Understanding Consumer Choice:
Analysing the role of a wide range of psychological and socio-economic determinants

Gianpietro Sgaramella*, Lina Rinaldi*, Alice Andrea Chinaia*, Folco Panizza*, Ennio Bilancini*, Anna Monticelli**, Sonia d'Arcangelo **, Isabella Cristina ***

*IMT School of Advanced Studies**

*Intesa Sanpaolo Innovation Center***

*Fondazione Capellino****

gianpietro.sgaramella@imtlucca.it

ISEE Conference,

Oslo, 25/06/2025

IMT SCHOOL FOR ADVANCED STUDIES LUCCA

Research goals

The project covers multiple aims. The most important and most general one is to understand **which intervention to assign to specific psycho-social profiles** given constrained resources (i.e. time and money) **to optimally reduce estimated impact emissions of people's consumer choices.**

So, the project will include a **systematic mapping of the relationships between many relevant pro-environmental behaviors (PEBs) and their determinants** *(first of its kind - to the best of our knowledge)* to d*eepen* the understanding of their *heterogeneity,* and (possibly) how to act on them.

Also, one important sub-aim will be to try to find the best way to produce the highest compound effect of an intervention leveraging its possible positive effects on non-targeted behaviors (also called **spillover effect** (Maki et al., 2019)).

Motivation

Why climate change and biodiversity?

- *Climate change* and *biodiversity loss are deeply intertwined*. So, we can also reduce the potential damages created by one of the two intervening on the other and get the highest effect acting on behaviors that affect the determinants of both (Shin et al., 2022).

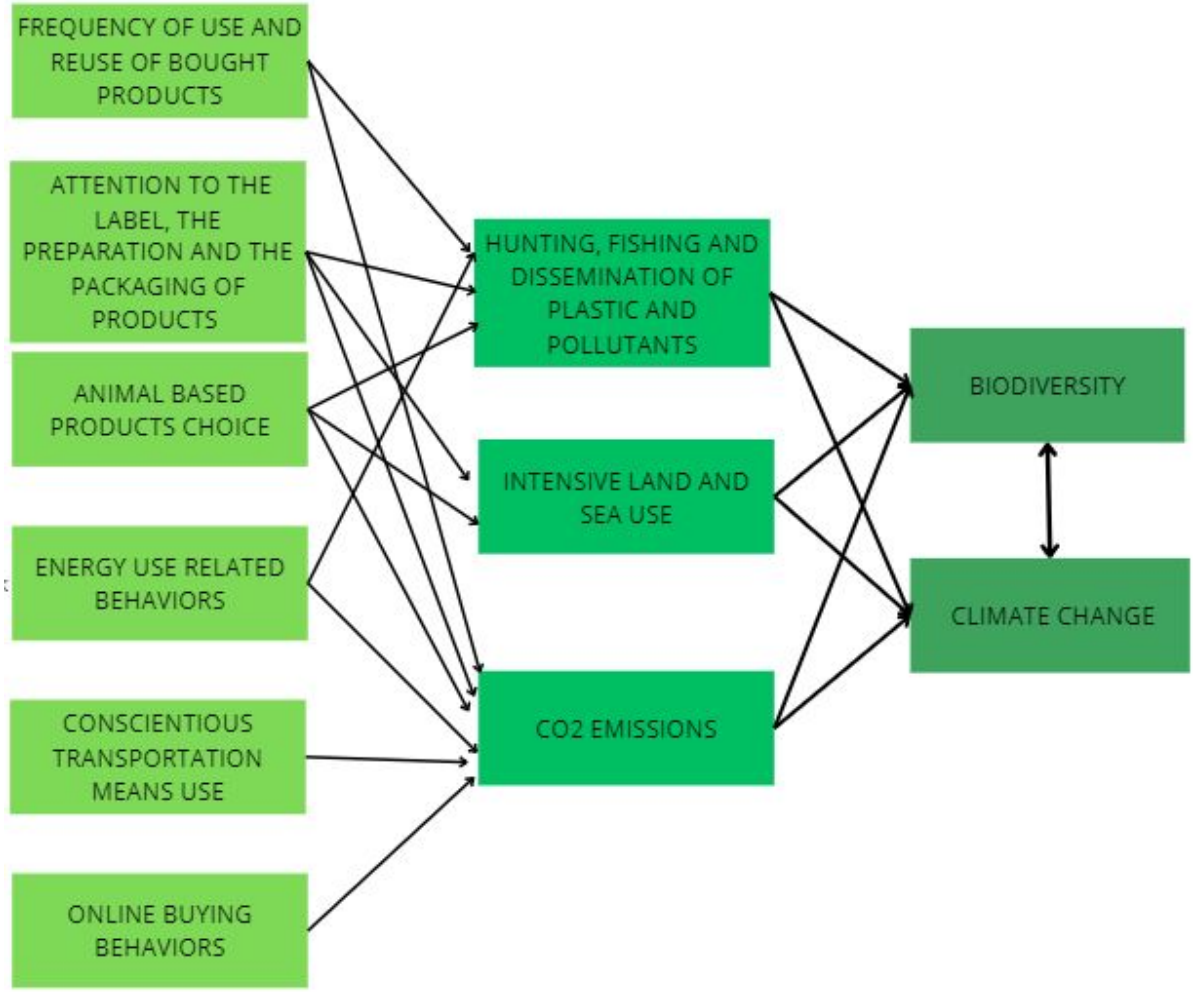
Why individual behaviors and their determinants?

