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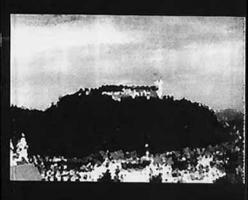
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FACET THEORY

Towards Cumulative Social Science

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FACET THEORY: Towards Cumulative Social Science

AN EMPIRICAL EXAMPLE OF THE COMPARISON BETWEEN MULTIPLE CORRESPONDENCE ANALYSIS AND SMALLEST SPACE ANALYSIS:

The Diffusion of the Social Representations Theory Through the Institutional Context of Scientific Communication

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Abstract

In the methodological framework of a comparison between Multiple Correspondence Analysis (ACM) and Space Analysis, we are presenting a study conducted within a project of meta-theoretical analysis on the entire body of Social Representations (S.R.) literature launched by Annamaria de Rosa in 1994 (de Rosa 1994a, 2001a, 2001b, 2002).

Content analysis was carried out on abstracts of all the conference literature on S.R. (de Rosa & d'Ambrosio, 2002), using a reduced version of the "Grid for Meta-Analysis of SR literature" (de Rosa, 1994), available on the European Ph.D. on S.R. and Communication web site (http://server.europhd.uniroma1.it/biblio/outline.htm).

After classification, the data was analysed by HUDAP, SPAD-N, and SPSS statistical packages to develop a *Space Analysis* and *ACM*, using the theoretical vs. empirical nature of the presentations at the International Bi-annual Conferences on S.R. as external/illustrative variables.

1. INTRODUCTION

This study is a piece of a wider research conducted in the framework of a meta-theoretical analysis of the complete body of Social Representations (SR) literature launched by Annamaria de Rosa in 1994, which is meant to provide an organic, comprehensive understanding of the overall development of this theory over time and across continents (de Rosa 1994a, 2001a, 2001b, 2002). Some of the main objectives of this project are:

- *to map the theory and its application around the world* (i.e., the anchorage of the theory to the different cultural contexts and research centres) and *over the time* (i.e., the development of the theory across different generations of researchers and schools of researchers).

- *to bring some brightness in the SR galaxy*, by reconstructing analytically the complexity of its various theoretical and methodological approaches.

An Open Distant Learning networking for co-operative international research programme review the whole literature on Social Representations and Communication (S.R. and C.). The database of the literature on SR and C receives the input from young researchers, who insert the data on-line through the website and it is periodically updated after a double quality control filter. The database can be consulted (using a password) by professors, researchers, or students working on SR and on C., who will act not only as user, but also as co-producer of the database.

This on-line integrated database is articulated in two different inventories:

a) A *fully bibliographical inventory of the literature* on SR and C. and its related paradigm; this inventory includes information limited to the *classic bibliographic details*.

b) A *meta-analysed inventory* of the literature on SR analysed according to the grid developed by de Rosa (1994). Its main aim is to develop the "meta-theoretical analysis" of the whole corpus of the specialised field (both theoretical and empirical literature).

At a meta-theoretical level of analysis, the grid is organised in 5 main areas:

- *Theoretical Reference to SR Constructs*: aims to monitor whether the publication refers to SR in a very generic way or addressing any specific paradigmatic element of the Theory with respect to the genesis, processes, functions, structure, transmission, transformation of SR or whether the contribution refers to the theory itself as an object of critical analysis (meta-theory) ;
- *Theoretical Reference to other Constructs and Theories:* aims to identify whether the publication refers to other constructs, concepts and theories in relation to SR and which is the aim of this reference: integration, differentiation, both, comparison, substitution;
- *Thematic Analysis:* aims to categorize the contents of the empirical contributions by identifying the general *Thematic Areas* (i.e. health) and the *Specific Object* of each study (i.e. AIDS), also in relation to the specific typology of SR (closed, open, polemic);
- The last parts aim to identify respectively the *Methodological Profile* of each study and the *Characteristics of the selected Population*.

