As a starting point: Methodological questions are not unrelated to theoretical ones

Di Giacomo (1980)

Lo Monaco, G., Piermattéo, A., Rateau, P., & Tavani, J. L. (under revision). Methods for studying the structure of social representations: a critical review and agenda for future research. *Journal for the theory of social behavior.*

Anthony Piermattéo
Lille Catholic University

Patrick Rateau
University of Nîmes

Jean Louis Tavani
University of Paris 8

Is there a disposable literature review about methodologies used in the framework of the structural analysis?

Methodologies: references

- Breakwell and Canter (1993)
- Doise, Clémence and Lorenzi-Cioldi (1992)
- Abric (2003)
- Moliner, Rateau et Cohen-Scali (2002)
- Etc.

Nothing centered on the structural analysis…

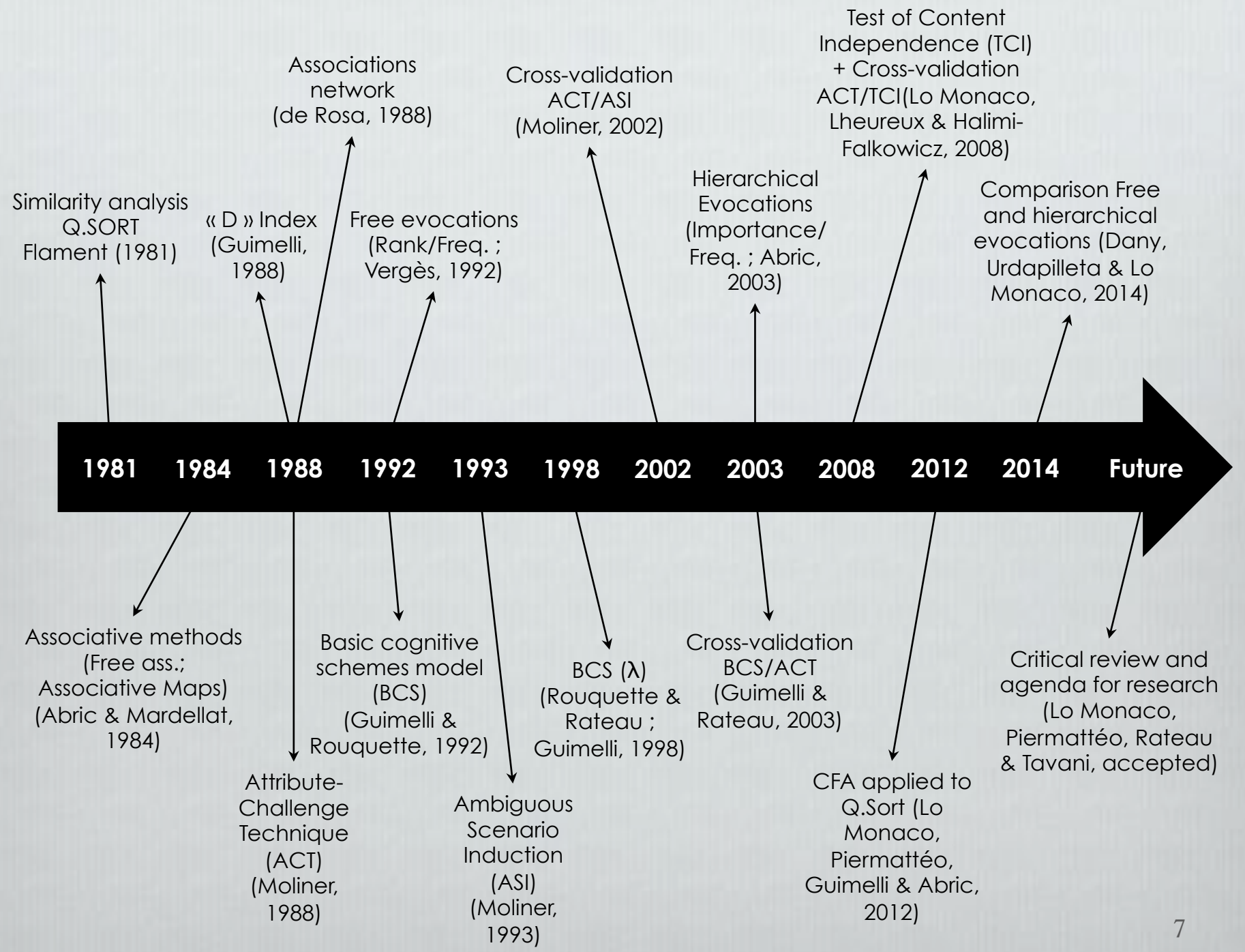
As a starting point: Methodological questions are not unrelated to theoretical ones

Di Giacomo (1980)

The Central Core Theory (Abric, 1976, 1994)

CENTRAL CORE	PERIPHERAL SYSTEM
Linked to collective memory and group's history	Allows the integration of individual experiences
Consensual →define the homogeneity of the group	Tolerates heterogeneity of the group
Stable Coherent Rigid	Flexible Tolerate contradictions
Change-resistant	Evolutive
Unsensitive to immediate context	Sensitive to immediate context

See Rateau, Moliner, Guimelli and Abric (2011) for a review and Rateau and Lo Monaco (forthcoming)