- *Demand-side solutions* can be consistent with high levels of well-being in the population (Creutzig et al., 2022) and have been shown to be a promising mitigation strategy to reach positive social tipping points (Pizziol & Tavoni, 2024);

- The role of the "classical" *psycho-social determinants* has been debated, still their analysis is thought as relevant (van Valkengoed et al., 2022);

- It is fundamental to make the normative classifications of behaviors we act closer to *laypeople's perceptions* (Truelove & Gillis, 2018).

The main channels of human influence on climate change and biodiversity (Diaz & Malhi, 2022) and the clusters



IMT SCHOOL FOR ADVANCED STUDIES LUCCA

The survey

- **2000 UK participants** composing a sample that is representative of the population based on age, gender and education;

- **Pre-registered** at https://osf.io/kywfz;

- **Show up fee** of 6£ per hour that implied a payment of 2.13£ (21 min and a half circa as a median duration of the completion of the survey);

- The participants had to complete correctly at least 2 of the 3 **attention checks** distributed along the duration of the survey (approximately after 2, 8 and 14 minutes);

- The collection of the data was implemented through **Qualtrics**;

- The answers of the participants were collected through **Prolific.co**.

The survey

It included questions on:

- the **reported frequency of behaviors** (à la Kaiser (2000)) in Likert scale (for instance, "*I buy products that are cheap and follow the latest trends*" is a statement referring to their fast fashion product buying behavior and they are allowed to answer *from "never" (0) to "always" (5)* with 1, 2, 3 and 4 times as options in the middle);

- their **personal norms, descriptive and injunctive social norms** (Cialdini et al., 1991; Bicchieri, 2022) for every behavior too;

- the **climate *and biodiversity* related self-efficacy** (Hanss & Bomm, 2013);

- the **pro-climate *and pro-biodiversity* self-identity** (adapted from Van der Werff et al., 2013);

- the **environmental concern** (Schultz, 2001);

The survey

It included questions on:

- **perceived impact of a behavior** on climate change and on biodiversity (adapted from Hampton & Whitmarsh, 2023);

- the short version of the **Moral Foundation Questionnaire** (MFQ-20) inspired by the Moral Foundation Theory (Graham, 2011);

- **Cognitive reflection test** (CRT-L) (Primi et al., 2016);

- **economic preferences** measured with the staircase method (Falk et al., 2018);

- **socio-demographic information** (like gender, age, education, and political stance).

IMT SCHOOL FOR ADVANCED STUDIES LUCCA

The main hypotheses

The study measures the **"between subjects" variation of participants' consumer choices** (i.e., different buying behaviour). It aims to verify if:

H1 (directional): People reporting higher **environmental concern (EC)** will also report a **higher frequency of pro-environmental behaviours (PEBs)**.

\+ EC → + PEBs

H2 (directional): People reporting **higher environmental and biodiversity-related self-efficacy (EFF)** will also report a **higher frequency of pro-environmental behaviours (PEBs).**

\+ EFF → + PEBs

H3 (directional): People who reveal a **higher pro-climate and pro-biodiversity identity (IDY)** will also report a **higher frequency of pro-environmental behaviours (PEBs).**

\+ IDY → + PEBs

The main hypotheses

H4 (directional): If **environmental self-efficacy (EFF)** is **low**, the relationship between **environmental concern (EC)**, **identity (IDY)**, and **pro-environmental behaviors (PEBs)** will be weakened.

+ EC → (EFF) → + PEBs and *+ IDY → (EFF) → + PEBs*

H5 (directional): Individuals reporting **strong personal norm (PN)** about a certain behaviour **will report performing that behaviour more frequently**.

+ PN → + PEB

H6 (directional): People who perceive **strong descriptive norms (DN)** about a certain behaviour **will report performing that behaviour more frequently**.

+ DN → + PEB

The main hypotheses

H7 (directional): People who perceive **strong injunctive norms (IN)** about a certain behaviour **will report performing that behaviour more frequently**.

\+ IN → + PEB

H8 (directional): People who perceive a **particular behaviour to have a high positive impact** (either on climate change or biodiversity) **will report performing that behaviour more frequently** (and vice versa).

\+ IMP → + PEB

IMT SCHOOL FOR ADVANCED STUDIES LUCCA

Results of the survey

The main results (obtained through multivariate correlations using OLS regressions) are:

- the **norms seem to have a momentous role in PEBs** (personal and descriptive norms in particular);
- **identity** follows as the third most associated variable with PEBs, and actually its **seem to be relevant to link behaviors that are not in the same cluster**, like suggested in the spillover literature (Maki et al., 2019);
- **morality seems slightly relevant**, with *ingroup* and *care* dimensions associated with 9 and 7 behaviors respectively;
- **self-efficacy seems a less relevant factor**, being weakly correlated with 7 behaviors out of 20 with a *beta* of less than 0.2 in absolute value;

Results of the survey

- the same can be said for **impact perception**, that **does not seems relevant in predicting the behaviors that actually impact the most**. Also, *only perceived impact related to climate change is associated with PEBS*;

- **EC, CRT and economic preferences** (self-reported ones) **have a weak or absent association** with the various behaviors, with coefficients ranging between 0.02 and 0.07 when they appear significant at the 5% level;

- the socio-demographic variables do not appear to have a particularly relevant role. **Gender** is the only exception, being correlated with 9 behaviors out of 20.