2. DEFINITION AND AREA OF FIELD OF INQUIRY: WHY THE SIX INTERNATIONAL CONFERENCES ON SR?

It's an empirical evidence the fact that during the last 42 years the SRT has become a multi-cultural, multi-language, and multi-generational enterprise and the vitality of the SRT and its internal debate, the growing number of meetings, workshops and small gatherings.

The enormous quantity of literature produced makes it impossible to obtain a comprehensive treatment of the subject in this presentation. For the purposes of this study, we focused our attention only on the six International Biannual Conferences on SR .

These, being one of the fundamental institutional contexts for this scientific community to disseminate and develop the related research fields, are a good mirror of the liveliness of the debate inside (and, in some extent, also outside) the Theory: they are a significant place for "the contagion of ideas from neighbour to neighbour", according to Dan Sperber's "*epidemiology of ideas*" (Sperber, D., 1990).

The intent, here, is to provide more questions about the transmission, combination and "becoming" of ideas. In the case in point:
- Does the type of scientific production elaborated in the SRT field, along with the variable *type of paper* (with theoretical/empirical modalities) as well as the variable *Type of reference to SR*, change in relation to the geographic dimension, intended as the institutional origin of the authors?
- Is it possible to produce a "chart" of thematic interests in relation to the geographic/cultural dimension?
- Is it possible, in the process of charting these interests, to point out the possible effects of an additional variable: the *temporal dimension*?

3. UNITS OF ANALYSIS: ABSTRACTS FROM THE BIANNUAL INTERNATIONAL CONFERENCES ON SR

The units of analysis of our study are the abstracts of papers presented in the language/s formally accepted for all the six Bi-Annual International Conferences on S.R. held from 1992 to 2000 respectively in Italy (Ravello), Brazil (Rio de Janeiro), France (Aix en Provence), Mexico (Mexico City), Canada (Montreal), U.K. (Stirling).

No sampling was done on this corpus of texts, rather, the total number of abstracts in the language requested by the conference's organizer and retrievable to date was analysed: 1093 abstracts meta-analysed on the 1137 abstracts presented.

4. PROCEDURES FOR DATA ANALYSIS PROCESSING: THE HUDAP AND SPAD.N PROGRAMMES

Data analysis was carried out on various levels and with different goals:
- first, a rather general descriptive view based on the exploratory analysis of frequencies, cross-frequencies followed by some Chi2 tests;
- then, a much deeper exploratory analysis on the statistical/conceptual structure of our subject, conducted thanks to the HUDAP software package and a Multiple Correspondences Analysis (ACM) performed with SPAD.N.

The logic of analysis of the structure from several angles has multiple purposes:
- to explore the potential of the HUDAP software package in our research field;
- to be able to compare the acquisitions obtained thanks to this program's procedures to the Multiple Correspondences Analysis;
- to identify the points of continuity or divergence of the two different approaches of qualitative "data analysis" .

In this contribution we will focus just on the structural analysis related to the first five Biannual Conferences, because of the space constraints.

5. ANALYSIS OF THE RESULTS OBTAINED VIA THE WEIGHTED SMALLEST SPACE ANALYSIS

The guiding design of the study can be summarised through the following "mapping sentence":

The extent to which the Social Representation Theory (S.R.T.) developed - through the time

| 1992 - 1st International Conference on S.R. Italy (Ravello) |
| 1994 - 2nd International Conference on S.R. Brazil (Rio de Janeiro) |
| 1996 - 3rd International Conference on S.R. France (Aix-en-Provence) |
| 1998 - 4th International Conference on S.R. Mexico (Mexico City) |
| 2000 - 5th International Conference on S.R. Canada (Montreal) |

and across the cultural contexts

| Europe : from France towards other European countries |
| From Europe to Latino-America and French speaking North America country (Canada) |
| New frontiers: Japan, India, Africa |

is presumed as highly related to the reference to the S.R. theory in terms of

A-specific General Reference to the S.R. theory:

| | Yes |
| | No |

Specific Paradigmatic Reference to the S.R. theory:

| Genesis |
| Processes |
| Functions |
| Structure |
| Transmission |
| Transformation |
| Meta-theory |

In the Space Diagram 1, the internal variables under analysis are organised in a modular circular structure where a central nucleus represents the point of intersection of all the correlations taking place and clarifies the more general and shared characteristics of our "concept-space". Some variables arranged around the cloud of central variables, concentrically and in contact with the central ones with they are most correlated. These have less shared character but, they define the meaning of the central variables.

