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A measure of compound intersectional inequality

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Abstract

When the dimensions of inequality reinforce each other, it is difficult to measure the influence of each. We explore a method for measuring the distance between predetermined groups of individuals (defined a priori by gender and geographical residence). The first step consists in classifying individuals by cluster analysis (without considering the a priori groups). The second step calculates the relative frequency distribution among the clusters for each of the a priori groups. Finally, the distance between two groups is defined as the Euclidean distance of the corresponding percentage frequency distributions. We assume that the more dissimilar this distribution is, the more unequal the a priori groups are. We apply this method to 23 European countries using data of the *European Social Survey* 2008 and 2018. We find that the average distance between men and women has decreased.

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1. Introduction

Intersectionality is a conceptual methodological approach that analyses the interaction between gender and the inequalities of class, race, ethnicity, sexuality, age and other systems of social hierarchy[1]. We can distinguish three forms of intersectional inequality[2]. One is *concomitant*: discrimination occurs because of different factors that act concurrently but separately: a disabled woman may be discriminated against because of her gender when applying for a job, and because of her disability when entering a public building not accessible to wheelchair users. Discrimination in this case occurs due to gender *and* disability, but in separate instances. A second type of intersectional inequality is *additive*: discrimination occurs on the basis of two or more factors that act cumulatively in *the same* social sphere. For example, in a labour market that segregates on the basis of gender (some jobs are reserved for men) and nationality (some jobs are available only to citizens), the chances of an immigrant woman finding a job are reduced twice: gender *plus* nationality. Lastly, *compound* intersectional inequality occurs when the discriminating characteristics interact dynamically, reinforcing each other across different social spheres. Suppose that a male Muslim intellectual and a fe-

[1] Unlike most of the very extensive literature on the topic, two recent syntheses can be found in Collins and Bilge (2020) and Bello (2020). This literature often refers to discrimination rather than inequality. In intuitive terms, discrimination occurs when members of a group have different opportunities because of personal characteristics that are independent of their abilities, while inequality occurs when people or groups have differential access to resources and social rewards. In the broad meaning just evoked, the latter concept embraces the former, which is why we only refer to inequality here.
[2] This paragraph is taken, with some adaptation, from Bellanca (2021). We draw loosely on Makkonen's (2002) classification; see also Ruwanpura (2008).

male Catholic scholar both aspire to top positions in an academy and in their respective religious communities. The man has a better chance, as a man, of obtaining that position in the religious community, which would grant him an advantage in obtaining the university position, as his community position increases his influence and social recognition. Likewise, as a man, he has a better chance of obtaining the top position in the academy, which makes him a better candidate as a religious leader in his community. On the other hand, for the female Catholic scholar, not only is it more difficult for her to obtain either top position as a woman, but more importantly, penalization in either competition penalizes her in the other as well. In this case, the woman's inequality emerges from *the combination* of gender and religion, it is not gender and religion or gender plus religion but rather gender *multiplied by* religion. The intersection of gender and religion therefore results in a process by which the two characteristics reinforce each other in a way that is larger than their sum: gender discrimination within religion reinforces gender discrimination within academia, and vice versa.

Thus compound intersectional inequality occurs when various dimensions – class, gender identity, ethnicity, age, disability, marital status, culture, place of origin, citizenship and so on – interact synergistically. Our research question concerns whether it is possible to measure the synergy or dynamic interaction that generates this form of inequality. If the causes at stake acted separately (for example, if class exerted an influence on inequality independent of that exerted by cultural level) or if they had a precise ordering (for example, if ethnicity had a significantly greater impact on inequality than marital status) or if they expressed a clear hierarchy (for example, if we were able to establish that gender inequality determines inequality in citizenship rights) then it would be easier to recognize and address inequality. In contrast, the "compound" nature of inequality suggests that the intersection creates an effect on women that is greater than the effect of individual factors. Moreover, each dynamic interaction of factors is specific; we cannot determine ex ante and with certainty which factor affects which factor more; we can only ascertain the phenomenon on a case-by-case basis. In short, our problem is to measure the synergy of a tangle of dimensions without knowing in advance their relative impact on inequality. How can this be done?

2. Method

The intersectional approach entails:

I. that the relationship between the multiple dimensions of differentiation (gender, race and so on) is not predetermined, but rather emerges dynamically from empirical investigation;
II. that each dimension has its own internal variety, which influences the way social groups are formed and change;
III. that dimensions are not exclusively confined to their pertinent institution (economy, state, family and so on), since each crosses and disrupts all institutional spheres[3].

In line with these criteria, we endeavour to interpret and measure the "tangle" of compound intersectional inequality (henceforth: CII) in terms of the difference (measured as distance) between women and men in multiple dimensions of social life, across space (countries) and time. We begin by considering the dimensions of inequality all together, to avoid assigning arbitrary ex ante weights to one or the

[3] These criteria are loosely reformulated from the contributions of Hancock (2007a; 2007b) and Marx Ferree (2011). For a succinct presentation and discussion of them, see Marchetti (2013, 142-144).

other; then we assign women and men to homogeneous sub-groups (clusters) defined by cluster analysis on a set of chosen variables; we then examine how much each variable drives the difference between clusters; finally, we test how unequal/distant, in terms of the distribution of each population among the clusters, women and men in one country in a certain year are from women and men in another country in the same year or from the same country in a different year. Thus, the logical steps by which we measure CII are: 1) we assume that individuals in the same cluster are similar to each other; 2) we calculate the distribution of women and men across clusters by country and year, assuming greater inequality of genders for more dissimilar distributions. By these two steps, we measure CII in terms of the distances between genders across countries and across years, based on the multiple aspects (variables) considered[4]. The dataset we draw on is the *European Social Survey*, a large periodic cross-national sample survey of the habits, beliefs and behaviours of people in Europe[5]. We focus on the 2018 survey (wave 9), the latest available, and the 2008 survey (wave 4), the one conducted ten years earlier. Twenty-three countries featured in both surveys: Belgium (BE), Bulgaria (BG), Croatia (HR), Cyprus (CY), Czech Republic (CZ), Denmark (DK), Estonia (EE), Finland (FI), France (FR), Germany (DE), Hungary (HU), Ireland (IE), Latvia (LV), Netherlands (NL), Norway (NO), Poland (PL), Portugal (PT), Slovakia (SK), Slovenia (SI), Spain (ES), Sweden (SE), Switzerland (CH) and the United Kingdom (GB)[6]. We use the questions in the section of the questionnaire entitled "Scale of human value" which asks respondents how much they feel represented by 21 "labels" characterizing the 21 dimensions of individuals in social relations. The dimensions