IMT SCHOOL FOR ADVANCED STUDIES LUCCA

Results of the survey on food and related choices

The main differences observed from the general pattern are:

- strangely, the **injunctive norms seem to be slightly but consistently negatively correlated** with the behaviors of cluster 2 and meat consumption;

- **identity has an important role for behaviors of cluster 2**, close to the one of descriptive norms;

- **morality maintains the same pattern in cluster 2**, with *ingroup* dimension that tends to be pretty relevant (5/6 behaviors) and *care* too (2/6 behaviors);

IMT SCHOOL FOR ADVANCED STUDIES LUCCA

Results of the survey on food and related choices

- **self-efficacy seems to be irrelevant**;
- **impact perception** with respect to climate change **seems to be pretty relevant for cluster 2**;
- **Gender** doesn't seem to play a relevant role.

IMT SCHOOL FOR ADVANCED STUDIES LUCCA

Policy implications for food choices and pro-environmental behaviors

People who perform the behaviors in cluster 2 are:

- careful about reputation and congruence with norms;
- have a clear environmental self-identity;
- are at least somehow informed about climate impacts.

So, the policy suggestions are:

- **Target identity and norms** (especially personal and descriptive) to shift behaviors in Cluster 2, being careful with respect to the base level of both (like in the case of meat and fish consumption).

- **De-emphasize injunctive norm messaging** (it may backfire or be ignored).

- Frame food choices around **identity coherence**, **authentic climate impact**, and **observed peer behavior** (with the same caveat of targeting the norms).

IMT SCHOOL FOR ADVANCED STUDIES LUCCA

References

Bicchieri, C. (2022). Norm nudging: How to measure what we want to implement. *Behavioral science in the wild*, 82-107.

Bicchieri, C., & Dimant, E. (2022). Nudging with care: The risks and benefits of social information. *Public choice*, *191*(3), 443-464.

Cialdini, R. B., Kallgren, C. A., & Reno, R. R. (1991). A focus theory of normative conduct: A theoretical refinement and reevaluation of the role of norms in human behavior. In *Advances in experimental social psychology* (Vol. 24, pp. 201-234). Academic Press.

Creutzig, F., Niamir, L., Bai, X., Callaghan, M., Cullen, J., Díaz-José, J., ... & Ürge-Vorsatz, D. (2022). Demand-side solutions to climate change mitigation consistent with high levels of well-being. *Nature Climate Change*, *12*(1), 36-46.

Díaz, S., & Malhi, Y. (2022). Biodiversity: Concepts, patterns, trends, and perspectives. *Annual Review of Environment and Resources*, *47*(1), 31-63.

Falk, A., Becker, A., Dohmen, T., Enke, B., Huffman, D., & Sunde, U. (2018). Global evidence on economic preferences. *The quarterly journal of economics*, *133*(4), 1645-1692.

Hampton, S., & Whitmarsh, L. (2023). Choices for climate action: A review of the multiple roles individuals play. *One Earth*, *6*(9), 1157-1172.

Hanss, D., & Böhm, G. (2013). Promoting purchases of sustainable groceries: An intervention study. *Journal of Environmental Psychology*, *33*, 53-67.

IMT SCHOOL FOR ADVANCED STUDIES LUCCA

References

Kaiser, F. G., & Wilson, M. (2000). Assessing People's General Ecological Behavior: A Cross-Cultural Measure 1. *Journal of applied social psychology*, *30*(5), 952-978.

Primi, C., Morsanyi, K., Chiesi, F., Donati, M. A., & Hamilton, J. (2016). The development and testing of a new version of the cognitive reflection test applying item response theory (IRT). *Journal of Behavioral Decision Making*, *29*(5), 453-469.

Rawat, A., Kumar, D., & Khati, B. S. (2024). A review on climate change impacts, models, and its consequences on different sectors: a systematic approach. *Journal of Water and Climate Change*, *15*(1), 104-126.