Similarity analysis Q.SORT Flament (1981)
« D » Index (Guimelli, 1988)
Associations network (de Rosa, 1988)
Free evocations (Rank/Freq. ; Vergès, 1992)
Cross-validation ACT/ASI (Moliner, 2002)
Hierarchical Evocations (Importance/ Freq. ; Abric, 2003)
Test of Content Independence (TCI) + Cross-validation ACT/TCI(Lo Monaco, Lheureux & Halimi-Falkowicz, 2008)
Comparison Free and hierarchical evocations (Dany, Urdapilleta & Lo Monaco, 2014)
1981
1984
1988
1992
1993
1998
2002
2003
2008
2012
2014
Future
Associative methods (Free ass.; Associative Maps) (Abric & Mardellat, 1984)
Attribute-Challenge Technique (ACT) (Moliner, 1988)
Basic cognitive schemes model (BCS) (Guimelli & Rouquette, 1992)
Ambiguous Scenario Induction (ASI) (Moliner, 1993)
BCS (λ) (Rouquette & Rateau ; Guimelli, 1998)
Cross-validation BCS/ACT (Guimelli & Rateau, 2003)
CFA applied to Q.Sort (Lo Monaco, Piermattéo, Guimelli & Abric, 2012)
Critical review and agenda for research (Lo Monaco, Piermattéo, Rateau & Tavani, accepted)

		Content identification?			
		Yes		No	
		Structural diagnosis?			
		Yes	No	Yes	No
Nature identification?	Yes	BCS*	–	–	–
	No	–	Research interview; associative maps; associative network; prototypical analysis and hierarchical evocations (hypotheses of centrality)	ACT TCI ASI	Similarity analysis; Q. Sort questionnaire (hypotheses of centrality)

* The content identified by means of this method may concern the object under study but, in most cases, it concerns associations related to one or more elements of the representation.

How to collect the content?

There are at least 2 ways

1. Interviews
   - non directive and semi-structured interviews
2. Associative techniques
   - Free associations ; Hierarchical associations ; associative maps ; association network method
   - Basic Cognitive Schemes

Content, structure hypotheses and social regulations

Hierarchical Evocations : method and data analyses

Associative tasks

Word association tasks constitute one of the main methods for collecting the content of SRs. It can be supported by a number of studies dealing with various objects of SR whose content has been revealed by verbal associations

(for recent works see Dany, Urdapilleta, & Lo Monaco, 2015; Jung & Pawlowski, 2014, 2015; Mäkiniemi, Pirttilä-Backman, & Pieri, 2011; Mouret, Lo Monaco, Urdapilleta, & Parr, 2013; Pozzi, Fattori, Bocchiaro, & Alfieri, 2014; Piermattéo, Lo Monaco, Moreau, Girandola, & Tavani, 2014; Roland-Levy, Lemoine, & Jeoffrion, 2014; Salès-Wuillemin et al., 2011).

Two methods are based on this type of task: free associations and hierarchical evocations (see Dany et al., 2015 for a recent review).

Hierarchical Evocations Method

This method is based on Verbal Associations Tasks

1. Associate *n* words or phrases to the object of representation under study.

2. Order these words or phrases from the more important to the less

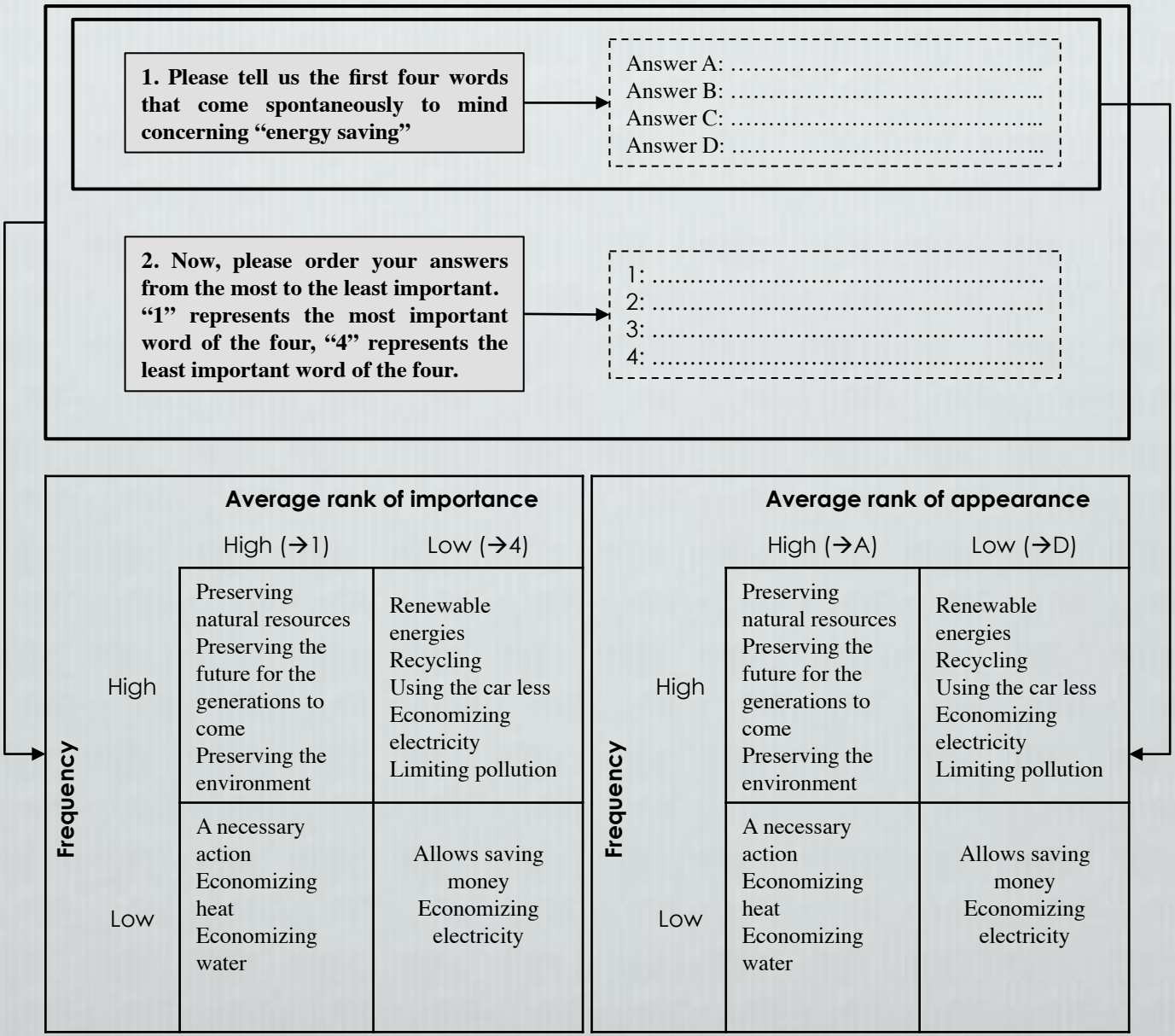
Hierarchical Evocations Method

We can add a third step:

3. Ask the participants to rate each answer in order to evaluate its attitude.
(Lo Monaco & Guimelli, 2008 ; Lo Monaco et al., 2009 ; Mouret et al., 2013 ; Piermattéo et al., 2014 ; Tavani, 2012).

Using a 7-point Likert Scale

From -3 (absolutely negative) to +3 (absolutely positive).


1. Please tell us the first four words that come spontaneously to mind concerning "energy saving"
Answer A: ……..
Answer B: ……..
Answer C: ……..
Answer D: ……..
2. Now, please order your answers from the most to the least important. "1" represents the most important word of the four, "4" represents the least important word of the four.
1: ……
2: ……
3: ……
4: ……
Average rank of importance
High (→1)
Low (→4)
Frequency
High
Low
Preserving natural resources
Preserving the future for the generations to come
Preserving the environment
Renewable energies
Recycling
Using the car less
Economizing electricity
Limiting pollution
A necessary action
Economizing heat
Economizing water
Allows saving money
Economizing electricity
Average rank of appearance
High (→A)
Low (→D)
Frequency
High
Low
Preserving natural resources
Preserving the future for the generations to come
Preserving the environment
Renewable energies
Recycling
Using the car less
Economizing electricity
Limiting pollution
A necessary action
Economizing heat
Economizing water
Allows saving money
Economizing electricity

How to formulate hypotheses concerning the structural status?

Hierarchical Evocations Method

2 indices :

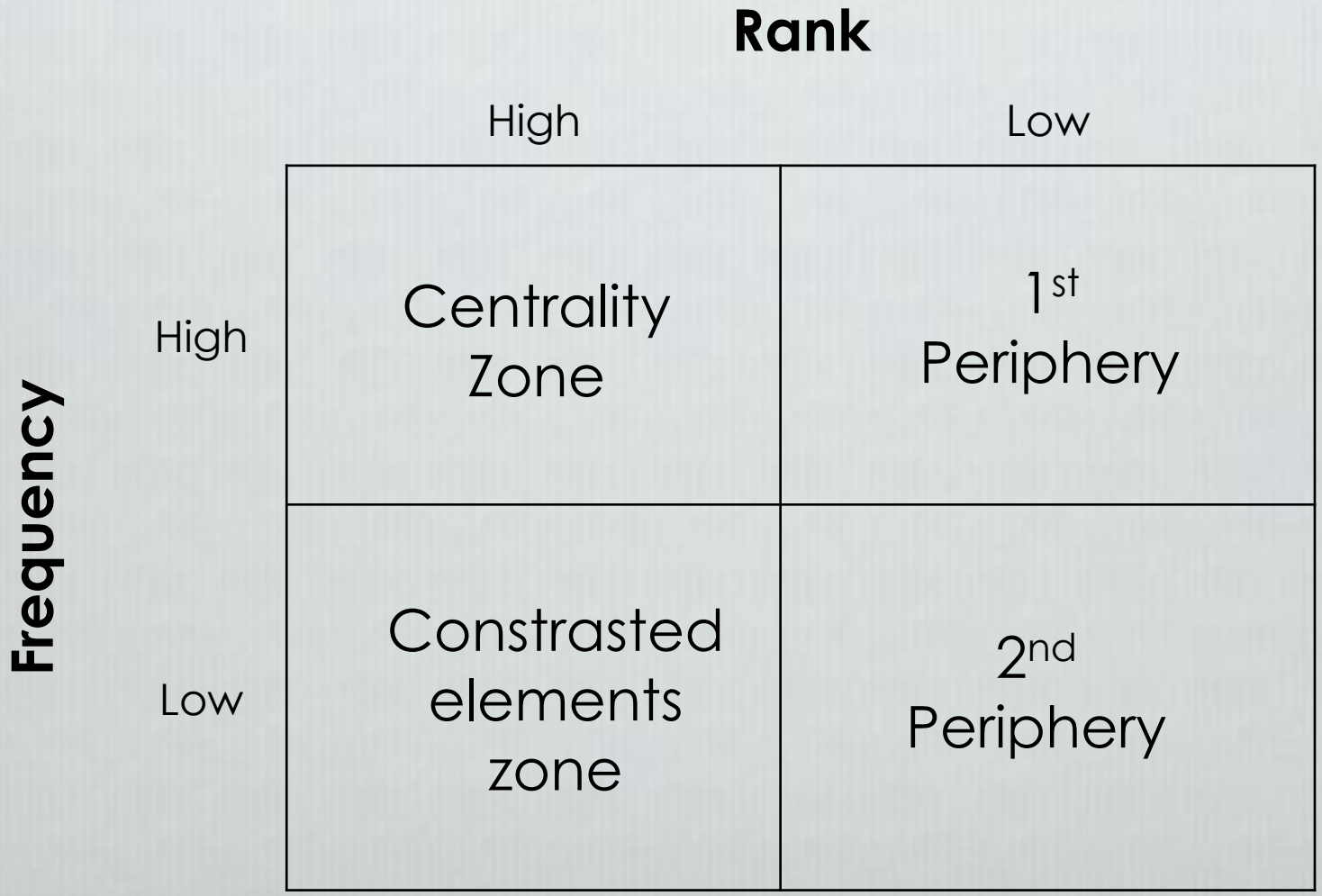
1. Average importance
2. Frequency

We can cross these 2 indices in order to :

→ **Formulate hypotheses** about the structural status of the cognitions associated by the participants.