In our case, the conceptual space object of study is the paradigmatic and thematic features of the corpus of abstracts presented at the first five International Conferences on S.R., taking into account the dimension "Type of paper" along its theoretical/empirical continuum.

In the graph 1, the central variables are, not surprisingly, all the conferences except the first one held in Ravello on 1992. Ravello is off-centre because of the theoretical and meta-theoretical character of the contributions presented at the first conference on S.R., it appears to refer to a more circumscribed area whose meaning is tied to meta-theoretical elaboration.

As regards the thematic areas, *Health/Illness* could actually be included with the variables of the central "cloud" because of its massive presence in practically all the conferences (especially Rio, Aix-en-Provence and Montreal) and its rather heterogeneous and visible treatment by all nationalities.

With a more connotative character, in the next layer we have *General Reference to SR* where all the other thematic areas radiate out to a more external sector. These are near the conferences in which they found the most space (i.e. *Development* for Montréal, *Environment* for Rio and *Gender* for Mexico City conference). The thematic *Politics* having been important in both the Mexico City and the Rio de Janeiro conferences, it is in the most external layer, in a intermediate position between the two.

Graph 1: WSSA1 External variables: Empirical Vs Theoretical Papers;
   Internal variables : International Conferences on SR, Thematic areas and Specific references to SR

In the external sector next to the central variable *Aix-en-Provence* and particularly near the central cloud, we find various types of reference to the SRT such as to *structure, transformation, processes* and *functions* of SR. In a more external layer we find reference to the SRT in *meta-theoretical* and *genesis* terms as well as the *Ravello* conference. On a further layer we find the thematic areas *Social Psychology and Other, Meta-theory, Communication and Multimedia*, as well as *Technological Development*, which, according to the intersecting frequencies, had its "boom" at the third international conference.

There is also a kind of differentiation between the *Rio de Janeiro, Mexico City* and *Montréal* conferences that could be characterised as having more *applied interests*, and the third in *Aix-en-Provence*, that seems more tied to interest in the *theory's paradigmatic aspects*.

However, when you consider the position taken by the external variables *Theoretical papers* and *Empirical papers* projected onto this structure, the interpretation of the graph can take on a new perspective. In fact, the external variables distributed in a decidedly antithetic and bipolar way. More precisely, the variable *Type of empirical paper* (*Empirical*), is located outside the cloud of variables, while the variable *Type of theoretical paper* (*Theoretical*) is located inside, even if not in a central position.

Furthermore we note that the variable *Theoretical* assumes a particular position: it is found inside the cloud on the side opposite that of the variable *Empirical*. In addition, is located almost alongside the variable *reference to SRT Meta-theory related* and more generally in the centre of a tight circle of variables linked to the session *Specific references to the SRT*. We can, therefore, venture an interpretation, coherently with the guiding hypotheses of the whole research programme launched by de Rosa: as is natural, the two variables *Empirical* and *Theoretical* are in opposition to each other, but the variable *Type of theoretical paper* with a

certain strength attracts toward itself the variables *Specific reference to the SRT* and the related *conference variable Ravello*. This is explained by the fact that, effectively, the more specific references to the Theory are expressed much more forcibly in theoretical papers. They are linked to the different thematic areas dealt with as well; which is why the cloud remains cohesive and does not divide along the two poles. However, the variables-thematic areas come to be distributed in the most external layer of the cloud, and in particular, in the sector that concerns the variable *Empirical*.

