

## Fuzzy set ideal type analysis

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### Abstract

This article advances a new method for studying cases, fuzzy set ideal type analysis, which is a framework that allows a precise operationalization of theoretical concepts, the configuration of concepts into ideal types, and the categorisation of cases. In a Weberian sense, ideal types are analytical constructs for use as yardsticks for measuring the similarity and difference between concrete phenomena. Ideal type analysis involves differentiation of both categories and degrees of membership in such categories. In social science jargon, this analysis involves the evaluation of qualitative and quantitative differences or, in brief, of diversity. Fuzzy set theory provides a calculus of compatibility. Fuzzy set theory can measure and compute theoretical concepts and analytical constructs in a manner that remains true to their formulation and meaning. This article sets out elements and principles of fuzzy set theory relevant for ideal type analysis and demonstrates their usefulness in an example drawn from comparative welfare state research on the conformity of changing unemployment policies to predefined ideal typical models.

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### 1. Introduction

Is the glass half empty? Is it more empty than full? Such questions are often linked to judgments that concern qualitative states and changes in degree and kind. Abounding in comparative case studies, such judgments bring forward issues of how best to conceptualize and measure. In comparative studies of the welfare state, for example, they prompt reflections on what constitutes the welfare state, how to operationalize it and how to measure change over time and space.

Comparative welfare state research has made significant progress in the theoretical understanding of the welfare state itself, not least due to a dialogue between qualitatively and quantitatively oriented studies. Since 1990, when Gøsta Esping-Andersen published *Three Worlds of Welfare Capitalism*, a common starting point has been the distinction between different types of welfare state regimes: identifying a liberal, conservative and a social democratic welfare state regime. In short, diversity – of similarities and differences – characterizes different welfare states.

Comparative research, however, has made much less progress in the measurement of welfare state and welfare state change. A lack of consensus about how to measure either is the main reason that scholars disagree on the direction and magnitude of recent change in social policy, that is whether reforms amount to fundamental or marginal change.

Of course, neglecting issues of measurement is not unique to comparative welfare state research. In a review of macro-level comparative studies, [Bollen et al. \(1993\)](#) found that although researchers acknowledge problems of measurement, they largely ignore their consequences. Yet the small number of countries (the small N-problem) means that researchers are often unable to apply statistical tests of data validity and robustness, researchers have a particular need to reflect on and tackle measurement problems in alternative ways. Otherwise, they run the risk of making (false) heroic conclusions on small N ([Lieberson, 1991](#)).

Given the connection between theory and data, a relationship also known as measurement validity ([Adcock and Collier, 2001](#)), the subsequent discussion could apply to a large number of substantive areas. For illustrative purposes the focus of this article is on problems of measurement in comparative welfare state studies. The key question is whether measurement meaningfully captures the ideas contained in concepts and ideal types.

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This article offers an innovative approach to measurement by using fuzzy sets and axioms in fuzzy set theory. The aim is to advance the application of fuzzy set theory as a new method for conceptualization and measurement (see Ragin, 2000, for a broad introduction to fuzzy set social science). The fuzzy set approach is particularly useful for assessing diversity and change across a limited set of cases, and it can overcome some of the problems typically related to the measuring of validity and precision. In other words, using fuzzy sets helps to assess whether the glass is half full or half empty, or how, if at all, the welfare state is retrenched or restructured.

Introducing the issue and focusing on key theoretical concepts, the subsequent section concentrates on welfare state diversity. The following sections argue that cases and ideal types are viewable as configurations of concepts and discuss the conceiving and operationalization of concepts as fuzzy sets. Finally, the article demonstrates how to formally examine concepts and ideal types with fuzzy set theory.

## 2. Welfare state diversity and social citizenship

One set of burning questions in comparative welfare state research concerns whether the welfare state is undergoing retrenchment or restructuring or whether it is resilient to change. Before 1990 distinguishing between residual and institutional welfare states was common (Titmuss, 1958; Wilensky and Lebeaux, 1958; Alber, 1998), locating real welfare states on a continuum stretching from a residual welfare state at one end to an institutional welfare state at the other (Fig. 1).

According to the dominant thinking for the last thirty years, cash transfers in the institutional welfare state were typically universal and generous, whereas benefits in the residual welfare states guaranteed a minimum and went to the deserving poor. Welfare states, therefore, were perceived as moving only in two directions: either expanding to become more institutional, or retrenching and becoming more residual.