Hierarchical Evocations Method

Studying the content and formulating hypotheses of centrality



Hierarchical Evocations Method

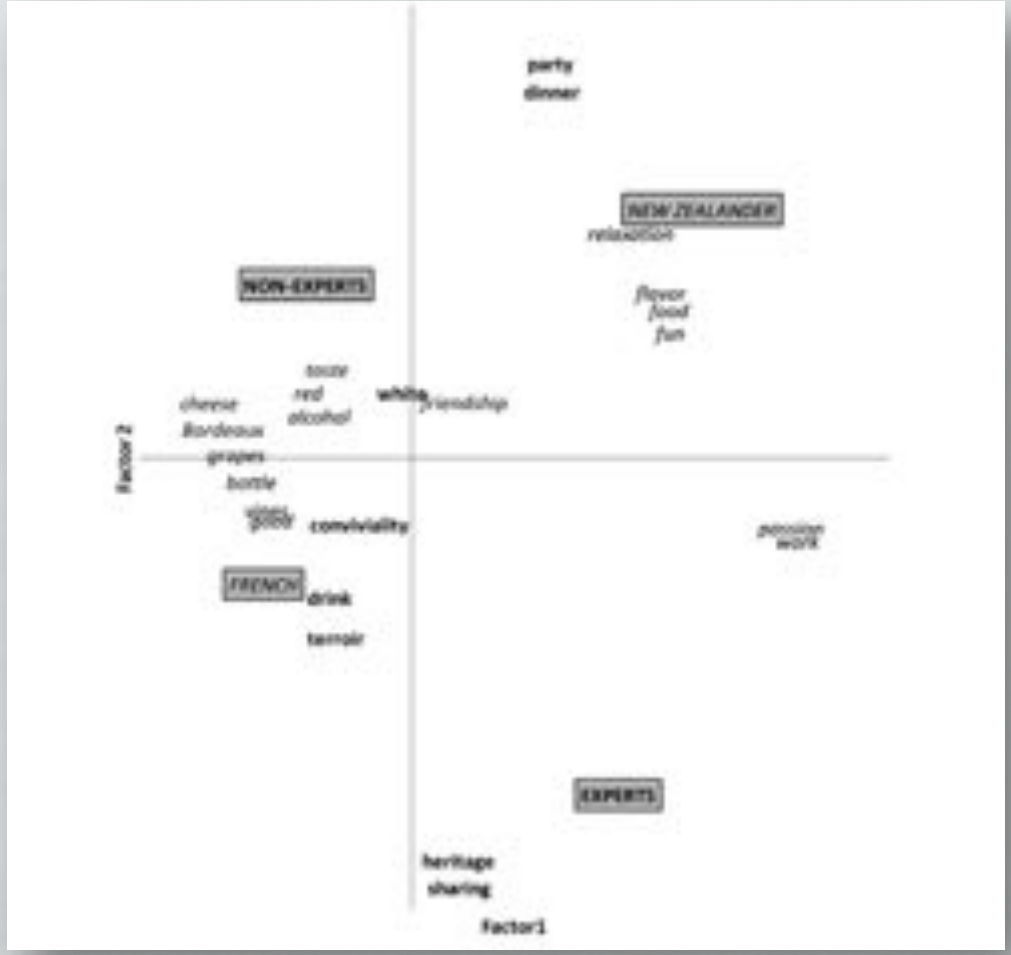
Fictitious example concerning the content of SR of Energy Savings

Frequency	Importance: High	Importance: Low
High	Preserving natural resources Preserving the future for the generations to come Preserving the environment	Renewable energies Recycling Using the car less Economizing electricity Limiting pollution
Low	A necessary action Economizing heat Economizing water	Allows saving money Economizing electricity

How to study the social regulations of the associated content?

Hierarchical Evocations Method

Studying the social regulations of the association of a content :



Mouret, M., Lo Monaco, G., Urdapilleta, I., & Parr, W. (2013). Social representations of wine and culture: a comparison between France and New Zealand. *Food Quality and Preference*, *30*, 102-107.

Hierarchical Evocations Method

The advantages …

- Easy to use
- Easy for the participants
- Give quickly access to a rich corpus of information
- Allow to use in the same time and for only one data collection to several ways to data analyses
  - Vergès' Table (1992)
  - Correspondences Factor Analysis
    - (e.g., Deschamps, 2003 ; Guimelli & Deschamps, 2000 ; Lo Monaco & Guimelli, 2008 ; Mouret et al., 2013 ; Piermattéo et al., 2014)
  - Computing an attitude score on the basis of the use of Likert scales in the framework of verbal associations
    - (Lo Monaco & Guimelli, 2008 ; Lo Monaco et al., 2009 ; Mouret et al., 2013 ; Piermattéo et al., 2014 ; Tavani, 2012)

Hierarchical Evocations Method

- **Allow a methodological triangulation of the methods of data analysis**
  - (Piermattéo, Lo Monaco, Moreau, Girandola & Tavani, 2014)

From a verbal association Task :

1. Vergès' Table (updated by Abric, 2003)
2. Correspondence Factor Analysis
3. Automatic lexical Analysis (Alceste or Iramuteq)
4. Linear Contrasts Analysis