[4] Our idea finds support in a statistical method recently developed to measure the closeness or distance of subjects, groups or territories in multiple domains (cultural, economic, rights and so on). The first application of this approach – called DBS, distance between strata – is in De Santis, Maltagliati and Salvini (2016). Later applications include Maltagliati and Bellanca (2020). See these essays for a more rigorous and complete illustration of the method.
[5] See < http://www.europeansocialsurvey.org/>.
[6] See <https://www.europeansocialsurvey.org/about/participating_countries.html>.

concern creativity and originality, wealth, equal opportunities, being esteemed for one's abilities, security, pursuit of novelty, sense of obedience, desire to understand others, humility, desire to transgress, autonomy of choice, solidarity, importance of recognizing one's achievements, importance of protection by public authority, propensity to take risks, conformity, importance of being respected, importance of being loyal, importance of respecting the natural environment, importance of family and religious traditions, and pursuit of fun and pleasure as such. The answers are scored on a six-point scale from "very much like me" to "not at all like me", with the additional possibilities of not answering or not expressing a position. In essence, the 21 labels cover many dimensions of the (unequal) way in which men and women represent themselves in social links: dignity, equality, belief in one's own means and trust in others, but also acceptance of a subordinate condition, attitudes of resignation and the weight given to dominant values. These variables are all filtered by subjective perception rather than being based on the (assumed) objectivity of a market price or measurable quantity. However, they have three great merits for our analysis: 1) they offer an extremely multifaceted picture of respondents' positions; 2) they allow us to work with as many as six levels of intensity in the responses; 3) they allow us to exactly compare the same set of questions submitted identically to respondents from the same nations a decade apart.

Although feminists have always questioned the intrinsic nature of attitudes and preferences attributed to the genders, these have often been taken as facts by social researchers. However recent research in the social and neurological fields has produced concrete evidence that these attitudes have more to do with social constructions and norms than with biology. For example, it has been noted that women, generally considered to be uncompetitive and risk-prone, behave differently if their opponent is a man or a woman, or that low propensity to invest, for example in agricultural innovations, is the result of scarcity of resources and time, not of aptitude. Women's lack of assertiveness is also often invoked to explain their lower wages and generally subordinate position in the workplace, but recent surveys show that women do not get the same pay rises as men, even when they explicitly ask for them. Recent studies have also shown that the influence of female leaders and role models in certain countries encourages girls to study and take leadership roles. Since self-perception and self-narrative are largely derived from the prevailing social structures and norms, measurement of the distance of attitudes and self-definition between men and women provides us with a cultural-structural picture of CII: the more men and women are distant, the more likely it is that CII weighs heavily in the social context, since the differences hinge on multiple aspects and attitudes that impinge directly on people's daily and material life, limiting or expanding their capabilities and therefore their self-realization. We can therefore expect the distribution of attitudes we observe in a country, and the differences between countries, to be an indication of the prevailing culture and social structures at a given time. A highly polarized distribution can indicate strong and persistent gender stereotypes, which reinforce CII, with real consequences. One of the most striking examples is in the field of medicine, where gender and for example ethnicity stereotypes interact and can have serious consequences for the health of the female population.

To measure the overall "dispersion" of the 23 countries for each of the four datasets (F in wave 4, F in wave 9, M in wave 4, M in wave 9), we consider the average distance of the 23 countries from the "barycentre", which is that of "all countries together"[7].

[7] In fact, to measure the overall "dispersion" of the 23 countries for each of the 4 datasets (F in wave 4, F in wave 9, M in wave 4, M in wave 9), we can follow two paths. We can calculate the average of the 253 (23 countries x 22 /2) distances between pairs of countries. (The possible comparisons between two elements of a pair, drawn from a group of k elements, are k·(k-1)/2, just as in a soccer league with 20 teams, the teams play 38 games each--playing two times with every other team, home and away--for a total of 380 games in the season and (20·19)/2 = 190 games in a round.) We can otherwise measure the average distance of the 23 countries from the "barycen-