The nucleus constituted by the variables *Ravello, Genesis related, Transmission related* and *Communication and Multimedia* is also interesting. We can presume that the relationship between *Ravello* and *Communication* is linked to the strong Italian presence at the Ravello conference (Italian researchers dedicate more attention to this theme). It also seems plausible that in the papers at the subject, frequent references to the SRT in terms of *SR transmission* and *genesis* will occur.

The *fitness* ("fit") of this graph's data representation is confirmed by the Shepard curve.

Accepting that graph 1 shows the structure of our concept, *corpus of papers presented at the biannual international conferences*, considering as internal only the variables relative to the *Thematic areas* and *Specific references to SRT* session, we ask ourselves: how does this structure change if we replace the variables relative to *Specific references to SRT* session with the *Countries of Authors' Institution* ? Below we present the Space Diagram 2.

Even if the position of the external variables is preliminarily the same, the distribution of the different thematic areas results rather different. We note how significant are the links between different countries and different thematic areas.

It seems that in the cloud three sectors have now been created which would lead us to think of a modular sequential structure.

Graph 2 External variable Empirical Vs Theoretical Papers;
   Internal variables: International Conferences on SR, Thematic Areas and Country of Authors' Institution.

The first sector is located on the empirical side and consists of thematic variables like *Development, Environment, Economy, Identity, Health,* and some Countries such as the Middle East, Spain, Belgium, Northern Europe, Finland, Greece and Inter-continental Collaborations.

Another sector surrounds the variable *Theoretical* and consists of thematic variables like *Meta-theory, Communication, Social psychology and other, Politics,* and some Countries such as Italy, Germany, Austria, Switzerland, Portugal, Australia, Japan and the Ravello conference.

Finally, a third intermediate sector consists of the following variables: the second to the fifth conferences, *Technology, Gender, Deviance, Interpersonal and Inter-group relations, Culture* and some countries such as the UK, France (which covers a rather central position), Latin America, Canada, Eastern Europe and international collaborations.

In graph 2, as well, on the other side, there remains a trace of a modular circular structure. We note that in the category countries, France, Latin America, the UK and Canada are in the centre of cloud. They probably are those that frequented a larger number of thematic areas, as they present the highest frequencies and they were present at all the conferences. Along with these Countries, the conferences gain the centre of the cloud even if moved toward the empirical side (excluding the Ravello conference, a bit separated near *Theoretical*).

We note some significant changes in positions with respect to the graph 1. Here we comment just the most interesting one: *Politics*, previously on the empirical side, has now moved to the theoretical side. How can this event be explained?

The variable *Politics* appears to be placed in a central position between two poles. The first pole consists of two variables to which it is related, *Mexico City Conference* and *Latin America*. In the case of Mexico City, it is because *Politics* was the most frequent theme. Politics constitutes more than half of the Latin American corpus. The opposite consists of Switzerland alone, which, given that 50% of its production was dedicated to this thematic area, results extremely correlated to it. A mediated solution was obtained.

The alienation coefficient for graph 2 is 0.24788, which is considerable given the numbers of variables under analysis.

6. ANALYSIS OF THE RESULTS OBTAINED VIA SPAD-N MULTIPLE CORRESPONDENCES ANALYSIS

At this point it would seem appropriate to present the principle results obtained via the Analysis of Multiple Correspondences (ACM) using SPAD-N (*Systeme Portable pour l'Analyse des Données*).

MCA is a multidimensional technique used in order to study linear correlations between observed qualitative variables that are measured both ordinally and nominally. Actually it uses the Chi-squared metric to understand the relation (as distances) between rows (subjects) and columns (variables), and within them, at the same moment.

MCA is a kind of factorial analysis, thus it obeys the general principle that processing numerical matrix, it is possible to substitute a big dimension matrix with a smaller one which works coherently as a good proxy. So, through this analysis it becomes feasible to find out another analytical pattern that is implied by the data, that allows to grip the intertwining of interdependences in the original variables by a smaller (say k-dimensional) number of more significant variables called "factors".

