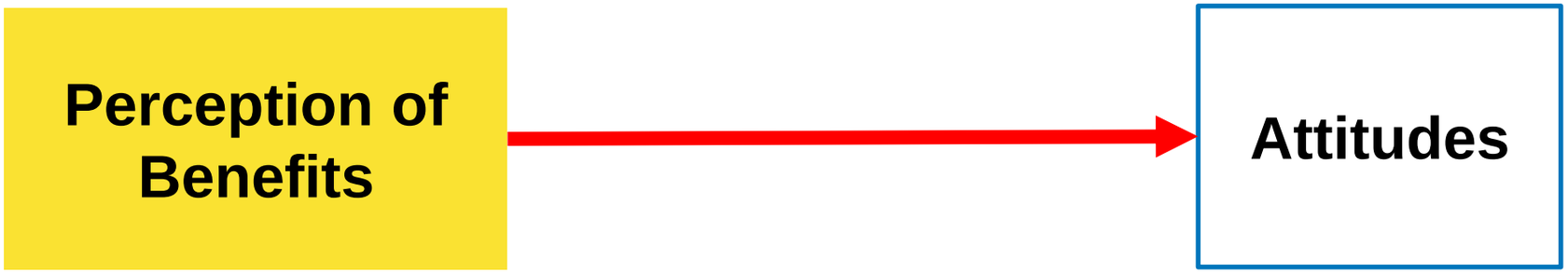
Information deficit model



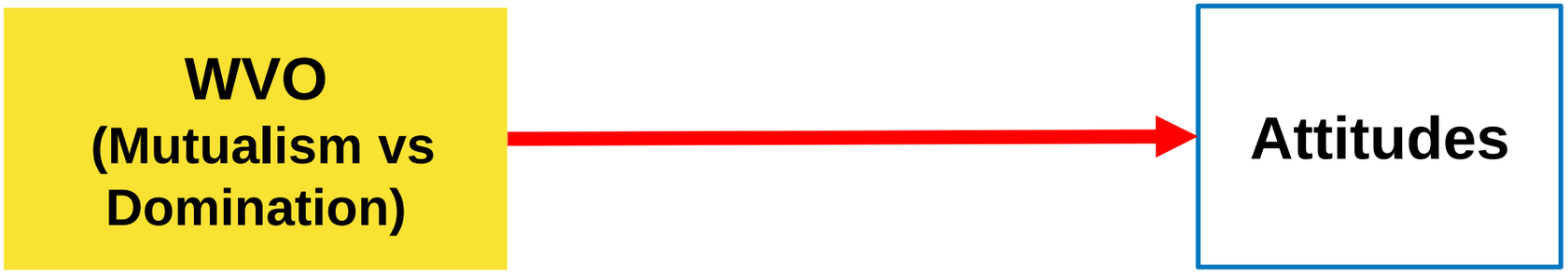
H2: Risk Perceptions vs Attitudes



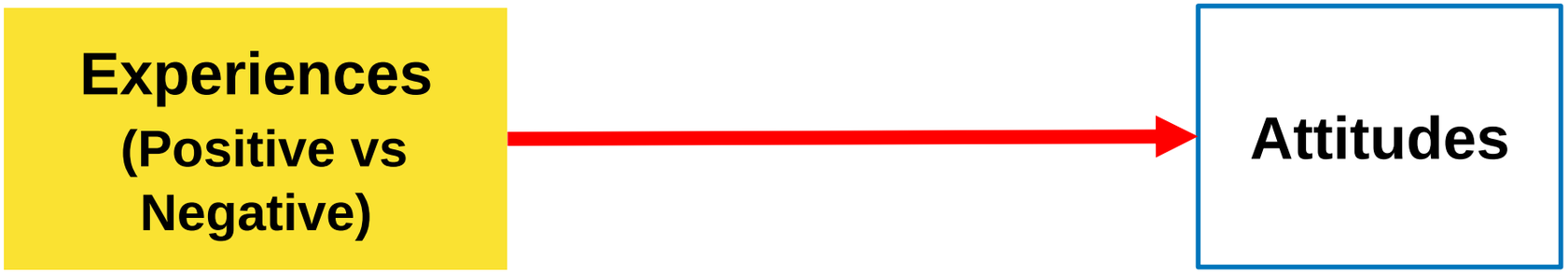
H3: Benefits vs Attitudes



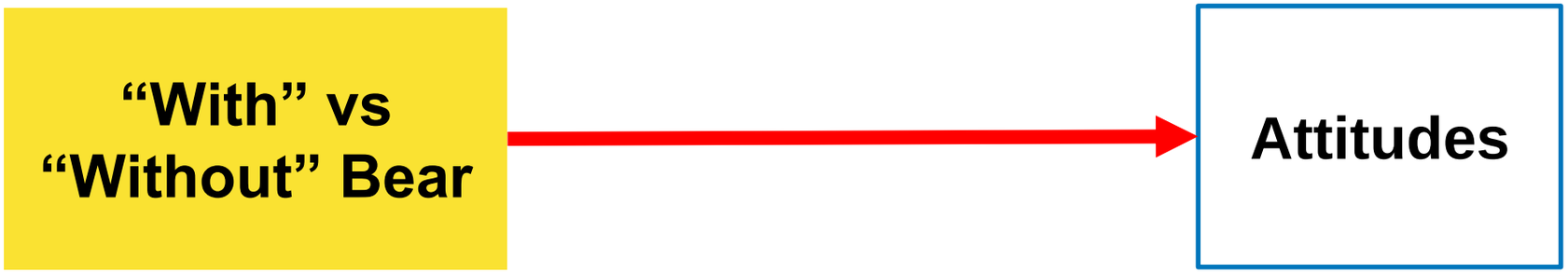
H4: Wildlife Oriented Values vs Attitudes



H5: Experiences vs Attitudes



H6: Occurrence vs Attitudes



Methods

Questionnaire

12 Questions

1) Experiences
2) Knowledge
3) Emotions
4) Attitudes
5) Beliefs
6) Perceptions (benefits and damages)
7) Values (Wildlife Oriented)
8) Socio-demographics (gender, age, etc.)

Binomial (yes/no)
5-point Likert Scale

Baseline

Experiences

Knowledge

Emotions

Attitudes

Beliefs

Perceptions (benefits and damages)

Values (Wildlife Oriented)

Socio-demographics (gender, age, etc.