Such views consider historical trajectories of welfare states as initially going through a phase of expansion, eventually reaching either a point of maturity (Flora, 1987) or a turning point leading to retrenchment (Mishra, 1990) from the mid-1980s onwards. Esping-Andersen (1990) who advances the idea that welfare states come in three types, not two, did not alter the notion of welfare states moving either in an institutional or a residual direction. Indeed, Pierson's (1994) influential text on change and politics of the welfare state mainly adds a point of no return, that is, welfare states' resilience to change.

However, since the mid-1990s a growing number of scholars have argued that we are witnessing changes that unilinear, one-dimensional conceptions of more, the same or less welfare state cannot capture. Revisiting *Three Worlds of Welfare Capitalism*, researchers pointed out that welfare state ideal types reflect different political ideological notions of social citizenship as constituted by social rights and obligations (Marshall, 1950)



Fig. 1. The dichotomy of residual and institutional welfare states.

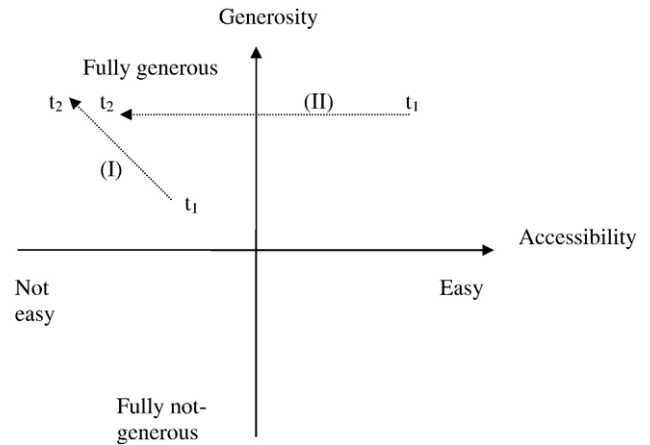


Fig. 2. Accessibility and generosity of social rights.

that, in turn, manifest in specific configurations of benefit characteristics, such as generosity and eligibility.

Fig. 2 presents an illustration. The liberal welfare state model depicts an ideal type where benefits are meager and targeted at the needy, positioned in the lower left hand quadrant of Fig. 2. While generous, benefits in the conservative model are selective, favouring labor market insiders, thus placing its ideal typical position in the upper left hand quadrant. The ideal typical social democratic welfare state model appears in the upper right-hand quadrant, granting both universal and generous benefits. Finally, the combination of easily accessible but not-generous benefits (lower right-hand quadrant — and not caught by Esping-Andersen's trilogy) — perhaps best fits the description of the Beveridgean, the lib-lab model (Room, 1979), or, simply, the labour model.

Methodologically, Fig. 2 describes welfare state diversity on a lower level of abstraction that is that of social rights. Following Robert Adcock and David Collier (2001), the welfare state is regarded as a “background concept” with broad constellations of meanings and understandings, whereas social citizenship is a “systematized concept” that entails a specific formulation. Depending on particular research interests, researchers could use systematized concepts other than “social citizenship” to inform the study of the welfare state. For example, “social citizenship” or “social rights” are theoretical concepts relating to the output, or policy, side of the welfare state, more outcome-oriented research might opt for concepts such as autonomy or equality, and more input-oriented studies might make use of concepts such as welfare effort or popular support.

The use of social rights as a systematized concept allows for the identification of different combinations of less, the same or more of the two constitutive dimensions of social rights, accessibility, and generosity. In turn, this identification facilitates the investigation of multi-dimensional change, a process described as “restructuring.” For example, if the generosity of a particular benefit (I) improves between one point in time ( $t_1$ ) and another ( $t_2$ ) while it simultaneously becomes more difficult to access (see Fig. 2). One could argue that the direction of change is towards a conservative welfare state model. The same may also be

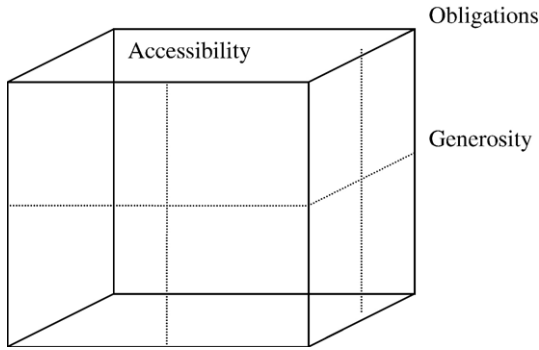


Fig. 3. Analytical property space for social citizenship.

true in instances where one dimension remains stable and the other dimension enhances a trait that is characteristic of the conservative welfare state model (see II in Fig. 2).

