# Symposium: Methodological Issues in Comparative Welfare State Research

# Regime-Based Analysis in Comparative Welfare State Research: Old and New Approaches

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For reasons that have been well-rehearsed elsewhere (e.g., Ragin 1987; Hall 2002; Shalev 2007), standard statistical methods are ill-suited to the tasks of characterizing and explaining cross-country diversity in systems of social protection. This paper draws on several recent strands of methodological innovation in comparative welfare state research and related fields, with a view to encouraging more self-conscious and systematic use of Esping-Andersen's welfare state regimes as an

alternative epistemological framework for explanatory comparative research. I discuss diverse methodological tools and approaches which can help harness the power of a regime-based approach in empirical analysis. I introduce some tools belonging to the statistical family known as multivariate analysis ("methods that simultaneously analyze multiple measurements on each individual or object under investigation"; Hair et al. 1995: 5). Some such tools (factor analysis and cluster analysis) are already staples of the field, but the paper also shows the potential usefulness of correspondence analysis, which has some similarities to factor analysis but rests on assumptions more congenial to comparativists. The biplot, a "perceptual map" that makes it possible to simultaneously visualize affinities between cases and their attributes, adds value to these techniques.

A "comparative regime analysis" (Ebbinghaus 2008) is one which self-consciously builds on the testable implications of insights offered by the literature on welfare state regimes. These insights may concern specific welfare state ideal-types or the regime system as a whole. As Esping-Andersen's (1990, 1999) foundational works illustrate, such an analysis may be quantitative or qualitative, exploratory or confirmatory. In weighing the empirical evidence, it may rely on the reasoning, expertise, and interpretive powers of the researcher, or on formal researcher-independent rules. The two most prominent formal methodologies in comparative welfare state research today, the regression family and the QCA (Qualitative Comparative Analysis) family, can both be utilized in regime-based research, but with limitations and without fully exploiting their core competencies. Comparative (often also historical) case studies, and the multivariate analysis family of quantitative techniques, are more naturally suited to the regime approach.

**Regime-Based Analysis**

Welfare state regimes can provide invaluable shortcuts for practitioners of comparative research. First, as distillations of the empirical record, ideal-typical regimes obviate the need for researchers to build up a comprehensive knowledge base from scratch, country by country. Second, and relatedly, the affinity between cases and types has already been documented in the welfare regime literature, aiding qualitative researchers to set manageable limits to the number of cases in their analysis, by purposively selecting those that exemplify regime differences. Third, and most importantly, regimes come pre-packaged with theoretical insights. Some of these concern the operating principles or "inner logic" of each regime, the glue that holds together multiple facets of policy and political economy. Others identify forces that are believed to account for regime differences. Still other insights are claims about the nature of regimes themselves—notably the argument that broad regime differences tend to be durable. No matter in what guise the theoretical claims of the regime literature appear, the key common denominator is that they may serve as a source of testable implications. If outcomes fit expectations, not only is Esping-Andersen vindicated, but even more important for the scholar in the trenches, she now has an empirically plausible explanation of cross-country heterogeneity. Yet, in keeping with the

assumptions of ideal-typical models, no one-to-one fit is demanded or expected. On the contrary, a regime-based analysis also invites both analysis of variation within regimes, and a focus on ambiguous or hybrid cases with affinities to more than one regime.

These empirical and theoretical assets furnished by the welfare regime literature have nourished three different types of comparative welfare state research that will now be introduced by example: systematic but non-formal case comparisons, formal quantitative analysis, and non-formal quantitative analysis. The last of these will provide our point of entry to multivariate methods. The fourth logical alternative, formal methods of comparing cases (QCA), is discussed in the concluding section.

### Regimes in Comparative-Historical Analysis

In his study of the causes and consequences of variation in early retirement policies in Europe, the U.S., and Japan, Ebbinghaus (2006) offers an illuminating illustration of the power of a regime-based approach in a close comparative study of the evolution of a particular policy area. The author's methodological self-awareness makes this a particularly valuable resource (see also Ebbinghaus 2008). While following in the footsteps of iconic practitioners of comparative-historical research like Moore and Skocpol, rather than inventing a typology from scratch, Ebbinghaus exploits the advantages of standing on the shoulders of existing scholars. Since the topic of early retirement is located at the intersection of welfare states with firms and industrial relations systems, he mobilizes the resources of regime typologies that have developed more or less independently in all three areas, using them to purposefully select a manageable sample of illustrative cases as well as to develop both ex ante hypotheses and ex post interpretive insights. In keeping with what Ragin (1987) famously described as casual complexity, Ebbinghaus finds that variation both between and within country clusters can only be explained configuratively—in this case, by interactions between the logics of national welfare states, varieties of capitalist production, and systems of social partnership.