The k-dimensional subspace is composed by the first k factorial axes with the following properties:
1. They are orthogonal (i.e. there is linear independence for any factor from another);
2. They are linear combinations stemming from the structural modalities of he analysis;
3. Any of these axes explain a diminishing quantity of the original data variance matrix: the first one explains most of the variance and so on, so that the first factor is the most important one and is the best proxy of the original matrix so that it explains the biggest share of the total inertia.

The inertial share explained by any factor corresponds to the eigenvalue (λ) that is associated to the factors itself: Eigenvalues and factors are the expression of the relations among the variables (which in this case are qualitative variables) together with those among variables and underlying patterns. The sum of the all the q eigenvalues equals the total inertia in the data matrix.

Below we show the histogram concerning the variance explained by each factor after having run a "clean-up" of the matrix in input, this graphically represents the eigenvalues through accordingly long segments.

Interpretation approaches can essentially be twofold:
- A "factorialist" approach, that is based on the identification of factorial dimensions focuses on the absolute contribution of ant variable and any modality, thus taking into count mainly the bigger contributions.
- A "structural geometric" approach, focuses on the "form" of the cloud of points, look at the modalities and distances within them, with a particular attention for the squared sines, that are considered as an indicator for how well are points represented on the axe

MCA projects modalities onto the factorial subspaces through using the factorial co dinates themselves. The structure of the relations can be deduced either through the posi of the points with respect to the axes or through the distances between the points themsel Generally speaking we can say that the bigger the distance of one point from an axis, the l ger its contribution to the framing of the axis itself, the bigger the "closeness" between mo ity-points, the bigger the interdependence between the modalities that are represented those points.
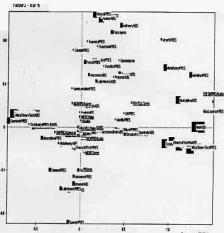
HISTOGRAMME DES 44 PREMIERES VALEURS PROPRES

Graph 3 Histogram of SPAD-N "Autovalori"

In describing and interpreting the factors and their intersections, we will adopt geometric approach and we will pay more attention to the first two factors than the o three. This is because according to the values obtained after re-evaluation via Benze optimization formula[1], the first two alone explain more than 96% of the variance[2]. They also the ones that we will discuss in the comparison with the WSSA1 results.

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[1] According to Benzecri, the eigenvalues yielded by MCA provide a simplistic vision of the inertia explained by the extr factorial axes, as given the high number of modalities with which MCA generally works, the total inertia is computed i into account many factors of infinitesimal relevance. Thus, Benzecri proposes an *"optimistic formula"* in order to tak the right account the relevance of the inertia percentage explained by first and most important factors.

The graph 4 shows the intersection between the first axis, in abscissa, and the second, in ordinate.

Gragh. 4 - Crossing First and Second Factorial Axes extracted with the ACM

The First Factor can be interpreted as *Empirical vs. Theoretical*.

The negative semi-axis of the first factor picks up the variables associated to empirical papers. This is why the modality present for *field research* is located along this semi-axis. Field research appears to the most employed modality in the application of the SRT and, according to the global data, the descriptive research designs (an overwhelming majority). After the absent modality for all *missing values* relative to methodological aspects[3], these two variables, (and respective modalities) are those that most orient the axis, presenting the relative and absolute contributions and the highest test values.

Among the illustrative variables that in their present modality are projected onto this semi-axis we find *Empirical papers* and *Montréal*. These contrast with the modality *Present* of the variables *Theoretical papers* and *Ravello* on the positive semi-axis.

Mirroring the negative semi-axis, on the positive axis we find the present modality *Missing values* relative to all the methodological variables and the absent modality for *Field research* and *Descriptive research design*. On the other hand, while they were absent on the negative semi-axis, we find present variables like *Reference to SRT Meta-theory Related* and the thematic area *Meta-theory*.