Whether the observed alteration amounts to a qualitative change depends on the start and end points of the benefit trajectory. For example, in Fig. 2, benefit I is subject to a change in degree, not in kind or type. Put differently, change here means that I has moved closer to the ideal type of the conservative welfare state model. The closer to the corner, the more the benefit reflects the ideal type. The change within benefit I illustrates a situation in which it belongs more strongly to the ideal type of the conservative welfare state regime at  $t_2$  than at  $t_1$ . The change, therefore, is quantitative.

Benefit II is subject to both quantitative and qualitative change. The quantitative change implies that benefit II is becoming much less accessible. Moreover, as Fig. 2 shows, benefit II is in the upper right-hand quadrant at  $t_1$  and in the upper left hand quadrant at  $t_2$ . This shifting of corners reflects a qualitative change. The example demonstrates how benefit II moves from belonging to a social democratic welfare state model to belonging to that of a conservative welfare state model.

Starting points also matter for the assessment of change. Although one might view the change in benefit II as stronger, and of a more qualitative nature, than the change in benefit I, Fig. 2 still shows that benefit I, rather than benefit II, is closer to the ideal typical corner that symbolizes the conservative welfare state model.

### 3. Configurations of concepts

Social citizenship comprises both rights and obligations, and so far we have only set out two dimensions of the rights. Looking only at rights and neglecting obligations is in line with most conventional analyses of social citizenship. Twenty years ago, researchers and politicians might have been able to justify this neglect in theory and political practice, but they no longer can. With the general shift in welfare policies towards more active, employment-centered objectives, an increasing emphasis on individual obligations, both before and during the receipt of benefits, is taking place.

Therefore, in Fig. 3, a third dimension joins the core analytical concept here. The further a benefit is situated towards

Table 1  
Truth table of social citizenship

Model	Accessibility	Generosity	Obligations
New social democratic	+	+	+
Old social democratic	+	+	-
New labour	+	-	+
Old labour	+	-	-
New conservative	-	+	+
Old conservative	-	+	-
New liberal	-	-	+
Old liberal	-	-	-

the back of this cube, the stronger the attached obligations and vice versa. As a consequence of adding obligations as a third dimension, four new ideal types emerge. These are “new” in contrast to the original four “old” ideal types. For example, the “old social democratic” welfare state regime is in the upper front right-hand quadrant, while the “new social democratic” welfare state regime, with a stronger emphasis on individual obligations, is closer to the upper back right-hand corner (see Fig. 3).

In a Weberian sense, the corners of the cube constitute eight ideal types and thus, as yardsticks, measure how close or distant any given empirical phenomena – cases – are to these ideal types and to each other (Kvist, 1999). In the analysis here, the relevant measurement is the extent to which national welfare states conform to the various ideal typical welfare state regimes, and to what extent national welfare states are moving closer to each other, a process also called convergence, or away from each other, divergence.

The use of a truth table (Lazarsfeld, 1937) is another way of illustrating this diversity and these analytical constructs. Truth tables, display the combinations that are possible. Table 1 shows this method for models of social citizenship, arising from simple yes-or-no dichotomies.

Alternatively, a simple eight-cell table might be useful (see Table 2). As Becker (1998) emphasises, such a table offers the researcher the possibility of adding a fourth variable by inserting the value into each cell. From the vantage point of concepts and ideal type analysis, however, the eight-cell table shares with truth tables the disadvantage of requiring aspects to be dichotomies.

Here the interest is in substantive issues that dichotomies do not capture sufficiently, such as “yes” or “no.” Such an approach does not allow the assessment of changes, both small and large, in relation to one another and to some analytical constructs. But how can we construct and measure the conformity of cases to ideal types and to each other? The remainder of this article discusses the ways in which fuzzy set theory provides innovative and powerful answers to this question.