### Regimes in Regression Analysis

With the proliferation of multi-country surveys based on standardized questionnaires, many researchers have adopted multi-level (hierarchical) models for simultaneously analyzing individual and country-level data. In this way, the membership of countries in welfare regimes can be integrated into conventional regression analysis of individual-level variables. Studies of this type seek to evaluate the impact of social policy regimes on key variables in welfare state research, most notably raising the methodological bar in studies of the determinants of public opinion towards inequality and redistribution (compare Svallfors 1997 with Jaeger 2006, 2009). Often the aim is to establish the net importance of regime effects, controlling for the variation between countries in population composition captured by demographic variables at the individual level. Some researchers also control for rival country-level explanations of cross-national variation. Arts and Gelissen (2001) offer a

classic illustration of this approach. They show that even after taking account of a diverse range of individual differences, the way that people rank three different principles of social justice varies systematically across welfare regimes.

Using the same basic design, Chung and Muntaner (2007) and Eikemo et al. (2008) illustrate a mushrooming research effort underway outside of the field of social policy, which is aimed at grading the performance of different welfare regimes on health and mortality indicators. In this sort of approach, regimes serve as a rather blunt instrument unless researchers take steps to pin down causality, either by incorporating causal mechanisms on the right-hand side of the equation, or developing sufficiently subtle outcome measures on the left-hand side (cf. Hurrelmann et al. 2011). Another way of tapping the power of multilevel models is by investigating cross-level interactions, which ask how regime membership affects relationships between micro-level variables. For example, a recent study by Mandel (2010) uses standard wage equations at Level 1 to isolate the effect of gender on an individual's location in his or her national wage hierarchy. The second level of the model makes it possible to show how the net gender gap depends on the welfare regime in which an individual is located. Then, in an attempt to tease out the causal mechanisms underlying such regime effects, policy indicators replace regime categories at Level 2 of the model.

This is a powerful approach with considerable potential, but several cautions are in order. First, the statistical power of the multi-level design is questionable in macro-micro comparative research. The number of countries analyzed at Level 2 (21 in Mandel's case) is infinitesimal compared to the Level-1 samples furnished by survey programs like the ISSP or ESS. As Snijders has noted, "sample size at the highest level is the main limiting characteristic of the [multi-level] design," and this problem is especially acute when testing for cross-level interactions (Snijders 2005: 1570).

Two other issues that deserve attention concern the fit between the analytical procedures invited by a multi-level regression model and the premises of welfare regime theory. First, as configurations of multiple attributes, regimes rest on the assumption that the meaning of any one policy depends on the overall policy configuration in which it is embedded. For instance, the corrosive effects of extended paid leave for women following childbirth on their future employment and earnings are likely to be far more severe in conservative than social-democratic welfare states. The reason is that the former are far more likely to offer incentives for fathers as well as mothers to take paternal leave, and to make subsidized public childcare and other incentives available to mothers who return to the labor force after a period of withdrawal. Consequently, unpacking regimes into discrete policies and modeling these policies as explanatory variables could actually end up sabotaging researchers' ability to identify the causal mechanisms responsible for regime effects.[1]

Another potential tension between the regime approach and multi-level modeling concerns the manner in which countries are assigned to regimes. Allocating each country to only one regime in which it has full membership is at odds with the

analytical status of ideal-types as condensations and caricatures of observable phenomena. When no uncertainty is permitted regarding country assignments this results not only in measurement error, but also in researchers forfeiting the leverage built into mixed and ambiguous cases. In welfare regime theory, such cases embody the interplay of contradictory political forces (cf. Esping-Andersen and Korpi 1984). They are even more central to Varieties of Capitalism theory, which argues that weak institutional coherence impairs the economic performance of hybrid cases.