Once again on the positive semi-axis there is the variable *Other theories* in present modality and with great orientation strength on the axis.

The Second Factor can be interpreted as *Literature Produced in Europe and North America Vs Literature Produced in Latin America*, because it expresses the difference of cultural contexts and the influence it has on literary production in the various Countries.

The above is not new for us (see the descriptive statistics) and is mirrored in the polarity expressed by the axis between literature of primarily European as well as North American origin and the Latin American literature. Such a polarity is highlighted by the positioning of the variable *Latin America* at the extremity of the negative semi-axis, and right after *No aims* that on this axis presents the highest absolute contribution and *No constructs and concepts Absent* is *Integration* (which represents in the majority of global data the most frequent aim of the reference to other Constructs or Theories of Social Psychology).

This combination of modalities and variables leads us to believe, that:

- this is the Latin American literature semi-axis;
- the type of paper delineated here is rather free on the level of theoretical comparison with other Theories and Constructs of Social Psychology.

Based on what has emerged so far, this last point seems to portray a relationship with the theory in terms of its "use" as a heuristic tool to understand social problems and a rather marginal contribution to its development in the theoretical sense. This reasoning is reinforced by the presence of the variable *General Reference to SRT* on the same semi-axis: this variable more than all others, characterises the Latin American papers and joins in presenting the absent modality for a good number of the paradigmatic references to the SRT.

The discussion is reversed if we take under consideration the positive semi-axis. This time the highest absolute contribution is associated to the absent modality of the variable *No aims* immediately followed by that associated to the present modality for the variables *Integration France*, *Canada* and *French*, along with a specific reference to almost all the paradigmatic aspects of the theory as well as other theories and constructs; a frequentation of the thematic area *Meta-theory*.

As illustrative variables, *Montréal* and *Aix-en-Provence Conferences* are projected onto the positive semi-axis while *Rio* and *Mexico City Conferences* are found on the negative.

Concerning the remaining factors, given the modest quantity of variance that they explain we will limit ourselves to point out that the 4th factor centres on the *contrast between the literature produced in the two periods taken into consideration 1992-1997 and 1998-2002*.

7. A COMPARISON BETWEEN RESULTS OBTAINED FROM THE TWO ANALYSES.

Although not being very conceptually distant from one another, the *Weighted Smallest Space Analysis* and the *Multiple Correspondences Analysis* distinguish themselves on the basis of substantial differences that bring with them consequences concerning the results.

The principle points of contact that come to attention are:

- Both methods of analysis are based on the calculation of an distance index then translated into spatial terms;
- Both methods of analysis envisage the use of variables (*external* variables in the WSSA and *illustrative* variables in the ACM) that do not take part in the determination of the data structures, but which are projected onto the structure that is built, without altering it, to simplify the interpretation of the output or simply to understand their behaviour given that particular structure of the data.

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[2] There is not any absolute rule to choose the number of factors to consider, a rule of thumb (Ercolani, Areni, Mannetti, 1990) is to look at the point in which the marginal inertia explained is very low, that is when cumulatively explained inertia increases at a much slower pace

[3] These aspects are present only in the encoding of the characteristics of the theoretical papers which do not have a empirical research component.

The principle points of difference between the two analyses are:

- While the ACM belongs to the family of Factorial Analyses and shares the intent to synthesise the complexity of the data via the individuation of a structure composed by latent factors, the basis of the WSSA1 procedure, is the Multidimensional Scaling which intends not so much to synthesise, but to explode the complexity of the data.
- The distance index at the base of the ACM is the result of the Chi2 test. Therefore this concerns the distance between the real data matrix and that of the expected data in the case of "equiprobability" of possible modality intersections. The distance index at the base of the WSSA1 is calculated in terms of correlations (Guttman's Coefficient of Monotonicity). Therefore, this deals with direct relationships between variables.
- In the ACM, the factorial axes are orthogonal and it's assumed the independence of the dimensions identified. In the WSSA1, the dimensions identified are interdependent.