Table 2  
Eight-cell table of social citizenship

	Accessible		Not accessible	
	Generous	Not generous	Generous	Not generous
Obligations				
No obligations				

#### 4. Constructing fuzzy sets on concepts

Fuzzy sets are not fuzzy in the sense of being imprecise or ambiguous. On the contrary, fuzzy sets need designing to accurately reflect theoretical concepts and analytical constructs that have precise meaning to those researchers using them.

Fuzzy sets provide a way of operationalizing a concept into the 0-to-1 metric, from being “fully out” to “fully in” a set. This operationalization requires drawing a demarcation line between “A” and “not-A.” In the analysis here, operationalizing implies the construction of sets that reflect accessibility, generosity, and obligations. These, in turn, will – in different configurations – constitute different ideal types of welfare states.

Researchers draw lines on the basis of substantive and theoretical knowledge. By having to draw a line or curve reflecting the particular concept under consideration, the researcher centers his or her focus on the concept rather than on the variables themselves. Focusing on the concept moves the analysis closer to the theoretical body that deals with concepts in the first place. A reference to “generous benefits” is more informative than speaking of “benefits with a net replacement rate above  $X$  percentage.” Using this term also helps to minimize measurement bias, that is, the gap between theory and reality.

While “fully generous” and “fully not-generous” equal extremes, many intermediary concepts link these two categories. Depending on the substance of the concept and the raw material, various fuzzy category intervals may be useful (see [Ragin, 2000](#)). Following is the application of a nine-value fuzzy set, where continuous fuzzy scores between 0 (fully out) and 1 (fully in) indicate partial membership in this way:

- score of 1 is fully in
- scores from 0.83 to 0.99 is almost fully in
- 0.67 to 0.82 is fairly in
- 0.51 to 0.66 is more or less in
- 0.5 is the cross-over point where the case is neither more in nor more out
- 0.33 to 0.49 is more or less out
- 0.17 to 0.32 is fairly out
- to 0.16 is almost fully out
- 0 is fully out.

Using this nine-value fuzzy set throughout the article helps translate interval fuzzy membership scores into verbal concepts or *verbal qualifiers*. For example, if a benefit has a fuzzy score of 0.75 the score represents a “fairly generous” benefit, and a fuzzy score of 0.60 translates to a “more or less generous” benefit.

Constructing fuzzy steps involves two steps: first, establishing empirical indicators for the fuzzy set and, second, calibrating the fuzzy set. The following two sections elaborate on these steps.

#### 5. Empirical indicators

Reducing the gap between theory and reality calls for empirical indicators that reflect the chosen concepts as closely as possible. Theories and substantive knowledge, with explicit reflections, shall guide the quest for useful empirical indicators.

Applying the example of social citizenship, three sets have been identified which reflect theoretically important concepts. The first set, accessibility of unemployment benefits, is measured by an index based on scores for the personal scope of application and various eligibility criteria (e.g., work demands, definition of employment records, and membership requirements, if any).

The set for generosity of unemployment benefits is measured by net replacement rates that express the ratio of benefits to former wages after taxation. This measure is now common in the literature. However, using the net replacement rate – as this study does – for a single person with previous earnings at the level of the Average Production Worker (APW) has two main drawbacks: first, net replacement rates calculated at other points in the income interval may provide other expressions of generosity. Second, the existence of tax allowances and/or supplements for children may cause differences in net replacement rates of persons in single individual households and non-single households. Aggregate measures such as average net replacement rates for different income and family situations do not indicate how national systems work for any particular population group but simply conflate otherwise useful information. As most national unemployment insurance programs are strongly individualized, and as unemployment is concentrated among groups with lower levels of education, the net replacement rate for a single APW as empirical indicator for benefit generosity seems justified here.

Measuring the third set on obligations of unemployment benefit claimants can take place in numerous ways. This example uses an index of negative sanctions, as stipulated in legal texts. In other words, the measurement reflects negative sanctions that the state may impose if a person becomes unemployed voluntarily or behaves inappropriately, and if benefit claimants refuse to accept a job offer or participate in an active labor market program. Acknowledging that the implementation of sanctions may not always follow the letter of the law, legal stipulations give at least an important signal to both administrative authorities and claimants, and therefore to some degree reflect politicians’ positions on the issue of obligations.