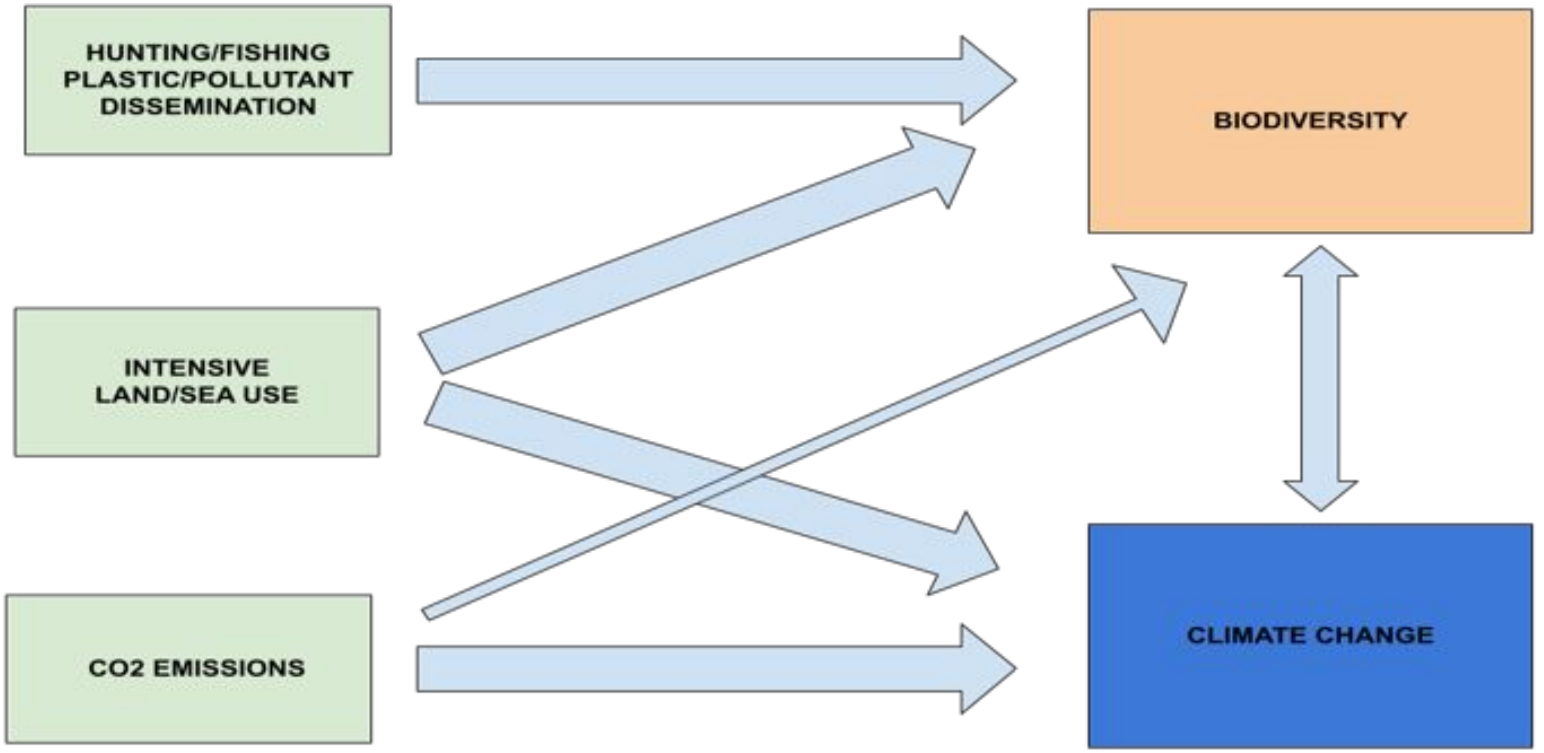
Shin, Y. J., Midgley, G. F., Archer, E. R., Arneth, A., Barnes, D. K., Chan, L., ... & Smith, P. (2022). Actions to halt biodiversity loss generally benefit the climate. *Global change biology*, *28*(9), 2846-2874.

Van der Werff, E., Steg, L., & Keizer, K. (2013). It is a moral issue: The relationship between environmental self-identity, obligation-based intrinsic motivation and pro-environmental behaviour. *Global environmental change*, *23*(5), 1258-1265.

van Valkengoed, A. M., Abrahamse, W., & Steg, L. (2022). To select effective interventions for pro-environmental behaviour change, we need to consider determinants of behaviour. *Nature human behaviour*, *6*(11), 1482-1492.

IMT SCHOOL FOR ADVANCED STUDIES LUCCA

The main channels of human influence on climate change and biodiversity (Diaz & Malhi, 2022)



IMT SCHOOL FOR ADVANCED STUDIES LUCCA

The behaviors related to clusters

- Fast fashion products choice
- Second hand clothes choice
- Use of disposable products
- Reuse

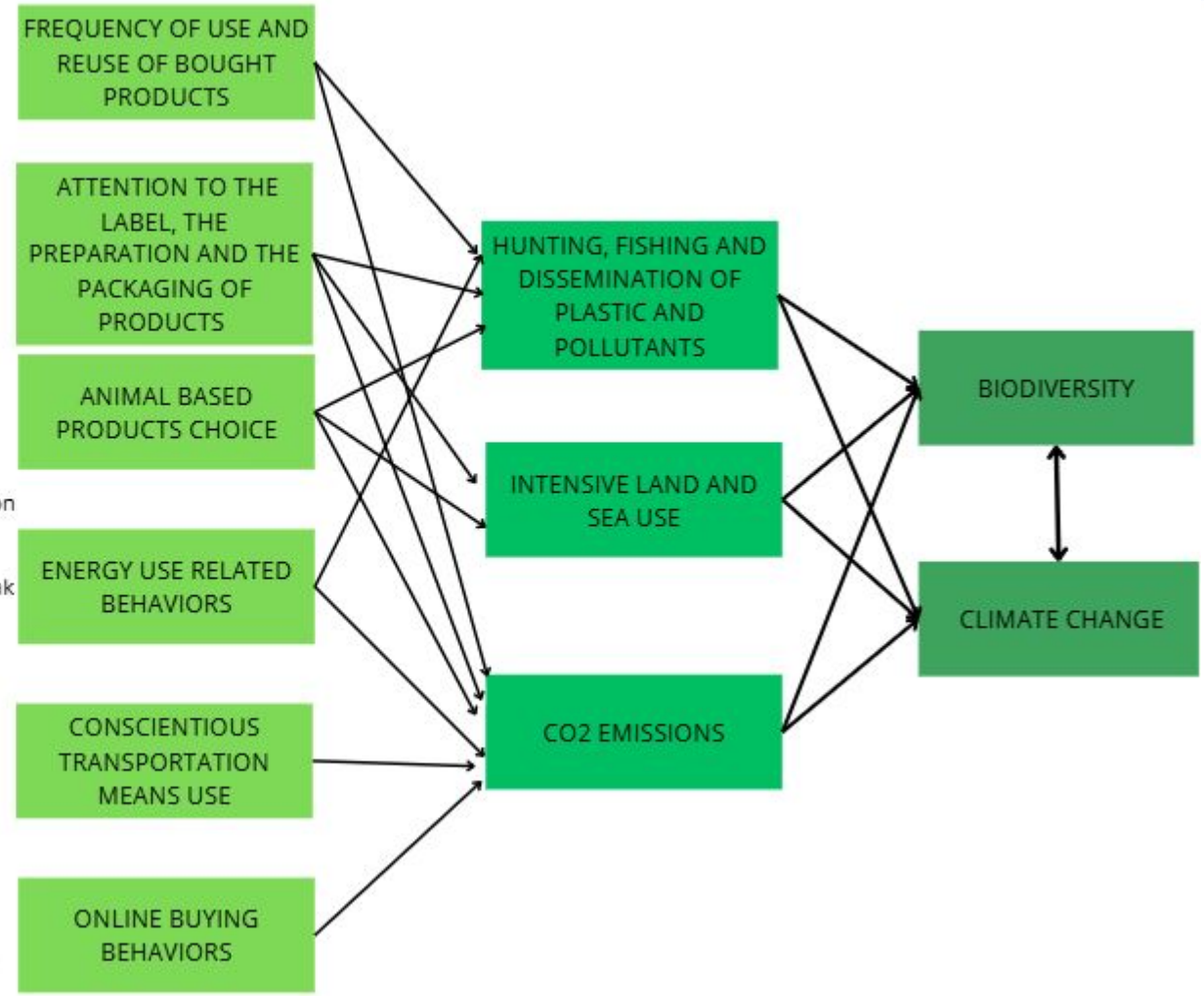
- **Attention to materials / ingredients**
- Choice of minimally processed products
- Choice of local products
- Choice of seasonal products
- Choice of organic products
- Choice of products with a sustainable packaging