From the above it follows that while the ACM admits the existence of "hidden dimensions" each time a particular intersection of factorial axes occurs.

Because of the interrelationship of all the dimensions:

- The WSSA1 presents a structure that includes and simultaneously displays them all.
- In the WSSA1, data is not synthesised on "n" dimensions but, specifically to allow the spatial visualisation, is placed in a space with 2 or 3 dimensions. In accordance with the model's "fitness", this can provoke a more or less appreciable distortion of the data, measured by the Alienation Coefficient and by the Shepard Diagram.

On both, the geometric and conceptual plane, the influence of the type of distance indices at the base of the analyses and the assumption of independent dimensions or not, translates into substantial differences on the plane of possible emerging structures. While in the ACM the only type of structure possible is the contrast of poles of variables on the axes, in the SSA it is possible to identify, beyond that of polarity, various types of "geometric" structures (i.e.: circular or axial structure, sequential segments, each one with possibility of the modularity).

Having obtained the results that we saw and interpreted above, we tried to carry out a comparison between the output of the ACM and the WSSA1.[4] For this purpose, we ran another WSSA1, introducing as internal variables the active variables chosen to run the ACM that we presented above, and as external variables, the same variables used as illustrative variables in the ACM. The result is the Space Diagram found below.

In the graph 5 a polarised structure does not emerge, but rather once again a modular circular structure. Despite the systematic selection performed by SPAD.N, the interpretation of this graph could be similar to the one for the first Space Diagram we analysed. Even here, in fact, we again find a core containing the conferences, with the definition of the external layers of groups of internal variables, that concern the conferences to which they are more closely related. Here, the variables linked to *Theoretical* and *Meta-theoretical* are near the variable *Ravello*, and the *Specific paradigmatic references to SRT* are near the variable *Aix-en-Provence*. On the *Rio de Janeiro* and *Mexico City* side, however, we find *General reference to SR* as well as all the variables linked to *Empirical* research while *Communication* and *Canada* are near *Montréal*.

A peak is located at the centre between the theoretical hemisphere of *Ravello* and *Aix-en-Provence* (complete with a projection of *Theoretical* paper) and the empirical hemisphere of the two conferences held in Latin America (complete with a projection of empirical paper). In the graph 5, the contrast on the temporal axis in respect to language (French and English for the first period versus Spanish for the end) is not maintained in the end, even if the period 1992-1997 is effectively near the theoretical and meta-theoretical side, in particular, near the *Specific references to SR*. The period 1998-2000, however, turns toward the Latin American and applied side.

[4] To this end we followed the procedure presented by F. Buschini during the 8th Summer School of the European Ph.D. on SR & C - held at the Colonna Castle in Genazzano, Italy, June 1-9, 2002. The paper presented by F. Buschini entitled "A comparison between HUDAP and Correspondence Analysis" is available on the European Ph.D. on S.R. & C. web site at the address: http://www.eurosphd.net

Graph 5 Space Diagram : Variables Selected by SPAD.N Criterion

To obtain a clearer idea about the contrast, in the Space Diagram we identified the variables that are present on the two semi-axes of the ACM's first factor.

In this way we obtained an accentuation of the two poles, as shown in the graph 6. The positive/theoretical axis is traced in red with a broken line, the negative/empirical axis in blue with a continuous line. We remember that the illustrative variables projected on the positive semi-axis were, in fact, *Theoretical* and *Ravello*, while those projected on the negative semi-axis were *Empirical* and *Montréal*.

Given that the first factor extracted in the ACM is considered the best approximation of reality and that the other dimensions are "hidden", one can say that, analysing only this factor the interpretation of the data's structure results decidedly less complete.