Hierarchical Evocations Method

The disadvantages…

- Thematic reduction made by the researcher

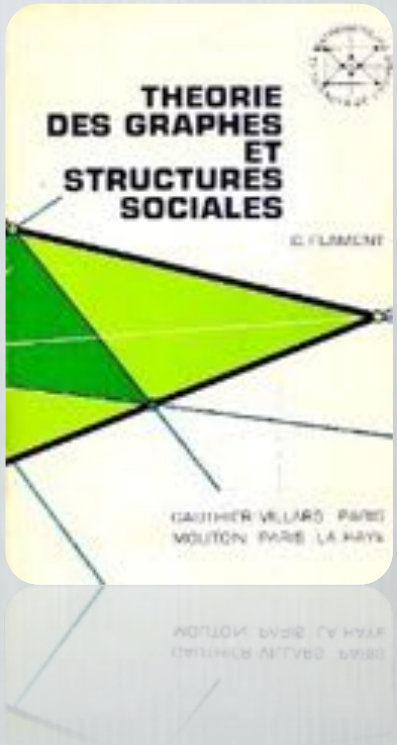
- Non systematic use of the rank of appearance or of the importance (Dany, Urdapilleta & Lo Monaco, 2014)
  - Represent a limit in terms of the comparability of the studies
- Problems concerning the thresholds
  - Represent a limit in terms of the comparability of the studies
  - Allow to formulate only hypotheses of centrality
    - Imply a second step to collect data
    - imply the problem of the feasibility: access to the population…

How to study the connexity property of the elements of a SR ?

The similarity analysis & the basic cognitive schemes model

The similarity analysis

Initiated by Claude Flament in 1962
This analysis is based on the Graphs Theory



A graph allow to describe a set of objects and their relationships, that is to say the links between the objects.

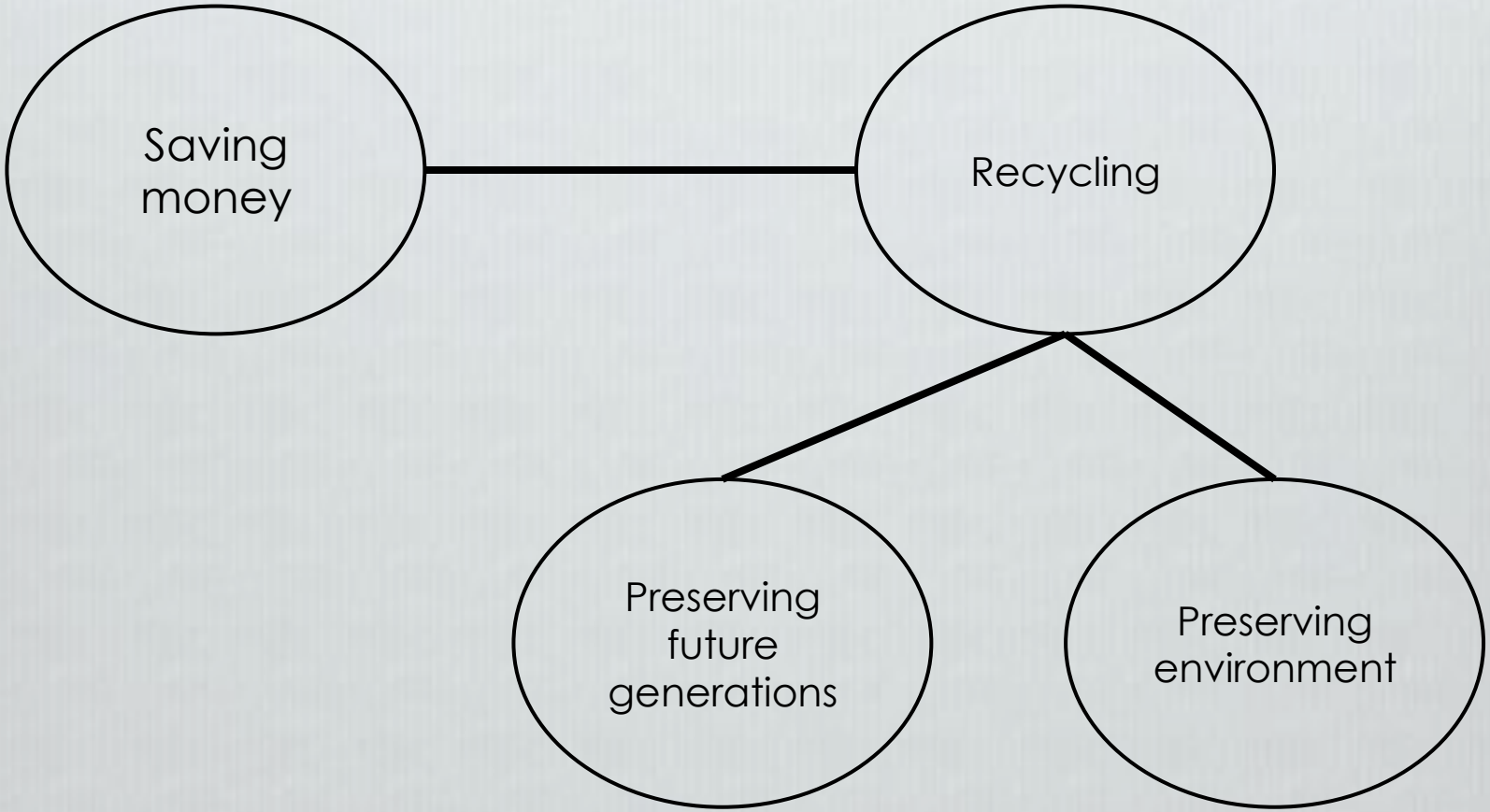
The objects are called the apexes of the graph

A link between two objects is called an edge.

A graph is composed of paths allowing to pass from an apex to another or to several others.