#### 6. Calibration of sets

After identification of the best possible empirical evidence the question becomes *how* the data reflects theoretical concepts. In practical terms, the best approach is, first, to establish when something is fully in and fully out of the set and, second, to fine-tune the set by describing how the set looks in the range from fully out to fully in. Theoretical and substantive knowledge must inform this calibration of sets, since calibration affects the measurement of fuzzy membership scores. No fuzzy set analysis is better than its sets, making the infusion of knowledge into sets indispensable.

The starting point for the accessibility index here is the assumption that people between age 18 and the official retirement age should be able to qualify for unemployment benefits after six months of employment within a 12-month period, taking into account activities (other than ordinary paid work) that might count towards eligibility, for example, training

Table 3  
Specification of empirical indicators and the translation of raw data into fuzzy membership scores and verbal labels

Accessibility	Generosity	Obligations	Fuzzy membership scores	Verbal labels
>90.0	≥90.0	>85.0	1	Fully in the set
82.0–90.0	79.3–89.9	69.5–85.0	0.84–0.99	Almost fully in the set
72.0–81.9	67.7–79.2	54.9–69.4	0.68–0.83	Fairly in the set
60.0–71.9	55.6–67.6	41.3–54.8	0.51–0.67	More or less in the set
59.0–59.9	54.5–55.5	40.2–41.2	0.50	Cross-over point
47.0–58.9	42.4–54.4	27.6–40.1	0.34–0.49	More or less out of the set
37.0–46.9	30.8–42.3	16.0–27.5	0.18–0.33	Fairly out of the set
28.9–36.9	20.1–30.7	5.4–15.9	0.01–0.17	Almost fully out of the set
<28.9	≤20.0	<5.4	0	Fully out of the set

Notes: ACCESSIBILITY to unemployment benefits is measured by an index taking into account personal scope of application, age groups, and eligibility criteria. GENEROSITY of unemployment benefits is measured by net replacement rates for single person with earnings at level of APW (%). OBLIGATIONS of claimants is measured by an index of negative sanctions imposed on claimants refusing to accept job and ALMP offers.

and child care. If qualification is possible under these conditions, accessing the benefit system is more easy than difficult (i.e., the membership score is greater than 0.5). If these conditions are insufficient for benefit qualification, accessing the system is difficult (i.e., membership score is lower than 0.5). Table 3 shows the translation of raw data – index scores – into fuzzy membership scores and labels. The higher the index score, the easier the access to benefits.

For the set on generosity, the first qualitative breakpoint occurs when the benefit is fully not-generous. Below this point variation is meaningless, because distinguishing between degrees to which benefits exceed “fully not-generous” does not make sense. The second qualitative breakpoint occurs when the benefit is fully generous. Above this point variation is meaningless, because distinguishing between degrees to which benefits exceed “fully generous” does not make sense. The third qualitative breakpoint is the cross-over point, where the benefit switches from being “more not-generous than generous” to “more generous than not-generous.”

According to national consumption surveys (Hansen, 1998), individuals cannot maintain any attained standards of living if their income drops by four-fifths; they would soon have to rearrange their financial affairs dramatically. Thus, if the net replacement rate is below 20%, we deem it fully not-generous. Having a job or participating in an active labor market policy program involves costs for mobility and various other expenses. In most European countries – for example, Denmark – workers have tax allowances to partially cover such costs and earnings disregard that allows participants in active labor market policy programs to earn something extra before having their benefits reduced. The tax allowance and the earnings disregard each amount to approximately 10% of the APW earnings in the Danish example. For this reason we label net replacement rates of 90% and more as fully generous. Establishing when benefits are more generous than not is more difficult. Consider the point

at 55.5%. For the specific translation of net replacement rates into fuzzy scores and labels, see Table 3.

The final fuzzy set, on obligations, concerns the severity of negative sanctions, as measured by an empirical indicator of (a) the number of weeks claimants may have their benefits suspended or reduced and (b) the timing of that sanction. The longer – and thus more severe – the sanctions, the higher the index score. The earlier the strict sanctions are imposed, the higher the index score.

Table 3 also shows the translation of fuzzy membership scores into nine verbal labels, ranging from “fully accessible” to “fully not-accessible.” These labels are used for the analysis of the conformity of cases to concepts and ideal types. For example, if a benefit scores 70.2 in the set on generosity, this score translates as a “fairly generous” benefit.