In fact it ignores: the theoretical role of the literature presented at Aix-en-Provence (which in fact, will emerge in the second factor); the *mediating* or perhaps *all encompassing* role of the literature presented in Montréal, transformed, here, into an empirical pole; and the *temporal aspect* which remains hidden if we consider just the intersection of the first and second factorial axes, etc. On the other hand, it should be noted that in the light of the ACM results the interpretation of the Space Diagram becomes much richer, coherent and gains clarity and strength of reasoning where, as in this case, the two analyses reciprocally confirm the results.

Graph 6 Projection of the first factorial Axis on the Space Diagram

We then tried to repeat the procedure for the variables present on the two semi-axes of the second factor extracted.

In the Space Diagram 7, in addition to the variables present along the two semi-axes of the first factorial axis (traced in blue with broken lines), we highlighted those present along the two semi-axes of the second one (traced in green with continuous lines); the positive to the left and negative to the right. We note how the lesser structuring of the second axis, along with the fact that it takes on a more specific and less visible dimension than the first, is reflected in the fact that the variables are more dispersed even in the Space Diagram.

Graph 7 Projection of 1st and 2nd Factorial Axis on the Space Diagram

CONCLUSIVE REMARKS

Following the reasoning of Carl Graumann (1998) and taking into account that the constant increment in participants from the First International Conference on SR in Ravello (1992) to the last held in Stirling (2002) from an ever increasing number of Countries, we can assume this fact as an indicator that the Theory has been established as a point of reference for a large network of researchers in social sciences, attracted by this theoretical perspective.

We have also highlighted some "specificity" related to the socio-cultural context in the phenomenon of the SRT's diffusion. The results of the structural analyses, both WSSA1 and ACM, meet on the identification of three paper typologies, in respect of the criteria of thematic areas and empirical vs. theoretical character of the scientific production:

• The more heterogeneous European papers, that are characterised by interest in the application of the SRT linked to attention to the development and articulation of paradigmatic aspects of the Theory and meta-theoretical interests.

• The numerous Latin American papers with strictly empirical, applied perspective, are interested in the development of the Theory as tool for the understanding of phenomena of social reality (democratic participation, social inequality, and the need and possibilities for solutions for various socio-economic problems).

• The North American contributions, overwhelmingly Canadian, are linked to the meta-theoretical interest for relations of the SRT with other theories, approaches or constructs. On the applied side, Canadian interest spikes in themes linked to development and education.

An integrated interpretation of the Space Diagrams and ACM results, leads to two considerations both of methodological and interpretative order, namely:

• This kind of interpretations seems to be more completed than the one based only on crossing of the first ACM factors (even if they explain the most part of variance), since they hide other dimensions. It is also clearer than the only interpretations of the Space Diagram, giving it order and strength of reasoning.

• The structural change showed by the Space Diagrams and the ACM results meet on the evidence of a transformation of papers presented to the last international conferences: besides the differences among the three scientific production models, a shared trend emerges from our results in relation to the influence of the *temporal dimension*.

In fact, from one side we attend to a reduced distance between the attention to meta-theoretical questions and the empirical approaches inspired by the SRT, which seems to make more critical its assumption also in relation to other theoretical constructs and paradigm.

From the other side there is a still relevant presence of a general reference to the theory rather than paradigmatic. Some questions arise:

• How to put in relation the *diffusion* of the theory as increasingly massive reference of researchers to it and its *development* also in relation to the development of the discipline and the diffusion of alternative paradigms.

• At what extent and in which way did the impact of the Latin American or Canadian model influence the European model of research in SR and vice versa?

• Which are the factors of resistance in the paradigmatic development of the Theory?

Of course in its diffusion, the SRT was not reproduced without change in the various new cultural and scientific contexts where it has taken root.

It would be necessary at this point a detailed reconstruction of the flow of researchers between the various scientific centres. Moreover it is absolutely necessary – before jumping to easy conclusions - to integrate and compare the results derived from the meta-analysis based on the papers abstracts presented at the Biannual International Conferences with the wider research programme aimed at meta-analysing the complete body (articles, books, PhD thesis) of the literature inspired by the SR paradigm (see preliminary results presented in de Rosa, 2002).

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