Regimes in Non-Formal Quantitative Analysis

Informed by these limitations of multi-level modeling, another comparative study of welfare state effects on the gender wage gap (Mandel and Shalev 2009) also relies on quantitative analysis of micro-data to assess the evidence for predictions based on prior theoretical and empirical knowledge of welfare state regimes—but without attempting to link cause and effect in a formal statistical model. As I suggested earlier, the potential power of such an approach depends on the researcher's ability to identify specific testable implications of regime ideal-types, and to develop equally targeted outcome measures, so that observed linkages between hypotheses and outcomes can be plausibly interpreted as causal effects.

Mandel and Shalev's core argument is that previous research on gender wage gaps confounded the effects of class and gender inequality. They undertake to differentiate between these effects, at the hypothesis-building stage by exploiting the rich prior literature on social policy and family policy and their effects, and at the hypothesis-testing stage by decomposing the gender gap into class-inequality and gender-inequality components. Drawing primarily on Esping-Andersen's work, the authors lay the ground for their empirical analysis by demonstrating that three key indicators of the role of the state in class and gender inequality appear to confirm the existence of distinct clusters of countries (with the exception of one or two mixed cases). Finally, heuristic methods (scatterplots and a simple simulation) are employed to demonstrate the interplay between regime membership and the decomposed indicators of class and gender inequalities. Although the authors offer their own account of the consistency of this evidence with their theoretical expectations, and carry out a formal test of one potentially confounding influence (women's selectivity into employment), it is ultimately up to the reader to make his or her own judgment regarding the convincingness of the exercise.

**Multivariate Statistical Methods**

As made explicit in the last of the three studies reviewed above, it is a precondition for regime-based analysis that researchers have good reason to believe that policies actually do congeal into the distinct bundles posited by welfare regimes (and/or other regime types). These empirical configurations then play an essential role in determining the regime membership of country cases. In the wake of both the extensive reliance on Esping-Andersen's regimes in welfare state research and the controversy they have generated, these tasks

have turned into a lively research industry with a life of its own. I make no attempt to review this literature here.[2] Instead I will focus on studies that have employed several related methods—factor analysis (FA), principal component analysis (PCA), and multiple correspondence analysis (MCA).

<u>Factor Analysis and Multiple Correspondence Analysis</u>

In earlier work (Shalev 1996, 2007), I argued that factor analysis is particularly appropriate for accomplishing the twin tasks of identifying welfare state regimes and assigning countries to them, because it directly addresses Esping-Andersen's core theoretical claim that two dimensions of variation drive observed differences in national welfare states. These two dimensions represent the polarity tension between socialism and economic liberalism, and the particular brand of conservatism that developed in Continental Europe. Practically speaking, I suggested that far from being daunted by the perennial problem of "too many variables," data reduction techniques like FA put them to good use.

A landmark study by Hall and Gingerich (2009) followed a similar approach. Theoretically, they posited the existence of two latent continua representing the two spheres of the political economy (corporate governance and labor relations) which Hall and Soskice (2001) maintain are the sites of the most important institutional complementarities. Graphically arraying the two sets of factor scores, as I did, led them to argue that the twofold typology is broadly justified. In a further step, Hall and Gingerich utilized variable-oriented methods to garner empirical support for a number of testable implications of these twin complementarities.

Other studies following the same strategy have utilized PCA (e.g., Tepe, Gottschall, and Kittel (2010), which tends to yield similar results to FA although it rests on somewhat different theoretical foundations and uses different measures of association. Analyses based on these methods suffer from two significant limitations. First, users of FA typically gear their use of it to the goal of identifying clearly separated dimensions (e.g., by "rotating" factors to enhance "orthogonality," absence of correlation, between them). This requires making strong theoretical assumptions about regime separation, similar to my reading of Esping-Andersen as claiming that conservatism is equally alien to both the liberal and social-democratic regimes. In fact, however, we know for instance that for different reasons conservatism resembles liberalism in its distaste for public service provision, and social democracy in its aversion to inequality. Secondly, the statistical assumptions made by FA and PCA are highly constraining.

Indicators must be measured on a continuous scale and are assumed to be normally distributed, and the relationships between them are expected to be linear. Moreover, to obtain reasonable levels of uncertainty, the number of cases ought to vastly exceed the number of variables, bringing the "medium-N" problem painfully back in.