## 7. Scoring cases

How can cases be scored? Basically, two options exist. The first option is to separately investigate each dimension of the case, in our example aspects of the policy development; the second is to use formal set theory axioms to study cases conformity to configurations of sets, in our example countries’ conformity to various welfare state types. This section gives a brief example of the first option as applied to empirical developments in Denmark. The subsequent section illustrates the potential of applying the second option.

In 1990, Danish unemployment insurance benefits were almost fully accessible (see Table 4). By 1998, the benefits had become only more or less accessible, because the required work period preceding unemployment increased from 26 to 52 weeks. Benefit generosity fell in the same period from fairly generous to more or less generous (see Table 4). This drop did not result from any direct cuts in benefit levels or in the benefit formulae but from two other reasons: benefit indexation lagged behind wage developments, and the 5% labor market contribution (i.e., a gross tax) introduced in 1994 increased gradually to 8% in 1997.

However, obligations see the most dramatic degree of change. During the 1990s demands on wage and geographical and occupational mobility on the part of unemployed benefit claimants became stronger, accompanied by tougher negative sanctions for the rejection of jobs or training offers. While obligations were fairly lax in 1990, they became nearly almost fully strong by 1998 (see Table 4). In other words, the marked development of obligations also led to a qualitative change from lax to strong obligations.

In the 1980s benefits were easy for Danish workers to access, with hardly any strings attached, leading some Danish observers

Table 4  
Fuzzy membership scores for Danish unemployment insurance benefits in accessibility, generosity, and obligations, 1990–1998

	1990	1995	1998
Accessibility	0.98	0.74	0.53
Generosity	0.71	0.63	0.60
Obligations	0.22	0.73	0.94

Source: Kvist (2002).

at the time to describe the unemployment benefit system as a citizen wage. This description is no longer accurate. The tightening of eligibility criteria and the strengthening of obligations means that there is no “free lunch” when it comes to claiming unemployment insurance benefits.

## 8. Configuration of fuzzy sets into ideal types

Esping-Andersen’s (1990) welfare state typology lives up to Weber’s definition of an ideal type as “formed by the one-sided accentuation of one or more points of view and by the synthesis of a great many diffuse, more or less present and occasionally absent concrete individual phenomena, which are arranged according to those one-sidedly emphasized viewpoints into a unified analytical construct” (Weber, 1904: 147). Although fuzzy sets and ideal types may appear as opposites, they are not. Fuzzy set theory is applicable to the configurational view of crucial aspects and concepts combining in ideal types (see Kvist, 1999; Ragin, 2000). Logical operations in fuzzy set theory allow the construction and measurement of alternative types in formal and precise manners.

Basically, operations with fuzzy sets are generalizations of operations on crisp sets (see Zadeh, 1965; Ragin, 2000). Suppose case  $x$  has a membership value  $v^a$  in fuzzy set  $A$  for ACCESSIBILITY, a membership value  $v^g$  in fuzzy set  $G$  for GENEROSITY, and a membership value  $v^o$  in fuzzy set  $O$  for OBLIGATIONS.

In the presentation of the analytical property space (Becker, 1998; Lazarsfeld, 1937), the New Social democratic model of social citizenship in relation to unemployed people can be expressed in fuzzy set terms as the ideal typical location – ACCESSIBLE \* GENEROUS \* OBLIGATIONS – or, in plain English, as a model characterized by easily accessible, generous benefits with strong obligations imposed on claimants.

Fuzzy set theory contains formal rules for dealing with set theoretic relationships like this one. In this case, we can make use of the *intersection rule*. The value of  $x$  in  $A * G * O$  is the minimum value of  $v^a$ ,  $v^g$ , and  $v^o$ . This operation represents logical AND, denoted  $*$ , and is called the *minimum principle* in fuzzy set theory.

Applying the minimum principle to the membership scores in Table 4 suggests that the minimum value for Denmark in 1990 was 0.22. Put differently, lax obligation requirements placed Denmark fairly out of the new social democratic model in the early 1990s. As obligations strengthened markedly in 1994, Denmark changed to belonging “more or less” (0.63) to the new social democratic model by 1995. As a result of tighter eligibility criteria in 1996, making access to benefits more difficult, Denmark was barely a member of the new social democratic model in 1998.