- **Choice of food animal-based products** (meat, fish, eggs and dairy products)
- **Choice of non-food animal-based products** (cosmetics, apparel, etc.)
- Choice of pet food committed to environmental preservation

- Household energy reduction
- Tendency to use the most consuming appliances out of peak hours with respect to energy demand

- Use of sustainable transportation means
- Responsible guide behavior (avoiding sharp accelerations/decelerations)

- Online buying for products available in distant stores
- Delivery services use for products packed in distant places



IMT SCHOOL FOR ADVANCED STUDIES LUCCA

Descriptive stats

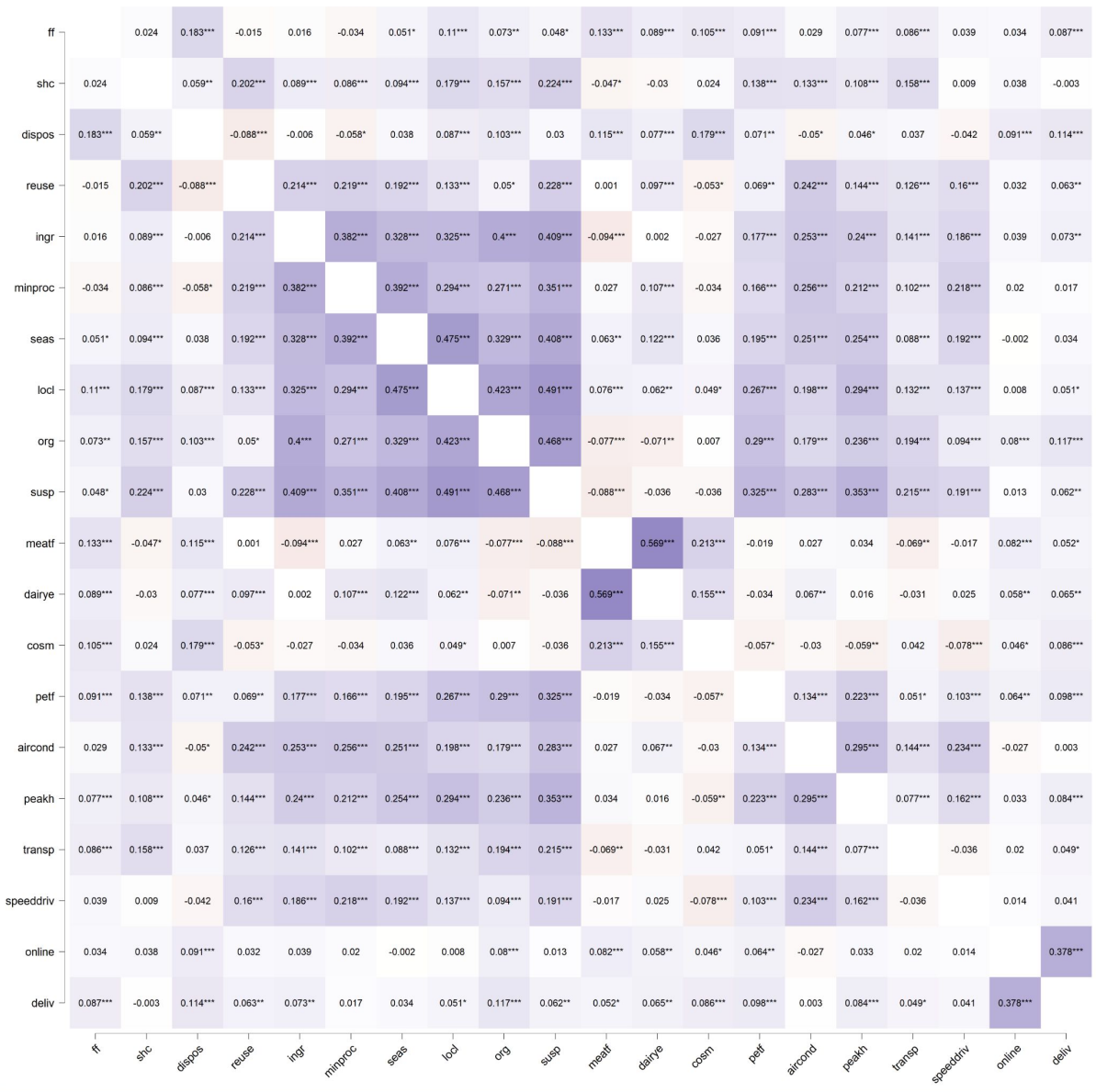
Descriptive Statistics ▼

	ff	shc	dispos	reuse	ingr	minproc	seas	locl	org	susp
Valid	1989	1989	1989	1989	1989	1989	1989	1989	1989	1989
Missing	0	0	0	0	0	0	0	0	0	0
Mean	1.988	2.045	1.851	3.893	3.108	3.315	2.805	2.415	1.778	2.532
Median	2.000	2.000	1.000	4.000	3.000	4.000	3.000	2.000	2.000	3.000
Std. Deviation	1.426	1.744	1.415	1.219	1.376	1.318	1.247	1.241	1.323	1.308