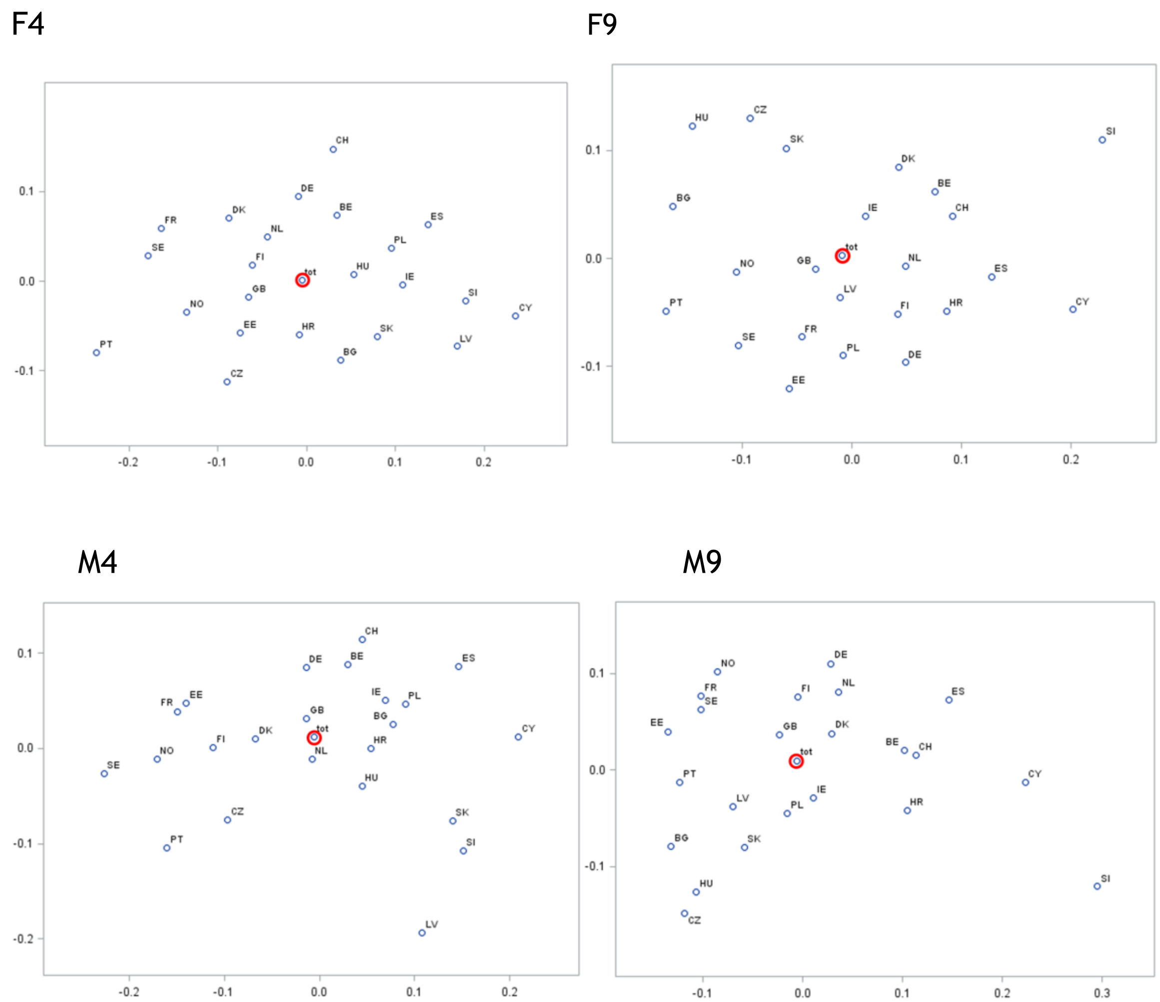

Fig. 1 – Multidimensional scaling maps for the four gender-waves

Since we have 23 countries, two genders and two waves, we will have a total of 92 possible types of individuals. The matrix of all distances is therefore very complex and even a graphic representation is difficult to decipher[8]. However, if we

tre", where barycentre is represented by "all countries together". As might be expected, the information derived from the two alternative paths is very similar (a "quirky" country will be both far from all the others and far from the barycenter, consisting of all the countries together). In the text we refer to the second road.

[8] The graphical representation of the matrix is done by Multidimensional Scaling. This is a statistical analysis technique for graphically representing the differences between elements of a set. Starting

divide it into four distinct distance maps, we can usefully represent that matrix. In each map, along with the acronyms of the 23 countries for each gender/wave, we also have the "barycentre" (*tot*, highlighted in each graph).
We have nine research questions:

1. What do the 21 variables mean, i.e. on the basis of what relatively homogeneous value orientations can we group the answers to the questionnaire?
2. What do the clusters mean, i.e. on the basis of what relatively homogeneous criteria are F (or M) grouped by our method, and how do these relate to CII?
3. How do F and M differ in a given country/wave and in general?
4. How does CII vary among F (or M) in a given country between 2008 and 2018?
5. How did CII vary among F (or M) in different countries between 2008 and 2018?
6. In general, did CII show a centripetal or a centrifugal trend among F (or M) in the different countries in the study period?
7. How did CII vary between F and M in a given country over time?
8. How did the difference in CII between F and M vary from one country to another over time?
9. Finally, can we identify the institutional spheres that most determine variations in CII between people of the same gender and wave in different countries?

from the distances of such elements in an N-dimensional space, through an algorithm, multidimensional scaling assigns each element a position in an M-dimensional space (with M, established a priori, less than N). If M is equal to 2, this space can be represented with a Cartesian graph. In our exercise, since each individual is placed in one of five clusters, for each cluster (defined by gender-wave-country) we have a percentage frequency distribution among the five clusters. Therefore, the Euclidean distance between the distributions of two clusters results in a distance in 5 dimensions. Through multidimensional scaling we "simplify" each of these distances back to only 2 dimensions that can therefore be visualized.

3. Results

We tackle question 1 (On the basis of what value orientations can we group answers to the questionnaire?) by collecting the 21 variables into eight relatively homogeneous groups, as indicated in Table 1.

VARIABLE	LABEL	CATEGORY
ipcrtiv	Think new ideas and being creative	AMBITION AND DESIRE FOR NOVELTY
ipadvnt	Seek adventures and have an exciting life	
impdiff	Try new and different things in life	
impfree	Make own decisions and be free	SELF-DETERMINATION
ipeqopt	Important that people are treated equally and have equal opportunities	
impsafe	Live in secure and safe surroundings	SAFETY
ipstrgv	Important that government is strong and ensures safety	
ipudrst	Understand different people	EMPATHY
iphlppl	Important to help people and care for the well-being of others	
iplylfr	Be loyal to friends and devoted to relatives	
ipgdtim	Have a good time	HEDONISM
impfun	Seek fun and things that give pleasure	
ipshabt	Show abilities and be admired	
imptrad	Follow traditions and customs	CONFORMITY AND TRADITIONS
ipfrule	Do what one is told and obey rules	
ipbhprp	Behave properly	
ipmodst	Be humble and modest, not draw attention	
ipsuces	Be successful and have people recognize	SUCCESS AND WEALTH
iprspot	Get respect from others	
imprich	Be rich, have money and expensive things	
impenv	Care for nature and environment	ENVIRONMENT

Table 1 - The 21 questions grouped into eight homogenous categories

From Table 1, we can immediately group the different categories on the basis of gender: resourcefulness, self-determination, hedonism, success and wealth are attitudes and values generically attributed to men, whereas empathy, conformity (also as aversion to risk and change), safety and protection of the environment are

more traditionally, though not necessarily, female attitudes. It is also immediately evident that some of the labels can differ according to gender on the basis of existing social structures: for example, the importance of living in a safe and secure environment is a very real need for many women.
We can represent the characteristics of the five clusters that emerged from cluster analysis[9] in a single matrix by measuring the average scores of the 21 variables for each (Fig. 2): the rows show the reasons that make groups of people homogeneous, while the columns show the reasons that make people's values homogeneous (the bold borders mark the variables that we merged, based on the homogeneity of the topics touched on). In the lower part of Fig. 2, the watershed is the value 1.00: each time a box expresses a lower value, it appears in a shade of green, which becomes brighter the more the value deviates from 1.00; similarly, whenever a box expresses a higher value, it is indicated in a shade of red[10].