Nonlinear versions of PCA, of which the best-known is Multiple Correspondence Analysis, make it possible to escape these constraints.[3] MCA generates a "map" based on the correspondence between the rows and columns of a cross-tabulation.[4] While designed, like PCA, to reduce variance in the data to two or more underlying dimensions, its internals are different. First, as a nonparametric technique, MCA makes no assumptions about the distribution of indicators or their associations. Second, indicators are categorical rather than continuous. If our original attribute measures are continuous variables they will be segmented into categories, making it easier to identify discontinuous effects. Technically, instead of a correlation matrix, which is the input to PCA, the raw material of MCA is a matrix of chi-squared distances between the categories of all attribute variables. MCA is known to many social scientists because of the "map" presented in Bourdieu's 1976 classic *La Distinction* visualizing empirical linkages found in survey data between individuals' tastes in food, music, etc. and their membership in specific social classes. The foundational text in English is Greenacre (1984).

The earliest application of this approach to regime-based welfare state research is a study by Wildeboer Schut and colleagues (2001) using nonlinear PCA, a technique similar (and sometimes identical) to MCA. Using a database comprising 58 different indicators for 11 countries, the study showed that the Netherlands was a hybrid case which uniquely failed to coalesce into any of the standard three welfare regimes because it shares features with two of them. More recently, an ongoing study by Ferragina, Seelib-Kaiser and Tomlinson (2011) uses MCA to test the applicability of Esping-Andersen's regime clusters over time and across different policy areas.[5]

As in the case of my reanalysis of Esping-Andersen's data using FA, nonlinear PCA and MCA provide measures (comparable to factor loadings and scores) that can be presented in two-dimensional charts, showing affinities between countries or indicators. Relying solely on the country view, Ferragina et al. test the stability of welfare regimes by comparing the clusters which emerge when selected regime indicators are measured at three different points in time. This approach has the benefit of generating strikingly clear findings. However, it misses the opportunity to exploit a method of visualization, known as the biplot, which presents both case and attribute affinities in a joint two-dimensional space.

<u>The Biplot</u>

The biplot is a tool which has been reinvented several times. The "bi" in biplot refers to the juxtaposition of proximities between indicators and attributes. Biplots can be constructed for all variants of multivariate analysis, irrespective of differences in scale of measurement, distributional assumptions, and method of calculating prxomities (Gower, Gardner-Lubbe, and Le Roux 2011; Greenacre 2010). The term biplot was originally used by Gabriel (1971) in the context of visualizing the results of PCA. In this context arrows are used to "project" the direction and strength of correlations between indicators, and cases are superimposed in locations that maximally reproduce their profiles on the set of measured indicators. In MCA, where indicators are measured categorically rather than continuously, each category is displayed as a separate point on the so-called "correspondence map."

Because successful biplots are uniquely able to portray

**Figure 1: PCA Biplot of Esping-Andersen (1990) Dataset**



Dim. 2: Corporativism (24%)