Identify

1-Conflict areas
2-Conflict Factors
3- Conflict Stakeholders

Results (preliminary)…

Analysis in progress

657

Results (preliminary)…

Analysis in progress

441

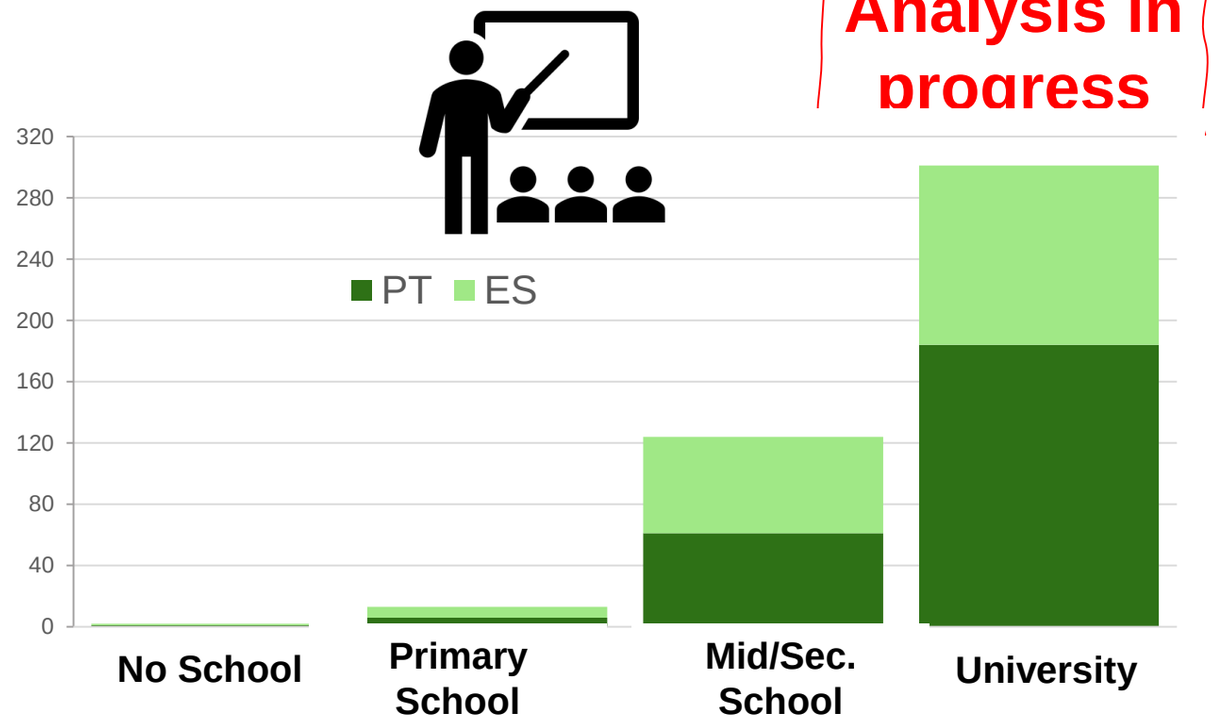
Results (preliminary)…

55% ♂ **58%** **72%**