Fig. 2, provides the answer to question 2, i.e. on the basis of what criteria are F (or M) grouped by our method? Cluster 1 groups people who emphasize aspiration to equal opportunities, solidarity, welfare state benefits, loyalty and conservation of the natural environment. They are otherwise attached to traditions, conformity and particularly sensitive to security issues (cluster title: *empathic environmentalists*). Cluster 2 groups people who are strongly self-focused, aimed at "cultivating their own garden" and fearful of the complexity of the world (cluster title: *narrow minded*). Cluster 3 groups people who are creative, hedonistic and interested in like people and in forms of social experimentation (cluster title: *creative*

[9] The results were obtained by the so-called Ward method (Ward 1963) using SAS software, together with the cubic clustering criterion (CCC), commonly used to estimate the optimal number of clusters. Other techniques were tested, without appreciable differences in the results.
[10] The first (uncoloured) part of the table shows (first five rows) the average score of each cluster for each question (remember that responses range from 1 to 6). The sixth row shows the average of all observations in the dataset. The ratio of the first five rows to the last therefore gives us a measure of how "skewed" a cluster is toward low or high values of responses. For example, the 1.15 ratio we find in the first question/first cluster results from the ratio 3.04 to 2.64 and indicates that in cluster 1, responses to the question "ipcrtiv" are on average 15% higher than in all clusters taken together.

hedonists). Cluster 4 unites people who express values in line with the social average on all the issues investigated (cluster title: *average*). Finally, cluster 5 groups people who do not value creativity, are concerned about safety, and advocate attitudes of conformity, obedience and submission (cluster title: *conformists*). From a gender point of view, we can expect the cluster of *empathic environmentalists* to include more women and cluster 3, *creative hedonists,* to contain a high percentage of men. The other three clusters have no marked gender connotations, although cluster 5 contains elements of attitudes culturally attributed to femininity (obedience and modesty).

	ipcrtiv	ipadvnt	impdiff	impfree	ipeqopt	iphlppl	ipudrst	iplylfr	impenv	ipgdtim	impfun	ipshabt	imptrad	ipfrule	ipbhprp	ipmodst	impsafe	ipstrgv	ipsuces	iprspot	imprich
cluster	creativity and originality	risk and emotions	search for novelty	autonomy in choices	equal opportunities	solidarity	desire to understand others	to be loyal	to respect the enviroment	hedonism and consumerism	pursuit of pleasure	to be admired	tradizions	sense of obedience	conformism	humility	safety	strong government	to be recognized	to be respected	wealth
1	3.04	4.03	3.48	2.72	2.84	2.92	3.08	2.61	2.84	3.28	3.40	3.58	3.64	3.84	3.50	3.46	3.16	3.26	3.62	3.73	4.17
2	2.02	2.74	2.10	1.75	1.93	1.88	2.08	1.67	1.89	2.18	2.17	2.30	2.39	2.70	2.23	2.53	1.90	1.89	2.23	2.45	3.35
3	3.63	5.25	4.41	2.83	2.13	2.29	2.52	2.00	2.08	4.18	4.24	4.41	2.47	2.83	2.29	2.31	2.27	2.28	4.43	3.95	5.01
4	2.58	4.51	3.06	2.11	1.92	1.93	2.14	1.71	1.82	3.05	3.18	3.26	2.30	3.04	2.36	2.44	2.03	2.05	3.29	3.22	4.49
5	1.96	2.60	2.06	1.65	1.84	1.98	2.04	1.70	1.97	2.27	2.29	3.12	3.62	4.27	3.69	3.34	3.52	3.01	3.10	3.69	4.29
ALL	2.64	3.94	3.02	2.22	2.15	2.19	2.38	1.93	2.10	2.98	3.06	3.24	2.74	3.21	2.67	2.74	2.39	2.38	3.25	3.28	4.20
1	1.15	1.02	1.15	1.23	1.32	1.33	1.30	1.35	1.35	1.10	1.11	1.11	1.33	1.20	1.31	1.26	1.32	1.37	1.11	1.14	0.99
2	0.76	0.70	0.69	0.79	0.90	0.86	0.87	0.86	0.90	0.73	0.71	0.71	0.87	0.84	0.84	0.92	0.80	0.79	0.69	0.75	0.80
3	1.38	1.33	1.46	1.28	0.99	1.05	1.06	1.03	0.99	1.40	1.39	1.36	0.90	0.88	0.86	0.84	0.95	0.96	1.36	1.21	1.19
4	0.98	1.14	1.01	0.95	0.89	0.88	0.90	0.88	0.86	1.02	1.04	1.00	0.84	0.95	0.88	0.89	0.85	0.86	1.01	0.98	1.07
5	0.74	0.66	0.68	0.74	0.86	0.90	0.86	0.88	0.94	0.76	0.75	0.96	1.32	1.33	1.38	1.22	1.47	1.26	0.96	1.12	1.02

Fig. 2 – Homogeneity between groups (rows) and Homogeneity between values (columns)