Shapiro-Wilk	0.923	0.879	0.900	0.815	0.918	0.903	0.933	0.937	0.915	0.937
P-value of Shapiro-Wilk	< .001	< .001	< .001	< .001	< .001	< .001	< .001	< .001	< .001	< .001
Minimum	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Maximum	5.000	5.000	5.000	5.000	5.000	5.000	5.000	5.000	5.000	5.000

meatf	dairye	cosm	petf	aircond	peakh	transp	speeddriv	online	deliv
1989	1989	1989	1989	1989	1989	1989	1989	1989	1989
0	0	0	0	0	0	0	0	0	0
3.755	4.085	1.304	1.126	3.689	2.167	2.632	3.289	2.879	2.321
4.000	5.000	1.000	0.000	4.000	2.000	3.000	4.000	3.000	2.000
1.525	1.256	1.407	1.478	1.332	1.500	1.693	1.506	1.311	1.717
0.774	0.734	0.834	0.758	0.844	0.926	0.903	0.867	0.923	0.897
< .001	< .001	< .001	< .001	< .001	< .001	< .001	< .001	< .001	< .001
0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
5.000	5.000	5.000	5.000	5.000	5.000	5.000	5.000	5.000	5.000

IMT SCHOOL FOR ADVANCED STUDIES LUCCA

Behaviors



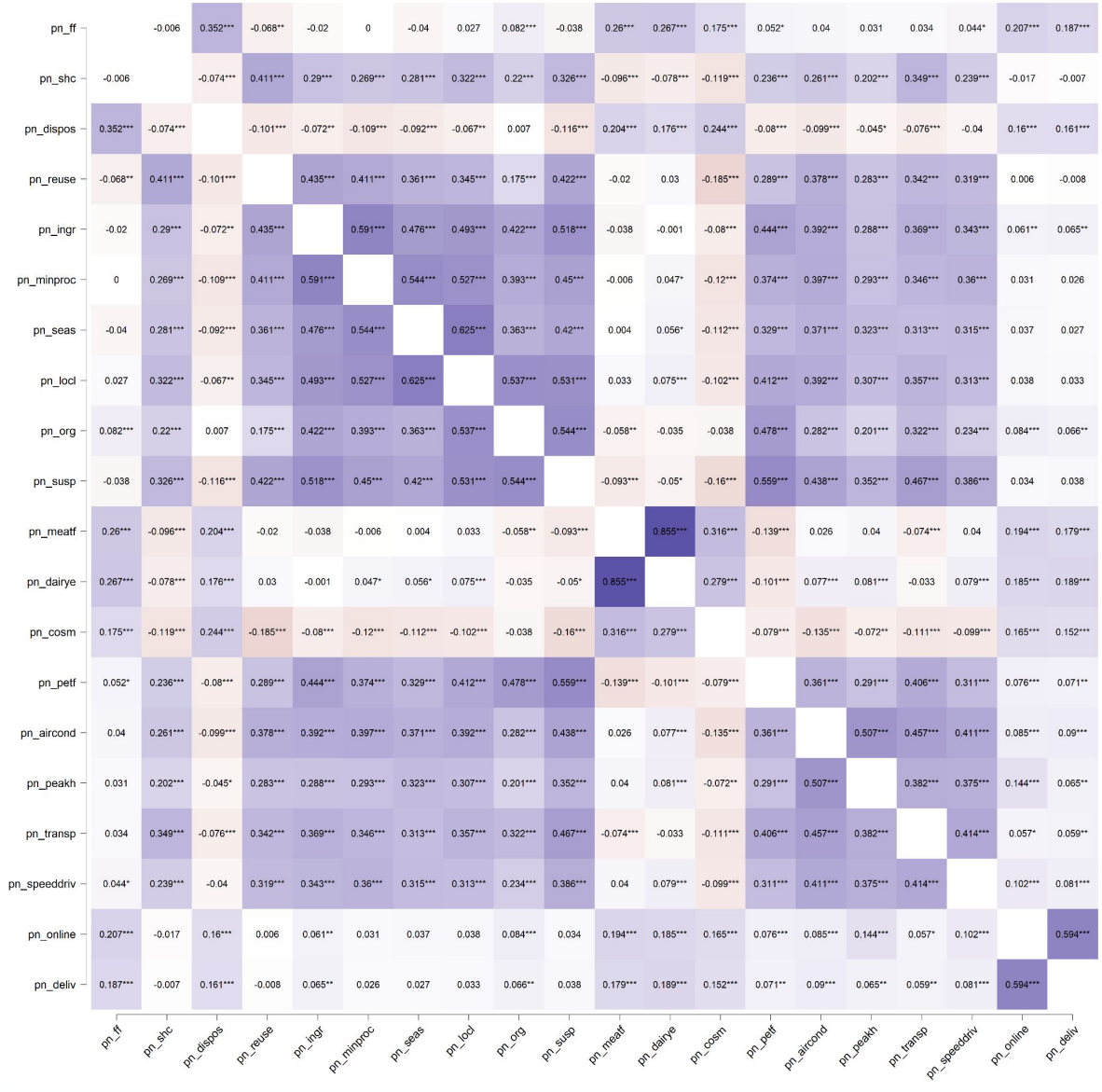
The intra-cluster links between the behaviors