45% ♀ **42%** **28%**

43y 🎂 **38 y** **49 y**

Analysis in progress



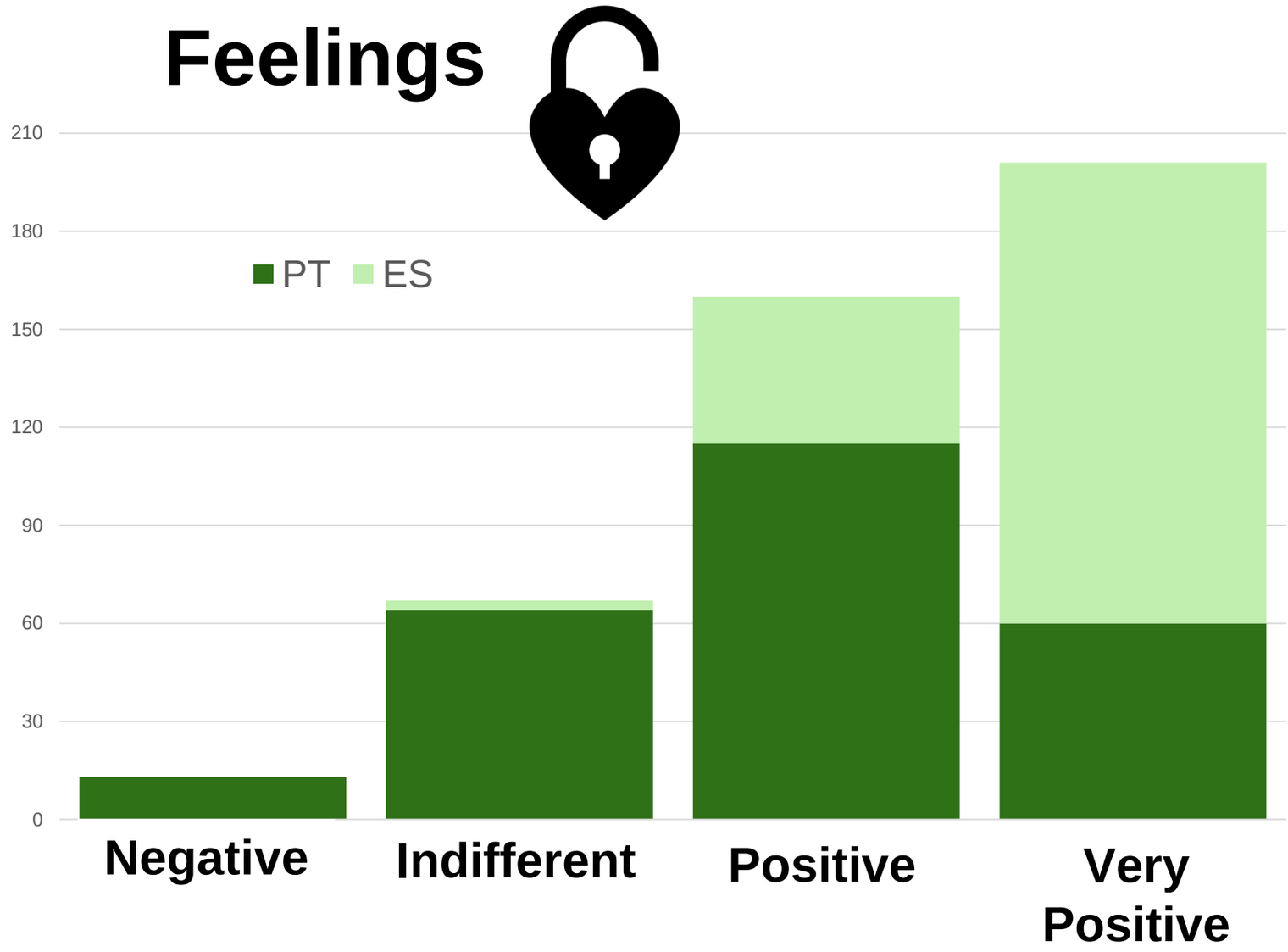
Results (preliminary)…

Analysis in progress

Region		
bear vs no bear		
	21%	**35%**
	79%	**65%**

Results (preliminary)…

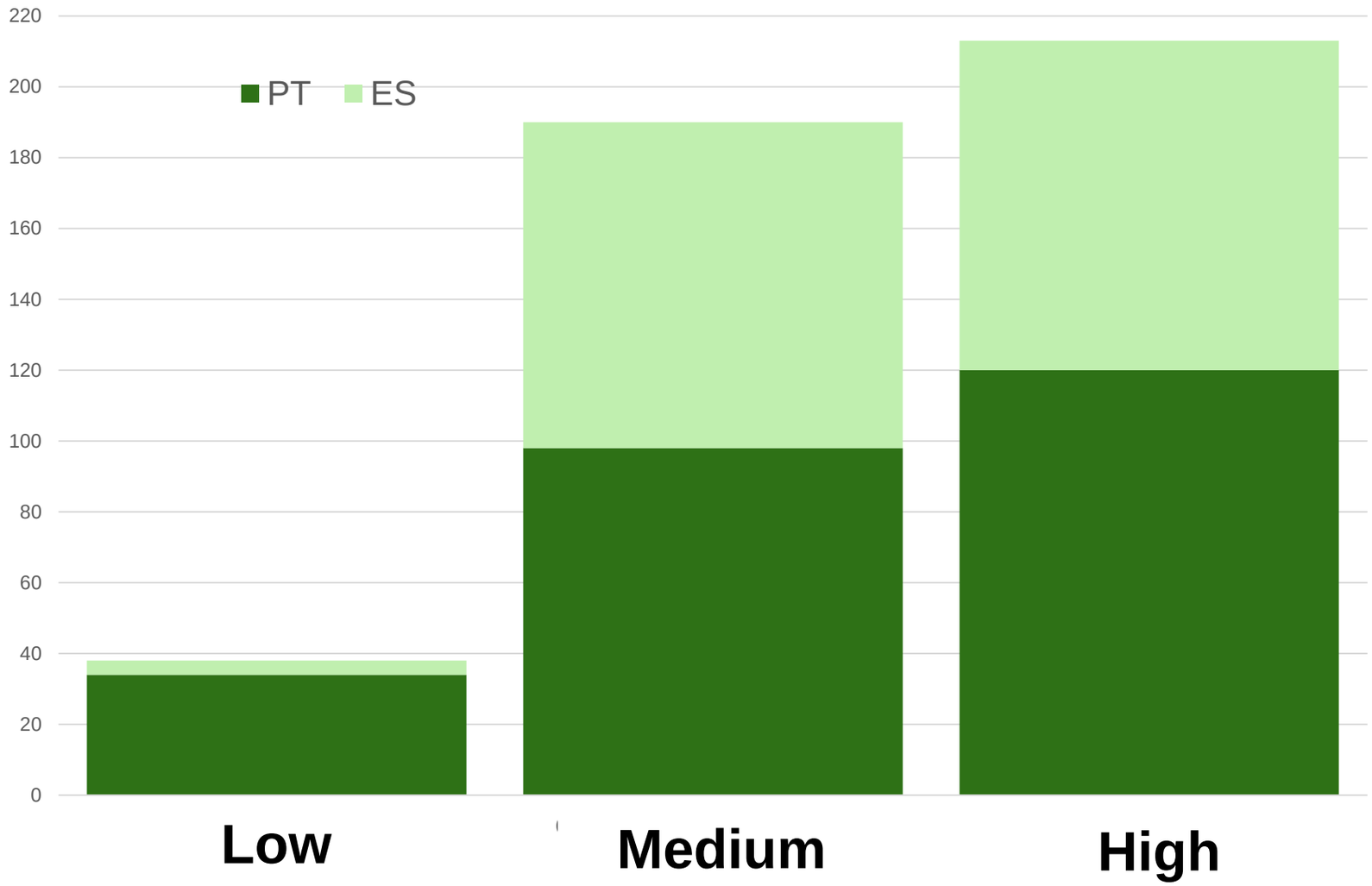