Having thus very succinctly defined the type of individuals inhabiting each cluster, we can go on to answer question 3, namely how M and F differ. To answer this, we can look up, for each gender, the distributions of the individuals in the five clusters (92 groups) and measure the distance between the female and the male distribution in each country. Fig. 3 shows the overall percentage (all countries) of men and women in the five clusters in both waves and the distance between the genders. It can be observed that for both waves, the first two clusters and the fifth mostly include M (e.g. the first cluster has 25.1% M and 19.3% F), while women are more frequent in cluster 4, *average* people, and also in cluster

3, *creative hedonists*. Cluster 5 contains few subjects and the numbers of M and F are similar. Although these percentages seem to partly contradict gender stereotypes (indeed, we initially ascribed a male stereotype to cluster 3 and a female one to cluster 2), they express the average of all countries, which have very different cultures and traditions. For the CII measure, we are interested in the distance between genders, which decreased slightly between wave 4 and wave 9 (from 0.1172 to 0.1079) and is mainly due to the higher numerotisity of cluster 4 (the contribution of this cluster to the overall distance is 35% in wave 4 and as much as 44% in wave 9).

	cluster					
	1	2	3	4	5	dist.
ALLF4	19.3	21.9	14.7	37.6	6.5	0.1172
ALLM4	25.1	27.3	9.7	30.8	7.1	
ALLF9	19.8	20.3	13.3	39.1	7.5	0.1079
ALLM9	25.1	25.2	9.7	32.0	8.0	
contrib dist w4	25%	21%	19%	35%	0%	
contrib dist w9	24%	20%	11%	44%	0%	

Fig. 3 – Percentage of M and F in the five clusters for each wave/gender group, distance between M and F for each wave, and contribution to the distance between clusters

The table in Fig. 4 shows the percentages of individuals in each of the five clusters for each wave/gender/country, and the distance between F and M in the same wave/country. The greatest “inter-gender” distance is found in FI (Finland) in wave 4 (distance 0.185) and the smallest in CY (Cyprus) in wave 4 (only 0.0552), where the distributions of M and F among the five clusters are very similar (F: 6%, 40%, 11%, 40%, 3%; M: 10%, 40%, 9%, 37%, 5%).

	cluster					
	1	**2**	**3**	**4**	**5**	**dist.**
BE4F	15	21	11	43	10	0.0990
BE4M	20	25	7	37	11	
BE9F	15	27	9	40	10	0.0906
BE9M	17	31	7	33	13	
BG4F	14	24	23	37	3	0.1308
BG4M	19	29	13	35	4	
BG9F	31	19	20	30	1	0.1423
BG9M	38	24	9	27	2	
CH4F	13	18	9	46	14	0.1617
CH4M	18	28	5	35	15	
CH9F	15	23	6	43	12	0.1336
CH9M	17	32	6	33	13	
CY4F	6	40	11	40	3	0.0552
CY4M	10	40	9	37	5	
CY9F	9	24	9	55	3	0.1543
CY9M	10	35	8	44	3	
CZ4F	28	21	21	29	2	0.1440
CZ4M	35	25	11	24	5	
CZ9F	29	27	11	31	2	0.1405
CZ9M	38	30	9	21	2	
DE4F	18	15	14	44	9	0.1288
DE4M	23	22	9	37	10	
DE9F	16	14	12	45	12	0.0983
DE9M	21	19	10	39	11	

	cluster					
	1	**2**	**3**	**4**	**5**	**dist.**
DK4F	24	18	10	34	14	0.0986
DK4M	29	23	9	28	12	
DK9F	16	26	10	35	14	0.0706
DK9M	22	25	8	32	12	
EE4F	23	17	21	33	6	0.1448
EE4M	34	16	12	31	8	
EE9F	23	10	20	41	6	0.1751
EE9M	34	15	12	31	7	
ES4F	7	26	20	43	4	0.1031
ES4M	11	30	14	38	6	
ES9F	9	24	16	45	6	0.0612
ES9M	13	26	13	42	6	
FI4F	19	15	20	37	10	0.1850
FI4M	31	20	13	26	10	
FI9F	14	18	15	40	13	0.1086
FI9M	22	20	13	34	12	
FR4F	30	9	14	37	10	0.1126
FR4M	34	15	11	29	10	
FR9F	23	13	15	41	8	0.1491
FR9M	31	15	11	30	13	
GB4F	25	20	14	34	7	0.0639
GB4M	25	25	11	32	8	
GB9F	21	18	15	38	7	0.0986
GB9M	25	22	12	31	10	

	cluster					
	1	**2**	**3**	**4**	**5**	**dist.**
HR4F	18	21	21	36	4	0.1118
HR4M	21	29	15	32	3	
HR9F	15	21	14	46	4	0.1251
HR9M	18	29	10	39	3	
HU4F	18	26	12	41	4	0.1268
HU4M	25	32	5	34	4	
HU9F	34	24	11	29	2	0.0902
HU9M	37	29	7	24	3	
IE4F	14	30	10	40	6	0.0567
IE4M	18	29	11	36	7	
IE9F	19	24	12	39	5	0.1108
IE9M	25	28	11	30	6	
LV4F	14	37	9	37	3	0.2141
LV4M	24	46	7	21	3	
LV9F	22	17	13	43	5	0.2067
LV9M	32	26	7	28	8	
NL4F	21	21	12	34	12	0.1042
NL4M	24	28	8	29	11	
NL9F	16	18	10	39	16	0.1119
NL9M	21	24	7	31	17	
NO4F	29	15	17	32	7	0.1133
NO4M	37	17	13	26	7	
NO9F	23	16	18	31	12	0.0549
NO9M	28	15	17	30	11	

	cluster					
	1	**2**	**3**	**4**	**5**	**dist.**
PL4F	12	24	17	45	2	0.1374
PL4M	19	30	9	38	4	
PL9F	19	17	20	41	3	0.1399
PL9M	28	22	13	36	2	
PT4F	40	13	14	30	2	0.1305
PT4M	42	22	5	27	4	
PT9F	33	12	11	34	9	0.1158
PT9M	36	20	7	29	8	
SE4F	32	13	11	32	12	0.1504
SE4M	41	15	11	21	11	
SE9F	25	11	13	35	15	0.1151
SE9M	31	17	12	28	13	
SI4F	11	36	8	40	6	0.1561
SI4M	18	43	4	28	6	
SI9F	5	37	6	48	4	0.1464
SI9M	6	48	2	39	5	
SK4F	12	24	21	42	1	0.2397
SK4M	18	40	11	28	2	
SK9F	22	26	18	30	3	0.1062
SK9M	31	27	14	26	3	

Fig. 4 – Percentage of M and F in the five clisters for the 92 wave/gender/country groups and distance between M and F in each wave/gender/country groups

Fig. 5 answers questions 4 and 5, i.e. how did CII vary among F and M within and between countries over time? It highlights the distance of each of the 92 groups of individuals (23 countries, two genders, two waves) from the corresponding four barycenters. For example, in Hungary, F and M moved considerably away from the barycentre[11].