At a first glance there seems to be at least partial support for the fact that behaviours pertaining to the same clusters are more correlated than behaviours of different clusters.

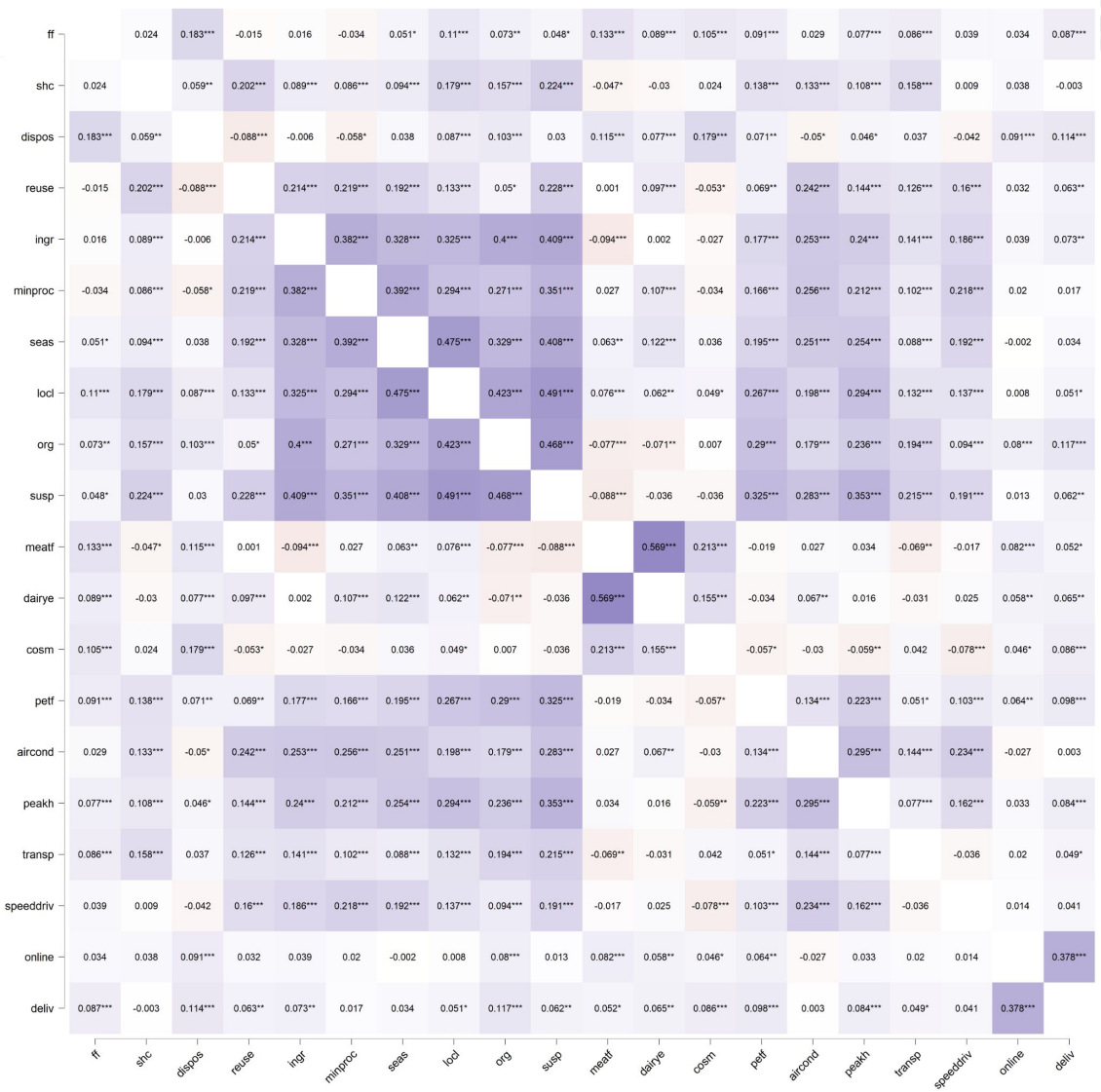
Same clusters:

- online and delivery (0.37)
- responsible consumer behaviours and other responsible consumer behaviours (attention to ingredients, processing, organic, seasonal and local products etc.) (0.05-0.41--> generally around 0.25)
- energy related behaviours (0.30)
- transportation related behaviours (NO)
- reuse and disposable related tendencies (some)