The similarity analysis

e.g., SR of energy savings



The similarity analysis

The advantages…

- Gives a fast insight of the relations between the cognitions / beliefs
- Allows to identify variations inthe organization of the representational field relatively to social practices, level of knowledge, level of personal involvement, socio-demographics variables…
- Existence of several indices (>70)
- Can be conducted from:
  - Questionnaire
  - Evocations
  - Q. sort questionnaires

The similarity analysis

The disadvantages…

- Provides hypotheses of centrality
- Gives only access to the quantitative connexity
- Difficult to proceed to a comparison between the graphs (only interpretative)
- Allows to work on the organization and not on the structural status of the elements, thus on the structure
    - (except in very recent works carried out by Ahn & Jung, 2014 or Jung & Pawlowski, 2014a, 2014b, … to be confirmed)

The basic cognitive schemes model (BCS)

- Developed by Rouquette (1990; Guimelli & Rouquette, 1992; Rouquette & Rateau, 1998)
- Developed in order to precise the quantitative connexity highlighted in the framework of the similarity analysis.
- Similarity analysis: consist in highlighting links between elements
  - → The basic cognitive schemes aims at precising the nature of these links.

The basic cognitive schemes model (BCS)

Concerning some elements identified during a previous step of research:

The participant has to associate three words to the inductor (for example the element « recycling » of the social representation of waste sorting)

After having associate the three responses R1, R2, R3 :

They have to answer several propositions in order to specify the nature of the link between each response (i.e., R1, R2 and R3) and the inductor.

1. Generally, we consider that the protection of the environment characterizes energy saving. From the term "recycling", please give 3 words that come spontaneously to your mind.

Answer 1: ……
Answer 2: ……
Answer 3: ……

2. Can you justify your answers?

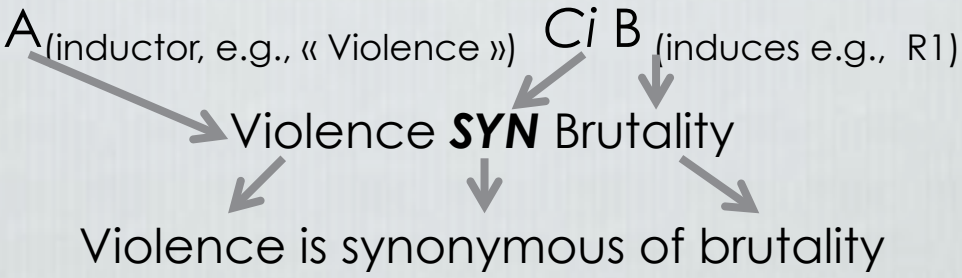
I have answered (your answer 1): ……
because……..
……..
I have answered (your answer 2): ……
because……..
……..
I have answered (your answer 3): ……
because……..
……..

3.	Write here your answer 1: ……	YES	NO	Maybe
SYN:	"Recycling" means the same thing, has the same sense as your answer 1	☐	☐	☐
DEF:	"Recycling" can be defined as your answer 1	☐	☐	☐
ANT:	"Recycling" is the opposite of your answer 1	☐	☐	☐
TEG:	"Recycling" is a part of, is included in, is an example of your answer 1	☐	☐	☐
TES:	"Recycling" has for an example, for a particular case, comprises, includes your answer 1	☐	☐	☐
COL:	"Recycling" belongs to the same class, general category as your answer 1	☐	☐	☐
COM:	"Recycling" is a constituent, component of your answer 1	☐	☐	☐
DEC:	"Recycling" has as a component, as a constituent, your answer 1	☐	☐	☐
ART:	"Recycling" and your answer 1 are both constituents of the same thing	☐	☐	☐
OPE:	"Recycling" makes your answer 1	☐	☐	☐
TRA:	"Recycling" has an action on your answer 1	☐	☐	☐
UTI:	"Recycling" uses your answer 1	☐	☐	☐
ACT:	It is your answer 1 which makes "Recycling"	☐	☐	☐
OBJ:	"Recycling" is an action which has for object, carries on, applies to your answer 1	☐	☐	☐
UST:	To make "Recycling", we use your answer 1	☐	☐	☐
FAC:	Your answer 1 is someone (a person, an institution) who acts on "Recycling"	☐	☐	☐
MOD:	Your answer 1 indicates an action that we can make on (about, in case of, towards) "Recycling"	☐	☐	☐
AOB:	Your answer 1 is a tool that we use on (about, in case of, towards) "Recycling"	☐	☐	☐
TIL:	"Recycling" is used by your answer 1	☐	☐	☐
OUT:	We use "Recycling" to make your answer 1	☐	☐	☐
AOU:	"Recycling" is a tool which we can use to make your answer 1	☐	☐	☐
CAR:	"Recycling" is always characterized by your answer 1	☐	☐	☐
FRE:	"Recycling" is often characterized by your answer 1	☐	☐	☐
SPE:	"Recycling" is sometimes characterized by your answer 1	☐	☐	☐
NOR:	"Recycling" has to have the quality of your answer 1	☐	☐	☐
EVA:	Your answer 1 estimates "Recycling"	☐	☐	☐
COS:	"Recycling" results in (consequence or goal), entails your answer 1	☐	☐	☐
EFF:	"Recycling" has for cause, depends on, is entailed by your answer 1	☐	☐	☐

The basic cognitive schemes model (BCS)