Analysis in progress



Results (preliminary)…

Analysis in progress

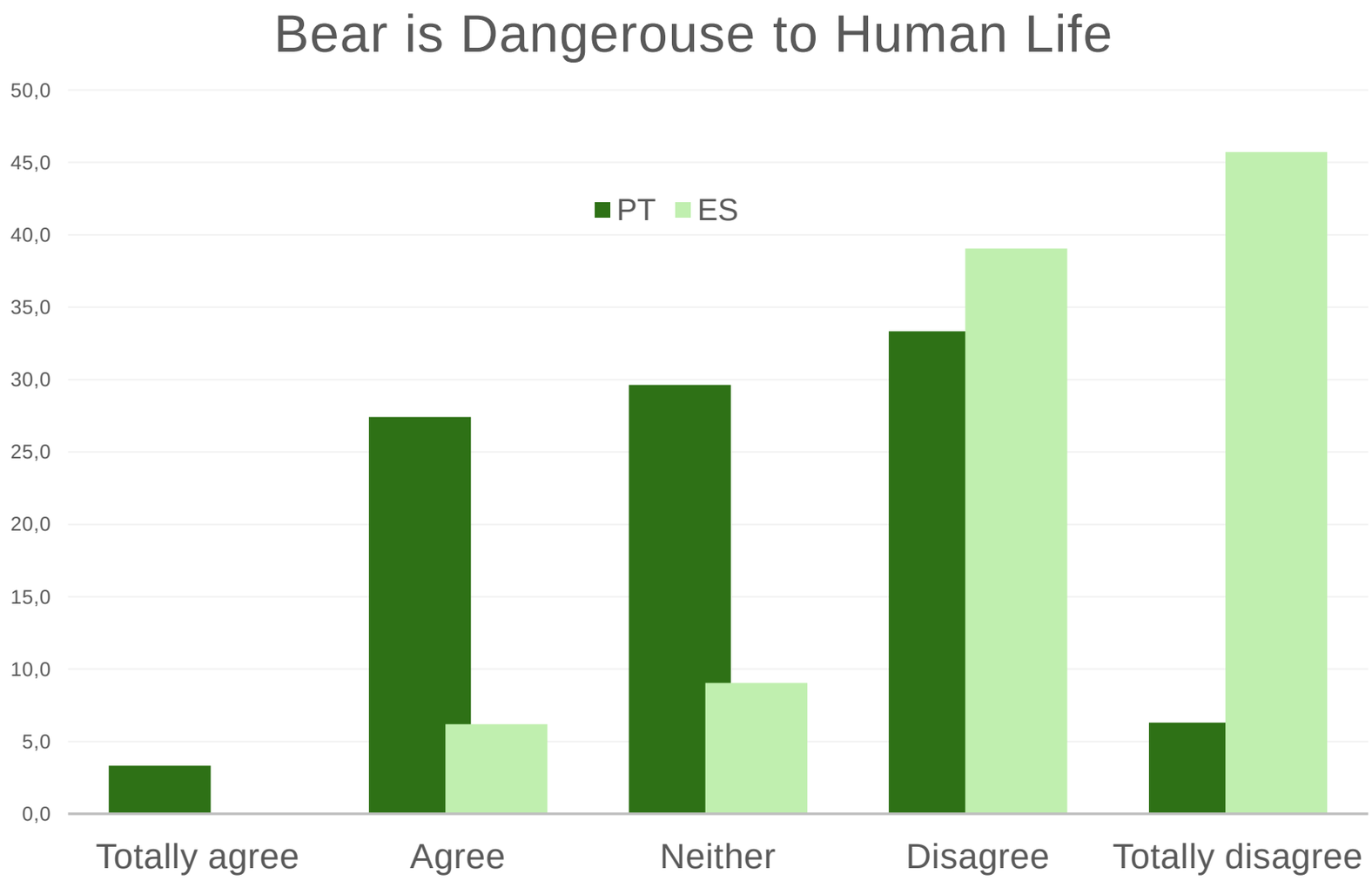
Knowledge



Results (preliminary)…

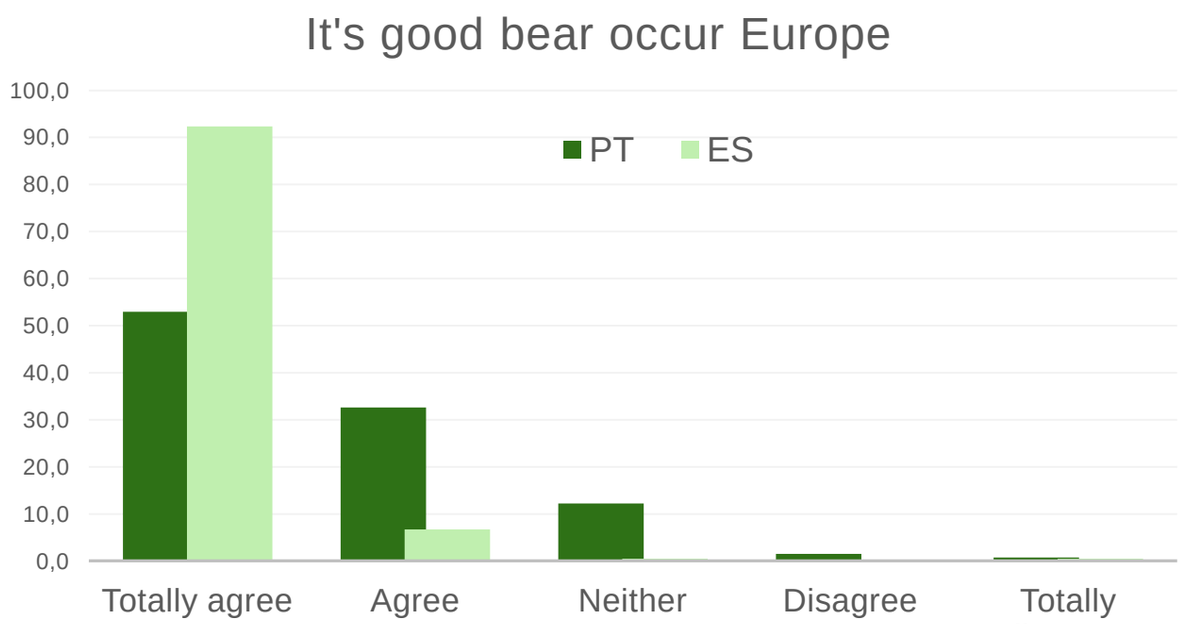
Analysis in progress

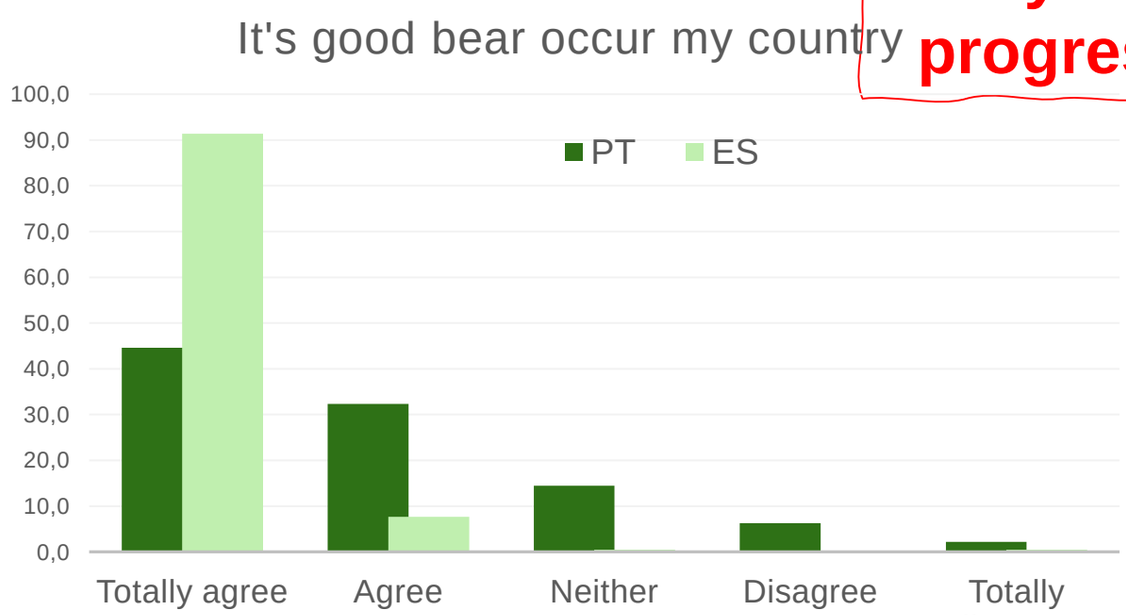