Personal norms

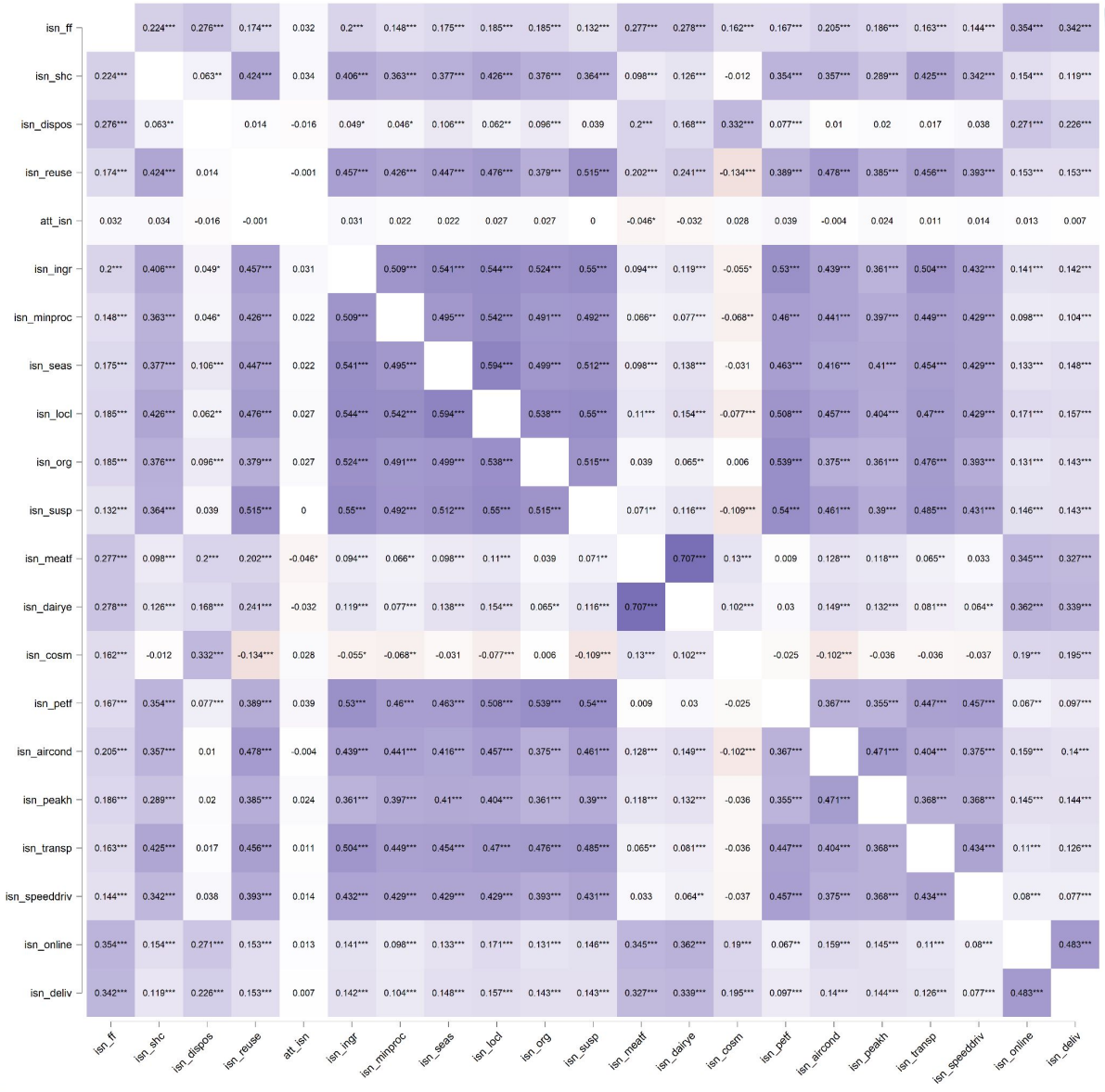


Descriptive norms



IMT SCHOOL FOR ADVANCED STUDIES LUCCA

Injunctive norms



IMT SCHOOL FOR ADVANCED STUDIES LUCCA

Results of the survey on food and related choices

- Low weight of determinants, vast majority of variance explained by norms (between 0.15 and 0.35) ;
- Ingredients attention is an exception since it's related more to the determinants (R^2 = 0.17 without norms, 0.31 with norms and 0.36 with everything);
- Some overlap in many cases, the total is lower than the sum of the 2. Very influential determinants for sustainable product choice even more than norms (0.33 vs 0.27) → highest variance explained by the full model (41%);
- Most influential norms on meat and fish (45% full model vs 46% full model) → similar pattern but with lower var explained for dairy and eggs and animal based cosmetics and apparel choice

The (partially explored) research questions of the study

The study aims to verify also:

RQ1: What variables tend to show a higher association with the performance of a certain behavior?

RQ2: To what extent do these associations vary across behaviors?

RQ3: To what extent do the hypothesized relationships (H1–H8) vary across cognitive style tendencies (derived through CRT performance)?

RQ4: What are the characteristics of the people showing the highest and the lowest positive impact on climate change?

RQ5: What are the characteristics of the people showing the highest and lowest positive impact on biodiversity?

The ranking of the clusters' impacts to select on which clusters to intervene (Ivanova et al., 2020; Diaz & Mahli, 2022)

Estiamated impact (from the highest to the lowest)	*Estimated modifiability of cluster-related behaviors*
Animal based products choice	3
Attention to labels, preparation and packaging of products	2
Transportation choices	5
Energy-related behaviors	4
Products use frequency	1
Online buying behaviors (*)	6

Legend:
The **darkest colors** represents a higher estimated impact.

*Online buying behaviors cluster was difficult to be placed in the ranking, given its highly variable impact.