For some nations, GB in particular, we see a constant closeness to the barycentre, while for others, especially Portugal PT, Cyprus CY and Slovenia SI, we detect a considerable distance of both genders from the barycenters in both waves. The complete information on distances between pairs of countries is given by a 92x92 matrix (available on request). Here we are limited to some details and special cases for reasons of space. The average distance of F from the barycentre goes

[11] For Hungarian F, the distance to the barycentre is 0.07 in wave 4 and 0.18 in wave 9, while for M it increases from 0.08 to 0.17.

from 0.1294 (wave 4) to 0.1209 (wave 9), and for M from 0.1278 to 0.1248. Confirming the greater centripetal tendency of F, we find that the average distance between the 23 groups of F decreased from 0.1843 to 0.1755, while that of M only decreased from 0.1833 to 0.1807. These empirical findings indicate that between 2008 and 2018, responses to the 21 questions on which our analysis focused become more homogeneous. They also indicate that this trend is more pronounced among F, who become more homogeneous than do M (in wave 4 they were less homogeneous). This seems to indicate a general "homogenization" of European culture[12].

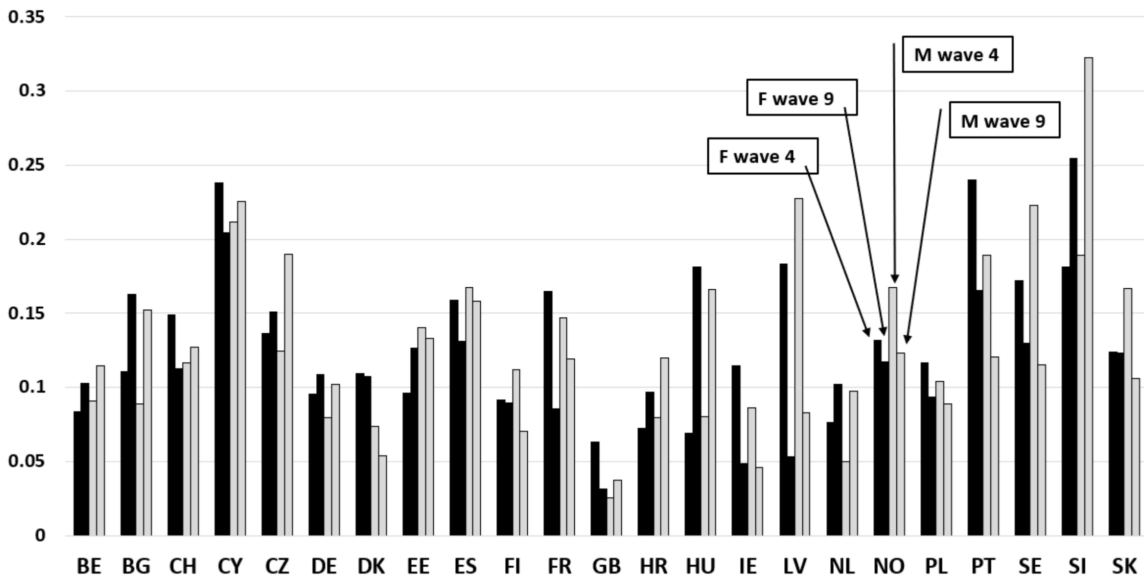

Fig. 5 – Variations in CII of F and M over time by country

[12] Scrolling through the distance matrix, one finds that the most distant F in wave 4 (0.4483) are in Cyprus and Portugal; in wave 9, the most distant F(0.4084) are in Portugal and Slovenia. The closest F in wave 4 are in Netherlands and Denmark, with a distance of only 0.049. In wave 9 this distance is still only 0.085, but the closest F are now in Switzerland and Belgium (0.057, down from 0.07). The most distant M are in Sweden and Cyprus (0.431 wave 4), and in Slovenia and Estonia (0.452 wave 9). The closest M are in EE and FR (0.026 in wave 4), and in SE and FR (0.032 wave 9). If we consider the closest and most distant pairs of countries by gender we observe that for F, the distance between FR and LV increased from 0.335 (wave 4) to 0.062 (wave 9) and the distance between LV and SI increased from 0.052 to 0.2696. For M, the distance between HR and BG increased from 0.043 to 0.237 and that between PT and LV decreased from 0.309 to 0.0697.

Fig. 6 answers question 6, namely whether CII shows a centripetal or centrifugal trend among F (or M) in European countries between 2008 and 2018. For example, it shows that the average distance of Belgian F from F of other countries in wave 9 increased by 0.019. In contrast, the distance of Belgian M from the barycentre increased by 0.023. Among F (and M) the prevalent trend is generally centripetal: the average distance between F (taking distances two by two) falls from 0.18433 to 0.17553 between wave 4 and wave 9; for M, it falls from 0.18335 to 0.18071. A similar result is obtained by observing the average distance of the 23 countries from the barycentre: for F, this distance drops from 0.12937 (wave 4) to 0.12085 (wave 9); for M it drops from 0.1278 to 0.1248.