These relations can be characterized by 28 different states

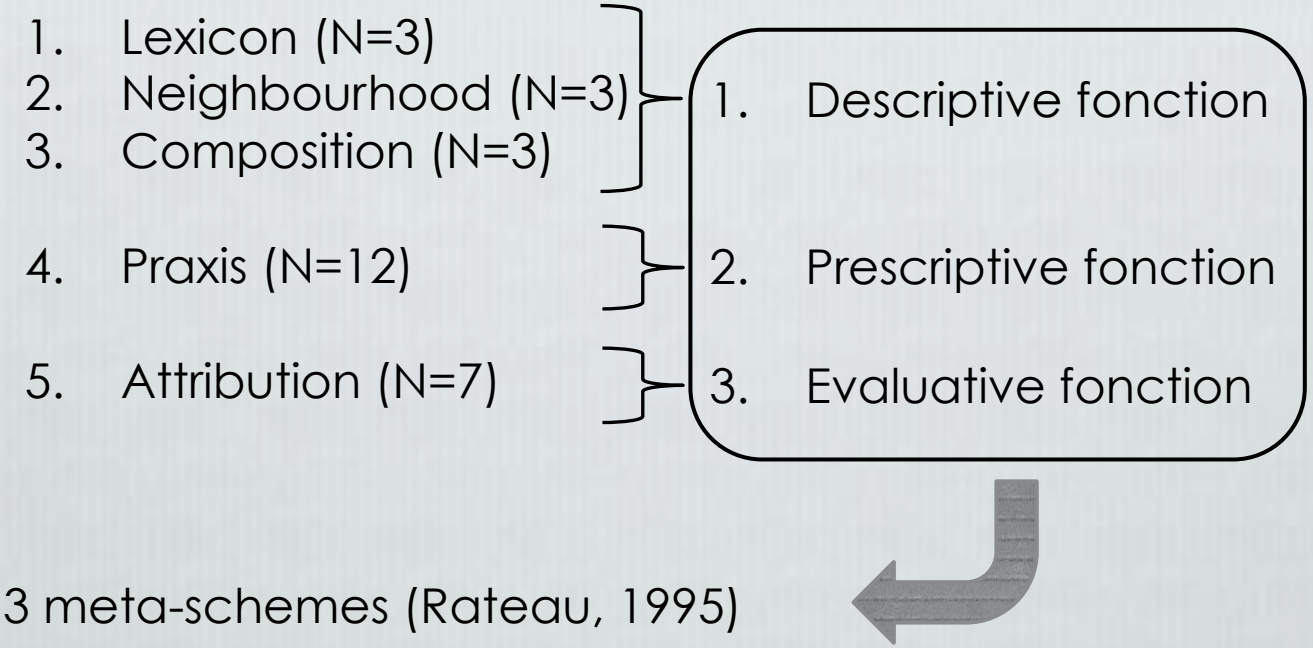
These states consitute a *triplet* :



Ci indicates the connector, they are 28 forming 5 families :

1. Lexicon (N=3)
2. Neighbourhood(N=3)
3. Composition(N=3)
4. Praxis (N=12)
5. Attribution(N=7)

The basic cognitive schemes model (BCS)



This model allows to tackle the question of the nature of the central elements:

- Functional vs. normative (Abric, 1987) vs. mixed, i.e., functional **and** normative (Abric & Tafani, 1995; Guimelli, 1995, 1998, 2003; Rateau, 1995)

The basic cognitive schemes model (BCS)

The advantages…

- Very complete model
- Gives information both on the structural status and the nature of the core elements
- Highlights the organizing role of the core elements
- Allows several ways of data analyses

The basic cognitive schemes model (BCS)

The disadvantages…

- An example to illustrate the major disadvantage:
  - If you want to to diagnose the structural status of 5 elements:
    - You need to obtain 84 responses X five elements, i.e., 420 responses.
    - However, according to Burchell and Marsh (1992), the length of a questionnaire is deleterious for the reliability of the responses provided by the participants.
    - Moreover, it affects closed-ended questions more than open-ended ones, which constitute the BCS questionnaire.
  - There is a reduced form of the BCS with 20 connectors
- Except Guimelli and Rateau (2003), the content associated by the participants is not considered, only the valences are taken into account.

How to diagnose the structure when we have previously collected the content?

Attribute-Challenge Technique
Test of Context Independence
Ambiguous Scenario Induction

Attribute-Challenge Technique (ACT)

- Developed by Moliner (1988, 1989, 1992)
- It was the first method which was able to diagnose the structure of a SR (Flament, 2001).
- Based on the symbolic property of the central elements (i.e., sense-making function).

Attribute-Challenge Technique (ACT)

Based on a double-negative principle

It can determine whether the lack of a link between the representational element and the object of representation (first negation) is

- unacceptable (second negation) or
- acceptable (absence of second negation)

If…
the absence of a link between the element and the object of representation proves to be unacceptable to the majority of participants,

then…
this means that this element is non-negotiable for the definition of the object and is therefore central.

Attribute-Challenge Technique (ACT)

In your opinion, can we say that a behavior correspond with energy savings if this behavior do not allow to preserve the environment ?

If there is a majority of « No » responses, the one can conclude that the preservation of the environment is an aspect for the participants implied in the way they think energy savings.

In your opinion, can we say that a behavior correspond with energy savings if this behavior do not allow to save money?

In this case, one can think that the participants would say « Yes »

Thus, the **« preservation of the environment »** and **« Money savings »** have not the same status for the participants in their way to think the energy savings.