Dim. 1: Institutionalism (35%)
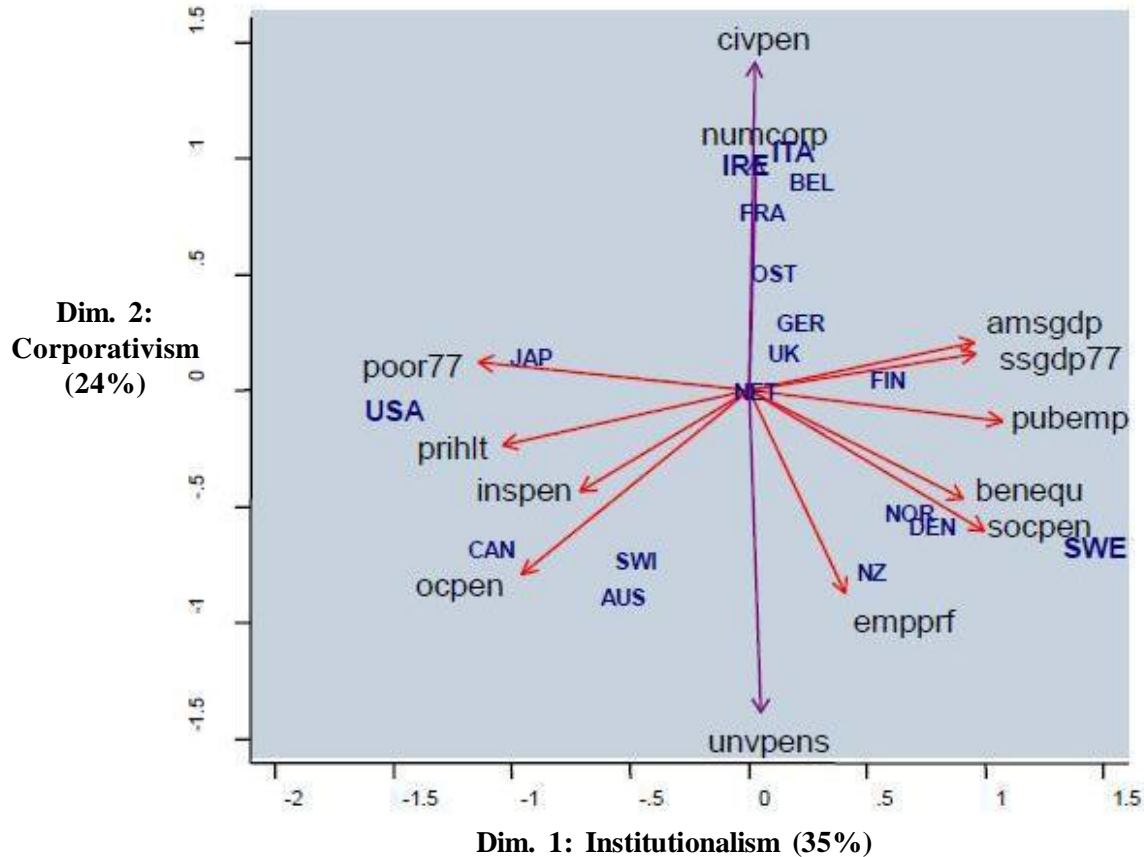
*affinities between countries and indicators*, they can be distinctly useful in regime-based research for clarifying which indicators and countries are most germane to clusters, and assisting researchers to both identify and interpret ambiguous cases. For illustrative purposes, I have carried out both a PCA and an MCA of the same 13 indicators for 18 countries analyzed earlier using factor analysis. Because the resulting biplots summarize a great deal of information, technical aids like high-resolution color graphics and animation, and the ability to refer back to the underlying data, are almost essential. Consequently, in addition to the inclusion of a PCA biplot as Figure 1 of this article, a web appendix is provided[6] which includes the dataset, the separate plots of factor loadings and scores published in Shalev (2007), and both the PCA and MCA biplots to which I shall now refer.

Comparing the two biplots, it is striking that even though MCA does not make the same stringent assumptions as PCA concerning the measurement and distribution of indicators or the form of their relationship, and does not require any excess of cases to indicators, overall the results obtained when applying both methods to the original *Three Worlds* dataset are very similar. The same three country clusters are found, according well with Esping-Andersen's own assignments. The same three ambiguous cases are evident (UK, Netherlands, and Finland). In addition, Australia is aligned with the Liberal countries and New Zealand is close to the Social Democracies—probably due to the absence of indicators of what Castles (1985) called "social protection by other means" (home owner-

ship and protectionism). The only noteworthy difference between the two biplots in the location of countries concerns the Conservative cluster, which is more cohesive in the PCA version. In addition, in the PCA results Belgium is located within the core group while Germany drifts towards the ambiguous cases, but the reverse occurs using MCA.

To interpret the vectors (arrows) in the PCA biplot, note that correlations between indicators are represented by the angles between the vectors: Right angles indicate lack of correlation, closely aligned vectors are highly positively correlated, and widely separate vectors (at the maximum, 180 degrees) are strongly negatively correlated. In addition, the longer the vector, the more reliable its correlation. Not surprisingly, the strongest correlation in this biplot is between two long and tightly connected vectors, for *civpen* (the share of pension spending on civil servants) and *unvpens* (the pension universalism), $r = -.81$. Note also that for a given case (country), its score on any indicator is ideally perpendicular to that indicator's vector. For instance, the three highest values of *numcorp* (number of separate pension plans) are for Italy, France, and Japan.