Obviously, this centripetal trend does not apply to all countries. In other words, the second column is not always lower than the first for F or M (black F, grey M). To highlight these differences, we could simply report them on a diagram: when the difference is negative (distance wave 9 less than distance wave 4) we have a centripetal trend, whereas if the change in distance is positive we have a centrifugal trend (Fig. 6). In the case of HU, both genders move away from the barycentre; in the case of LV, both move towards the barycentre. Some geographical patterns emerge: centripetal trends mainly occur in Eastern European countries and the Balkans, whereas Nordic countries, such as Sweden, and southern European countries, such as Portugal, showed centrifugal trends. Some countries, notably Switzerland and Cyprus, show opposite trends for men and women.

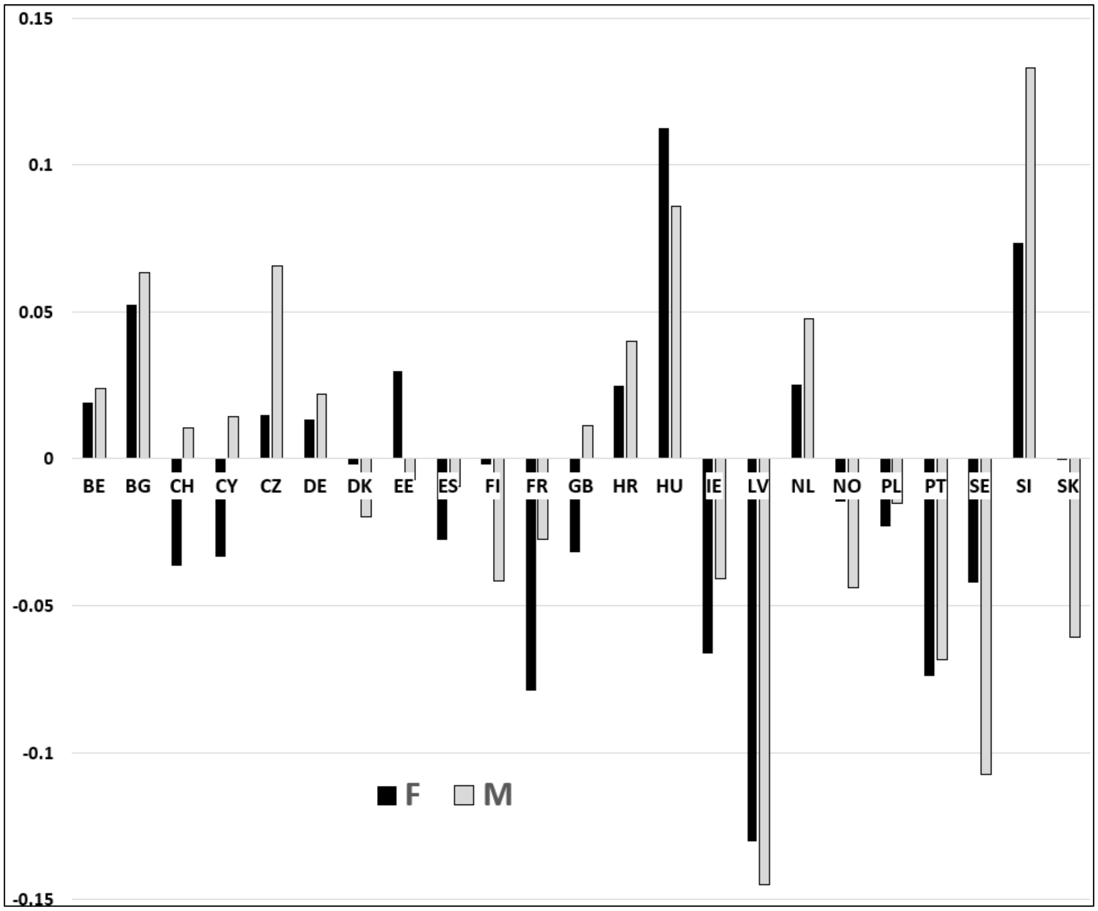

Fig. 6 – Centripetal or centrifugal trend of CII among women and men by country

Fig. 7 answers question 7 (How did CII vary between F and M in a given country over time?) and question 8 (How did the difference in CII between F and M vary from one country to another over time?). Are F and M moving closer to each other or further apart? Of course, this varies from country to country. In countries like CY, for example, it seems that F are moving significantly away from M: the distance practically triples (from 0.055 to 0.154). Conversely, in Slovakia (SK) the distance is 0.240 in wave 4 and 0.106 (less than half) in wave 9.