Risk Perception

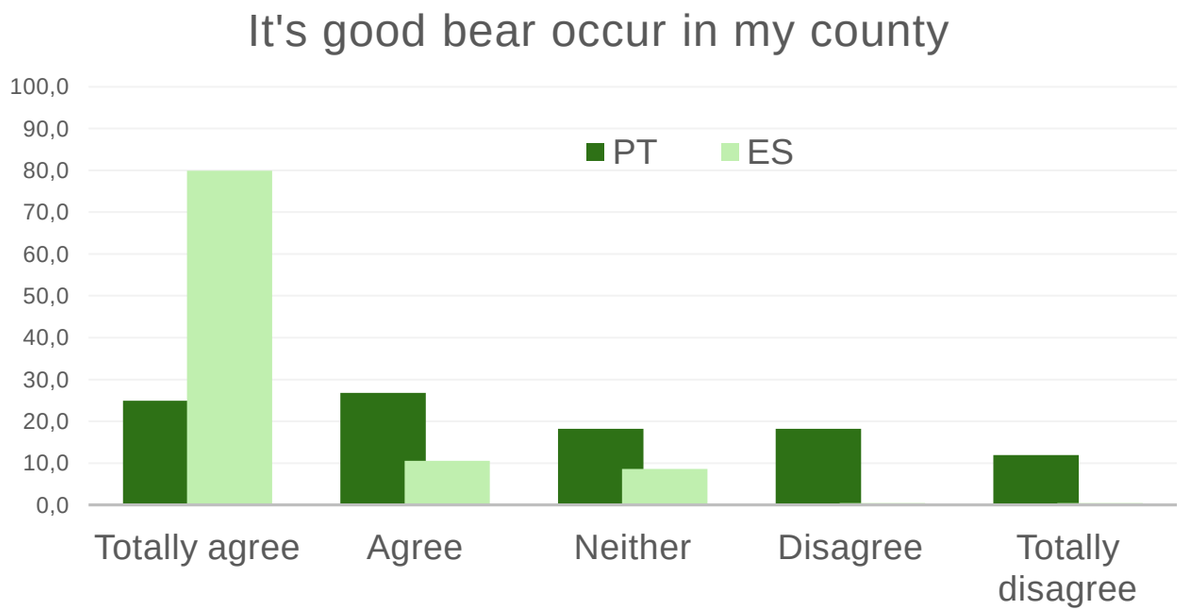


Results (preliminary)…

Analysis in progress







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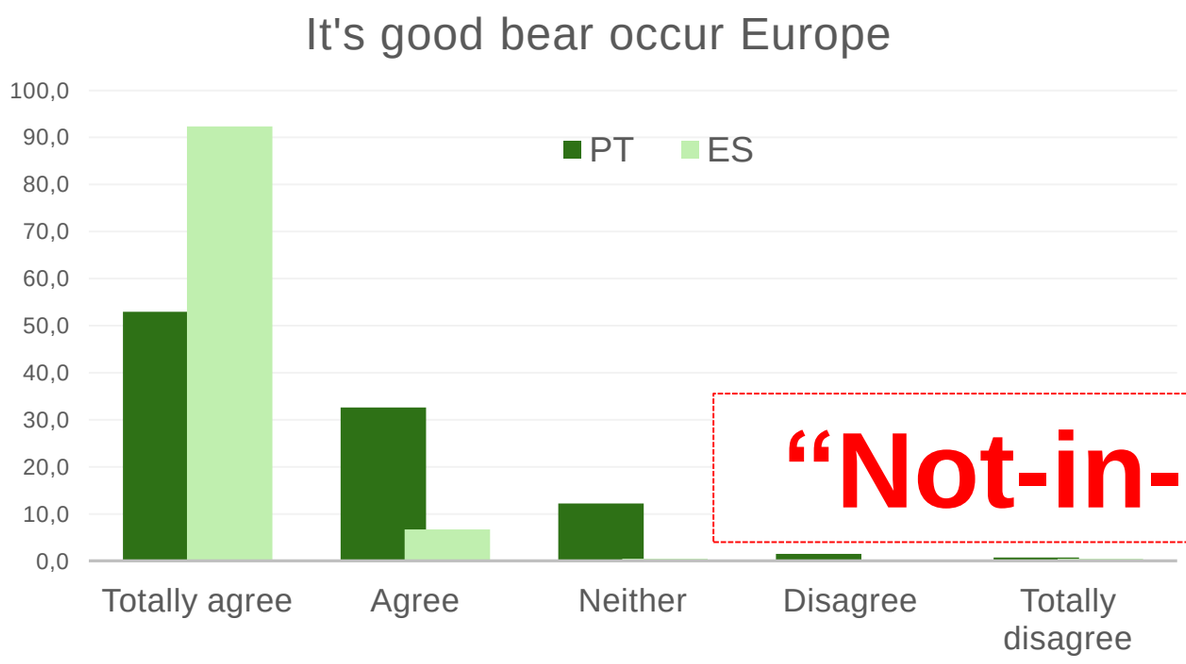
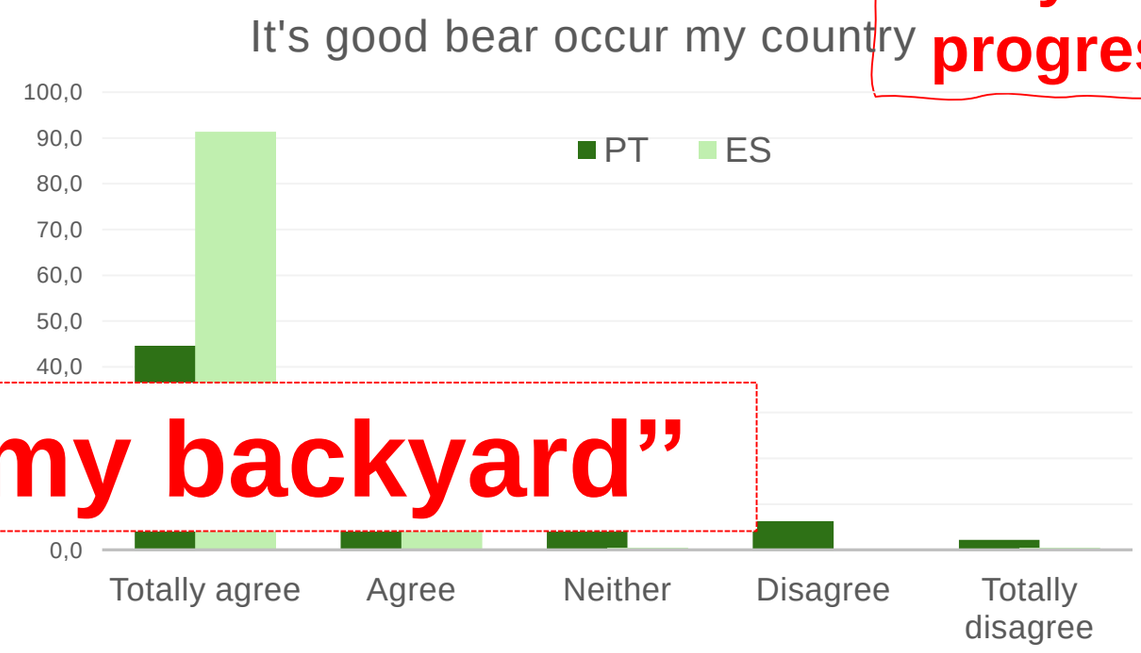