Once one becomes accustomed to its geometry, the PCA biplot is easier to interpret because it is more parsimonious. However, only MCA can identify potential nonlinearities. To capitalize on this, all of Esping-Andersen's original measures were split into three equal categories (tertiles). Substantively, the greater detail furnished by the MCA yielded two specific benefits. First, having an intermediate category on the map

makes for an intuitive way of distinguishing between two types of regime distinctions: when attributes separate one regime from both of the others (e.g., the magnitude of civil service pensions), and when attributes carry a different weight in each regime (e.g., "poor relief"). Second, and more important, while the PCA biplot offers scant indications of what accounts for the neutral positioning of the ambiguous cases, the MCA version points to some distinctive features of two of them. For example, the UK is characterized by medium and the Netherlands by high levels of spending on social security and active manpower policies, and Britain also stands out for the limited role of private health plans. The odd placement of the Finnish case reflects the hybrid character of its welfare state at the time —markedly conservative in pension fragmentation but highly social-democratic in other respects.

The lesson is that it is not always possible to squeeze all of the relevant information into a two-dimensional chart, and it is always advisable to return to the original data in order to verify that the spatial location of indicators and cases has not been misrepresented due to conflicting demands. In my view, this combination of formal (rule-based) manipulations, the parsimony afforded by data reduction and visualization, and the ability and indeed necessity of weaving back and forth between summary representations and raw data offers an attractive balance between "black box" techniques and "getting down and dirty" with data.

### Conclusion

This paper has sought to clarify both the shared and different features of different strategies belonging to a single family of regime-based approaches to comparative welfare state research. It has also demonstrated that there is a wide range of analytical techniques, many of which cross-cut traditional methodological divides, which can be mobilized in the service of regime-based comparisons. To some extent the choice of strategies and techniques is a matter of researcher expertise and preferences, but notice also that due to the tradeoffs that often characterize these choices, researchers can profit from being methodologically ecumenical.

Space limitations prevent me from addressing two lacunae. First, I have not attended here to the vibrant methodological toolkit developed by Charles Ragin to approximate qualitative, case-oriented methods of comparative analysis. These methods have traditionally been used to identify the types of elective affinities summarized by welfare regimes directly from the data. However, Kvist (2007) has argued that FSA can be equally well applied as an aid to developing and testing ideal-types of policy configurations. This method has since been adopted in several studies that sought to establish whether productivist or "workfare" policies conform with or contradict Esping-Andersen's typology (Vis 2010; Hudson and Kühner 2009). While Hudson and Kühner (2010) have recently suggested that multivariate methods do a far inferior job of this than Kvist's variant of fs/QCA, I believe that the matter hinges more on different interpretations of what ideal-types are and how they are connected to comparative analysis in regime-based research.

A second and more direct challenge to my suggestion to harness multi-variate methods in the service of regime-oriented research is a recent methodological critique by Ahlquist and Breunig (2009) of work on Varieties of Capitalism and welfare regimes, accusing researchers of "reifying" these typologies. Using model-based clustering, these authors are unable to replicate previous findings, which it is claimed rest on the use of inadequate techniques that are merely "exploratory" (Ahlquist and Breunig forthcoming: 25–26). This critique should be constructively turned around, to encourage researchers to substitute the probabilistic measures generated by the techniques favored by these critics for absolute assignments of countries to regimes. At the same time, in practical applications these methods are far more ambiguous and dependent on researcher judgment than Ahlquist and Breunig admit. While the aspiration of reaching more precise and less arbitrary truth claims is always welcome, and methodological creativity based on borrowing advances made in other fields clearly has the potential to contribute to that goal, we should not forget that social scientists are for the most part limited to the (honorable) task of generating *plausible accounts* of what goes on around us.

### Notes

[1] In theory, interdependencies between different state interventions could be handled by including conditional relationships (interactions) in the model. Unfortunately, severe degrees-of-freedom constraints rule out this possibility.

[2] For an up-to-date review of the methods used by previous researchers for validating and operationalizing the three worlds, see Ferragina, Seeleib-Kaiser, and Tomlinson (2011).

[3] For useful integrative treatments of the linear and nonlinear variants of PCA, see Meulman et al. (2004).

[4] The adjective "multiple" signals that more than two variables are included in the cross-tabulation.

[5] For an insightful application of both PCA and MCA in relation to questions raised by the Varieties of Capitalism typology, see Tepe et al. (2010).

[6] http://pluto.huji.ac.il/~mshalev/Shalev_web_appendix.pdf

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