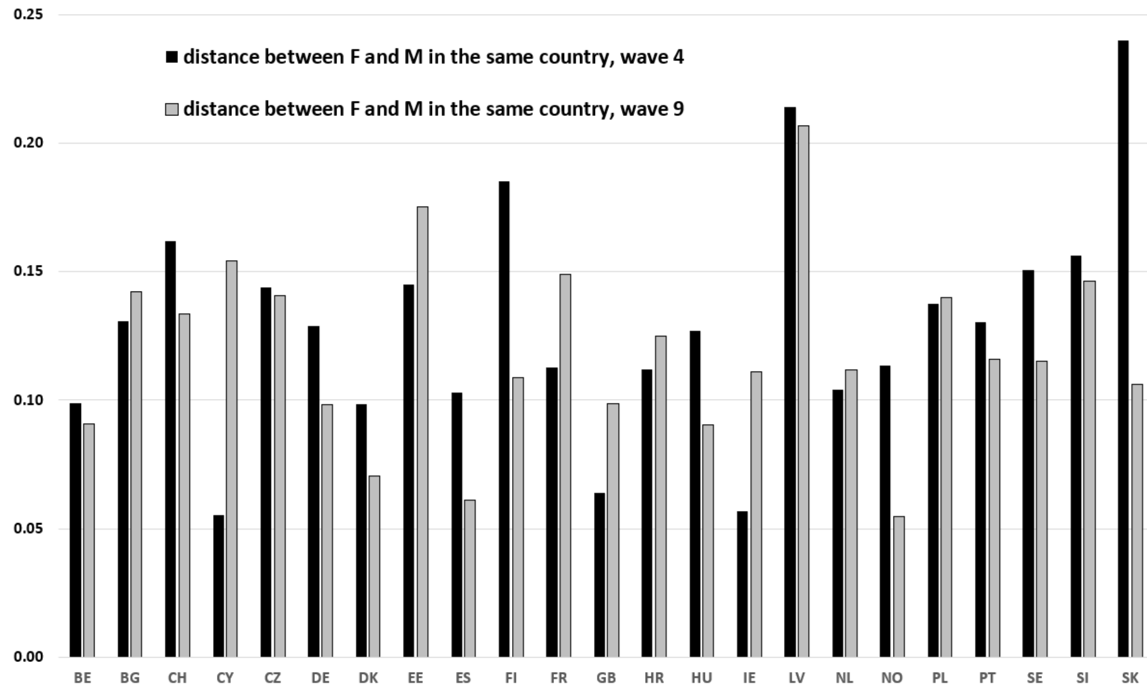

Fig. 7 – Distance between CII of F and M over time by country

Finally, question 9, namely whether we can identify the institutional spheres that most determine variations in CII between people of the same gender and wave in different countries, requires detailed comparative analysis. For example, among countries with the greatest gender distance, CY and PT show F and M distant from each other in both waves, though Cyprus recorded a very marked increase in distance in wave 9. To explain why, we again use the percentages of the five clusters in Fig. 4.

In Cyprus, the distribution in wave 4 is extremely similar for M and F. Clusters 2 and 4 contain large numbers of individuals: together they contain 80% of F and 77% of M in wave 4. Clusters 2 and 4 identify more conformist and conservative individuals: individuals who value the status quo. In the second wave we see a shift of F to cluster 4, while more M remain in cluster 2. In Portugal, cluster 1, *empathic environmentalists,* is the most numerous in wave 4 for both men and women and cluster 4 is the second most numerous. In Portugal, the main difference between the two genders is that cluster 2, *narrow minded,* is much more frequent for men than for women, and this happens both for wave 4 (13 F Vs 22 M) and 9 (12 F Vs 20 M). In the second wave, the distribution remains similar, with a reduction in cluster 1 for M and F and an increase in cluster 5. The result is that the distances are significantly different in both waves and for both genders, but the distribution in the clusters gives us different information.

	cluster					dist. F CY/PT
	1	**2**	**3**	**4**	**5**	wave 4
CY4F	6	40	11	40	3	0.4483
PT4F	40	13	14	30	2	

	cluster					dist. F CY/PT
	1	**2**	**3**	**4**	**5**	wave 9
CY9F	9	24	9	55	3	0.3434
PT9F	33	12	11	34	9	

	cluster					dist. M
	1	**2**	**3**	**4**	**5**	CY/PT wave
CY4M	10	40	9	37	5	0.3830
PT4M	42	22	5	27	4	

	cluster					dist. M
	1	**2**	**3**	**4**	**5**	CY/PT wave
CY9M	10	35	8	44	3	0.3345
PT9M	36	20	7	29	8	

Fig. 8 – Cyprus and Portugl: percentage distribution of the five clusters by wave and genders and distance between the two countries

4. Conclusions

We focused on intersectional inequality of a compound type that occurs when various dimensions (classes, gender identities, ethnicities, age, disability, marital status, culture, place of origin, citizenship and so on) interact dynamically, reinforcing each other across multiple social domains. In the *compound* case, women's inequality emerges not from simple addition, but from a combination of factors.

To measure this synergy, we used the *European Social Survey* datasets of 2008 and 2018. We selected a number of relevant dimensions with corresponding indicators (qualitative and quantitative) and formed female and male clusters with respect to each dimension, assuming that those in the same cluster were similar to each other. Finally, we calculated the distribution of women and men between clusters, assuming that more dissimilar distributions indicate greater gender inequality. This method enabled us to measure compound intersectional inequality in terms of gaps between genders across countries and across years for the selected dimensions, as well as to compare gaps in one dimension with those in the other dimensions.

Our results suggest narrowing trends in attitudes between countries and genders, although differences between countries, and trends we might call regional, remain. This centripetal trend suggests a general decrease in CII in the countries considered, as differences between women and men are less polarized. But it is important to consider the spheres in which it occurs: for women, there is convergence on average values. This is partly indicative of a more general awareness of gender questions, while reflecting a reluctance of women to expose themselves by voicing strong opinions. In some cases, the unification of attitudes and perceptions occurs around “conservative” values. Then there are striking cases of departure from the barycentre, as in the case of Hungary. In the ten years between the two surveys, the financial crisis of 2008-2009 and subsequent austerity policies caused significant changes in the political landscape, which certainly influenced the observed trends. While there is a more liberal "homogenizing" trend on important issues, such as the environment, there is also a leaning towards conformity and maintaining the status quo, if not a countervailing trend towards conservative values. Centrifugal tendencies and increasing gaps between men and women are certainly observed, and may indicate an exacerbation of CII. An analysis of more objective factors, such as income or job positions, may help paint a more complete picture of CII.

Concluding, the abundant literature has long discussed how gender is a result of social constructs, while more recent empirical literature spanning disciplines confirms how social and identity constructs determine most differences in behaviours and attitudes observed between genders. In this paper we used value attitudes to measure intra- and inter-gender differences, in an endeavour to estimate an intrinsic measure of compound intersectional inequality. The perception and attribution of value to certain phenomena and traits determines and reinforces inequality: if female qualities are constructed and represented as obedience, modesty and low risk-taking, it influences the responses we observe, as well as objective outcomes. It reduces women's propensity for risk-taking, negotiation, and so on, further reinforcing inequality, for example by reinforcing the gender pay-gap or the scarcity of women in STEM professions. Likewise, the construction of male qualities as a disinclination for empathy, caring and the like further reinforces gender inequality, for example burdening women with care work, which in turn affects their job success.

Our results illustrate two important facts: 1) men and women do not necessarily divide in line with social constructions and gender stereotypes; 2) the distance between women and men has generally decreased. These results suggest that on average, inequality is less entrenched in Europe and that it has lessened over time. The persistence of strong national diversities and centrifugal trends should not, however, be underestimated, especially in the light of the recent crises, which have demonstrated how readily social, economic and legal progress can be reversed.

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