Of course, case membership in other models is also open for study. The old social democratic welfare state model, for example, comprises easily accessible and generous benefits that are not subject to strong obligations. Here the complement rule applies; that is, the value of  $x$  in  $\sim A$  is  $1 - v^a$ , where  $\sim$  is not. This operation finds the complement to  $A$ , and is called principle of negation in fuzzy set theory. The value of  $x$  in  $A * G * \sim O$  is the minimum value of  $v^a$ ,  $v^g$ , and  $1 - v^o$ .

Again, looking at the scores in Table 4 suggests that Denmark operated a fairly old social democratic welfare state model, equal to a score of 0.71, in 1990. However, eight years later it is almost fully out, with a score of only 0.06. Behind this fundamental change in the Danish model lies a labor market reform with a series of subsequent modifications, exacerbating certain traits (such as increased obligations) uncommon to the old social democratic model. Combining tougher obligations with stricter accessibility (see Table 4) moved Denmark into the boundary regions of the new conservative (0.47) and social democratic welfare state models (0.53).

Finally, Esping-Andersen (1990) argued that there is only one “liberal” model, that a distinction between the liberal model and the labour model is not necessary. If Esping-Andersen is correct, then in this case the *rule of union* applies; that is, the value of  $x$  in  $A + G + O$  is the maximum value of  $v^a$ ,  $v^g$ , and  $v^o$ . This operation represents the logical OR, denoted  $+$ , and is called the *maximum principle*. Applied to an analysis of the “liberal” model, this operation means that the value  $x$  in  $(\sim A + A) * \sim G$  is given by the maximum of these two expressions. In plain English, the fuzzy membership score of the “liberal” model is the highest score of the model characterized by either not-accessible, not-generous benefits or by accessible, not-generous benefits. The aspect of obligations is entirely absent.

The view of cases as configurations of aspects introduces the idea that a single difference between two cases may constitute a *difference in kind* — a qualitative distinction. Moreover, the analytical property spaces or truth tables indicate that aspects are not independent, separable variables but elements of configurations (Ragin, 2000). Of course, in principle the possibility remains that not all eight feasible combinations have empirical validity or are of theoretical relevance. However, even when some of the ideal types are empirically irrelevant, listing them helps the researcher to get an overview of the subject (see Becker, 1998; and Ragin, 2000 for set theory ways of reducing the property space).

## 9. Ideal type analysis

Table 5 sets out fuzzy membership scores for seven countries in the eight possible welfare state ideal types for unemployment insurance. Using these qualitative distinctions makes possible an analysis of which ideal type a country belongs to and a determination of the country’s degree of membership. Moreover, statements about which ideal type the country is closest to and furthest away from also become possible. This analysis allows nuanced judgments on the (shifting) character of the national welfare states.

Table 5 shows that Denmark and Sweden have moved from belonging to an old social democratic unemployment insurance model to belonging to a new social democratic model. Moreover, these shifts were not incremental: both Sweden and Denmark moved from being fairly out of the new social democratic model to becoming fairly in and more or less in, respectively. Indeed, one interpretation is that the greater emphasis on obligations in the two Nordic countries has brought about a qualitative change in the unemployment insurance

Table 5  
Fuzzy membership scores for seven European countries in unemployment insurance ideal types, 1990–99

Country	Year	New social democratic	Old social democratic	New labour	Old labour	New conservative	Old conservative	New liberal	Old liberal
Denmark	1990	0.22	0.71	0.22	0.29	0.02	0.02	0.02	0.02
	1995	0.63	0.27	0.37	0.27	0.26	0.26	0.26	0.26
	1999	0.53	0.06	0.40	0.06	0.47	0.06	0.40	0.06
Finland	1990	0.38	0.62	0.38	0.38	0.34	0.34	0.34	0.34
	1995	0.38	0.62	0.38	0.38	0.29	0.29	0.29	0.29
	1999	0.48	0.52	0.43	0.43	0.48	0.42	0.42	0.42
Norway	1990	0.65	0.25	0.35	0.25	0.22	0.22	0.22	0.22
	1995	0.65	0.25	0.35	0.25	0.22	0.22	0.22	0.22
	1999	0.64	0.25	0.35	0.25	0.36	0.25	0.35	0.25
Sweden	1990	0.22	0.78	0.04	0.04	0.08	0.08	0.04	0.04
	1995	0.22	0.77	0.19	0.19	0.22	0.23	0.19	0.19
	1999	0.71	0.19	0.29	0.19	0.23	0.19	0.23	0.19
Nether-lands	1990	0.40	0.41	0.25	0.25	0.40	0.59	0.25	0.25
	1995	0.28	0.28	0.25	0.25	0.40	0.60	0.25	0.25
	1999	0.28	0.08	0.28	0.08	0.72	0.08	0.28	0.08
Germany	1990	0.45	0.34	0.42	0.34	0.55	0.34	0.42	0.34
	1995	0.28	0.28	0.25	0.25	0.40	0.60	0.25	0.25
	1999	0.45	0.34	0.45	0.34	0.54	0.34	0.46	0.34
UK	1990	0.04	0.04	0.48	0.52	0.04	0.04	0.48	0.48
	1995	0.03	0.03	0.48	0.52	0.03	0.03	0.48	0.48
	1999	0.00	0.00	0.51	0.49	0.00	0.00	0.48	0.48