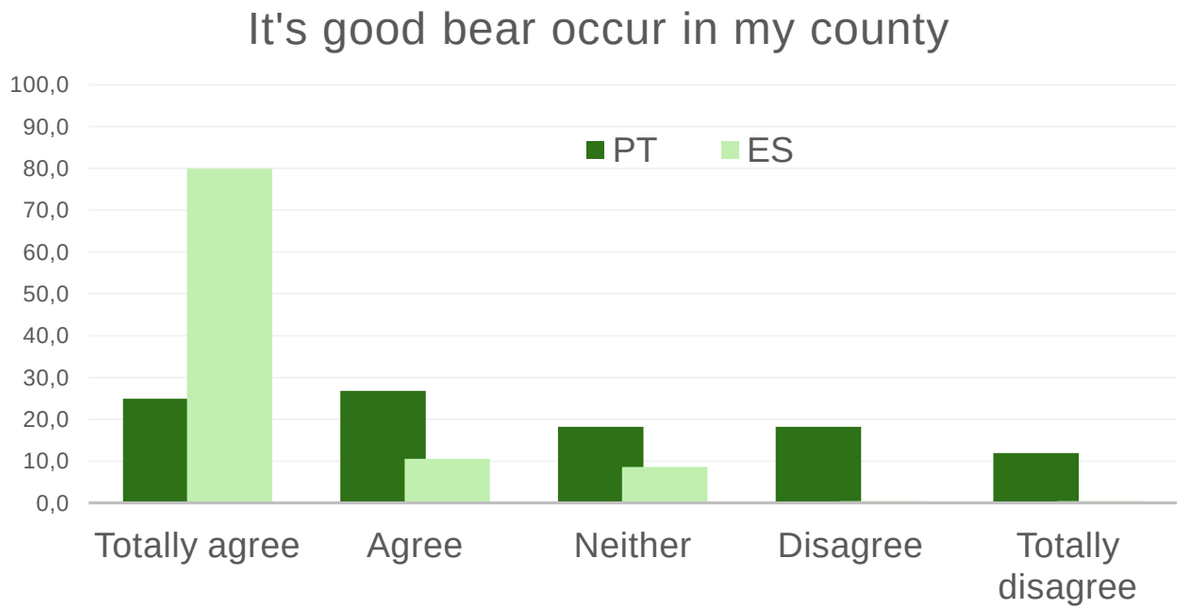
Analysis in progress





“Not-in-my backyard”



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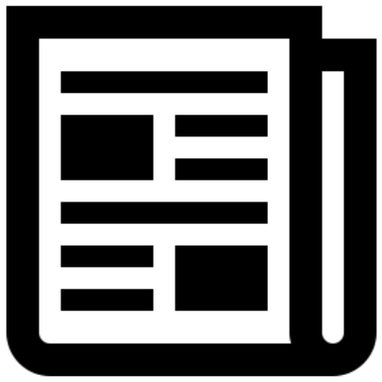

More to come...

Next steps…

- More questionnaires/interviews in ”bear area” with more stakeholders both in PT and ES;
- Analysed the data further (test Hypotheses);
- Test some interventions to increase knowldege and reduce risk perceptions.

Thanks/Gracias/Obrigado!

- To Palombar and the Networking Event Organization, for the invitation!
- To all of you, for paying attention!
- al oso, que también *“deja huella en la vida”*
- *To the team:*

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FCUL
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IESA-CSIC
Jenny Glikman

Questions?