Source: Kvist (2002).

model. Furthermore, these two countries were almost fully out of many of the other ideal types during large parts of the 1990s. In other words, their unemployment insurance models are fairly distinct most of the time.

In contrast, Finland presents a more ambiguous case. Throughout the 1990s, Finland belonged to the old social democratic ideal type, although to varying degrees. However, as the scores in Table 5 show, Finland is only more or less out of a number of other models. In other words, Finland has an unemployment insurance model that is less distinctive than the ones in the other two Nordic countries. The fourth Nordic country, Norway, had a fairly strong new social democratic unemployment insurance model during the 1990s. Moreover, Norway was neither close to nor very distant from many other models. In short, the Nordic countries live up to the expectation that they operate social democratic unemployment insurance models. However, with the exception of Finland, by the end of the 1990s they belonged to a version that could take the label of the new social democratic model, one that stresses strong obligations.

Due to welfare reforms, particularly in Denmark and Sweden, some convergence toward the new social democratic model in unemployment insurance across the Nordic countries has occurred. However, no convergence between the four Nordic and the three non-Nordic countries in Table 5 has taken place. Although all seven countries intensified obligations on the part of the unemployed, the result was continued diversity, or what we have described elsewhere as “parallel trends, persistent diversity” (Kautto and Kvist, 2002). The Netherlands in particular experienced a qualitative change from an old to a new conservative welfare state model. In contrast developments in Germany and the UK have been less dramatic. Being a member of the new conservative model, Germany is not as distinct as the Netherlands, as an examination of its membership

scores in other models shows. The scores for the UK indicate a distinctive case; that is the country is fully out of both social democratic and conservative models. In fact, the UK is situated in the border region between the labour and the liberal models. The UK seems to have stronger affinities across the Atlantic than with the other European countries.

## 10. Concluding remarks

The ideal type analysis illustrates two advantages of using fuzzy set theory for measurement purposes. First, fuzzy sets can reflect the ideas of theoretical concepts, thereby directly tackling the key concern of achieving measurement validity. Fuzzy set theory demands a high degree of correspondence between concepts and fuzzy membership scores in sets that researchers establish to reflect such concepts. Researchers must pay great attention to constructing analytical concepts, criteria for establishing qualitative breaking points, and the empirical evidence. Crucial decisions should devolve from theory, substantive knowledge, and the availability and nature of data. In any case, such decisions should be sufficiently explicit to allow for scientific dialogue and replication of the analysis.

Second, the article demonstrates how axioms in fuzzy set theory allow the interrogation of the analytical property space (i.e., the inside of the cube), and the observation of how cases move around over time. Using comparative welfare state studies for illustrative purposes indicated how concepts such as resilience and retrenchment are inadequate for capturing ongoing welfare reform. Instead, simultaneous change in several dimensions suggests that a better term for retrenchment would be restructuring. Using fuzzy set theory allows qualified statements on such changes and, in the case of unemployment insurance, the identification of a cross-country process of parallel trends but persistent diversity.

In short, the article illustrates the uses of advanced fuzzy set theory for comparative case studies, especially measurement purposes. If nothing else, applying the approach requires researchers to be more knowledgeable about theory and cases. In turn, such knowledge may greatly inform discussions of whether the glass is half empty or more empty than full.

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