Attribute-Challenge Technique (ACT)

Concretely, responses are collected by means of 4-point ordinal scales, such as the following one which includes

Two acceptance levels and two refutation levels:

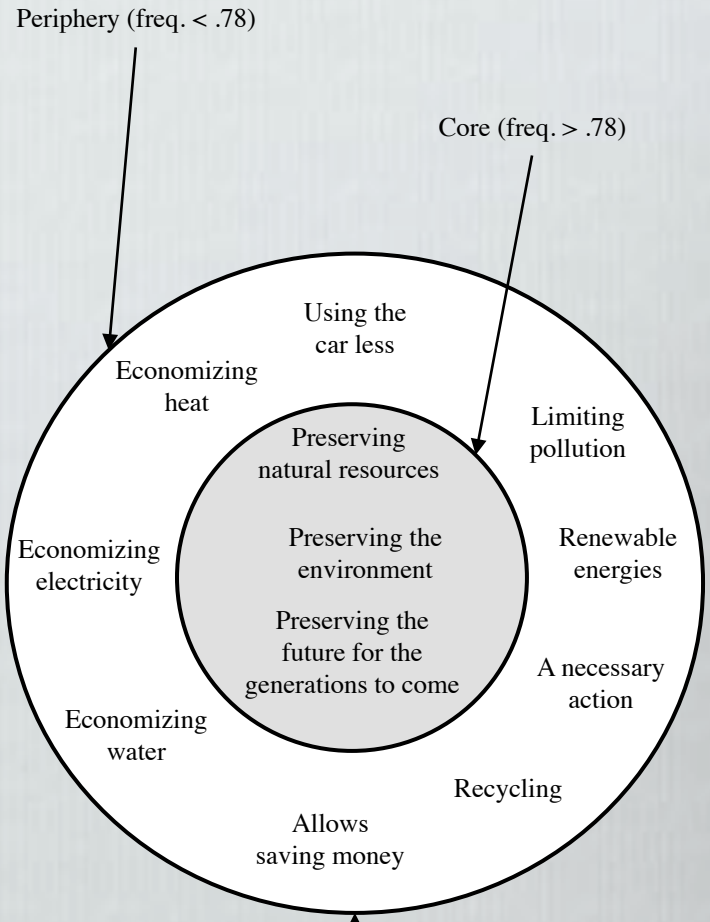
This certainly corresponds with energy savings	This probably corresponds with energy savings	This probably does not corresponds with energy savings	This certainly does not corresponds with energy savings

ACT : In your opinion, can an activity be considered as energy savings if it does not give rise to: **TCI :** In your opinion, is "energy savings" an activity that always involves, in all cases:	Examining the frequencies of "No" responses (ACT) or "Yes" responses (TCI)	
	ACT ("No" frequencies)	**TCI ("Yes" frequencies)**
Preserving natural resources	.80	.80
Preserving the environment	.79	.79
Economizing electricity	.65	.65
Recycling	.54	.54
Limiting pollution	.46	.46
Economizing heat	.72	.72
Renewable energies	.46	.46
A necessary action	.70	.70
Allows saving money	.50	.50
Using the car less	.67	.67
Economizing water	.65	.65
Preserving the future for the generations to come	.86	.86

Calculation of the *Dmax* Kolmogorov-Smirnov*

For $N = 40$
$Dmax\ (p < .05) = .78$

$$Dmax = 1 - \left(\frac{1.36}{\sqrt{N}}\right)$$



How to analyze data collected by means of ACT?

Attribute-Challenge Technique (ACT)

Thresholds of decision

There are four informations.

1. From the beginning: threshold of 75% of refutations
2. Equifrequency (chi-square test): an element is central if its % of refutation significantly differs from 50%
3. Certain works compared the frequency of refutations to norm of 75%.
4. Kolmogorov-Smirnov *D*max Test in order to identify a threshold beyond which the proportion of frequencies does not significantly differ from 100%

Attribute-Challenge Technique (ACT)

The advantages…

- Has allowed the identification of the structure in the framework of several studies.
  - Allows an important hindsight.
- Simple to use
- Implies a reduced number of participants

Attribute-Challenge Technique (ACT)

The disadvantages…

- The double-negative is est « annoying » for everyone (Flament, 2001)
  - Presents inconvenients for understanding (Dickes et al., 1994 ; Lo Monaco, Lheureux & Halimi-Falkowicz, 2008)
- There are variations in terms of centrality diagnosis function to the number of modalities.

Ambiguous-Scenario Induction

It consists in searching for elements that are useful to recognize a representation object and to differentiate it from other closed objects.

- Originally proposed by Moliner (1993)
- Directly inspired by Mc Cauley and Stitt (1978)
- Consists of the presentation of a scenario with a general, imprecised, and vague object

Induction by Ambiguous Scenario

1. First step:

After having collected the content (by means for example of a verbal association task)
From this corpus, you have to locate a set of associated themes.

For each theme: study of its structural status.

2. Construction of an ambiguous scenario
Description of a general, imprecised, and vague object

''Since many years, Solitec has gathered several persons with diverse competences and interests. Each one of these persons contributes in his proper manner to the functioning of this organization which is recognized as one of the most important of its speciality area''.

According to you, this description corresponds to:
A: an association
B: a firm
C: a research center
D: none of the 3

Induction by Ambiguous Scenario

In his study, Moliner (1993) observed the following results:

- 38% associate SOLITEC to an association
- 33% to a firm
- 28% to a research center
- 1% None

Induction by Ambiguous Scenario

3. Centrality test

One completes the scenario with two different modalities:

1. The scenario ends with:
''SOLITEC is surely one of the most representative firm of in its field''

2. The scenario ends with:
« Yet, SOLITEC is not a firm ».

For each condition, Moliner (1993) proposes 14 items previously identified in the framework of a first step.

For each item, the instruction is the following:
According to you, does SOLITEC present the following attributes?

6-point scale	Condition		Structural diagnosis
Items	**Yes it is a firm**	**No it is not a firm**	
Makes money	4.13*	2.81	
Economy	4.13*	2.94	
Headed by a boss	4.31*	3.06	
Face competition	4.63*	2.75	
Work place	4.81	4.06	
Organized	5.00	5.38	
Product	4.31	4.81	
Hierarchized	4.00	3.50	
Communication	4.56	5.13	
Objectives	3.81	4.56	
Conflicts	2.19	2.75	
Creation	4.88	4.69	
Jobs	3.75	2.81	

Induction by Ambiguous Scenario

The advantages…

- Gives access to consistent results with ACT
- Really allows to work on the sense giving function of core elements

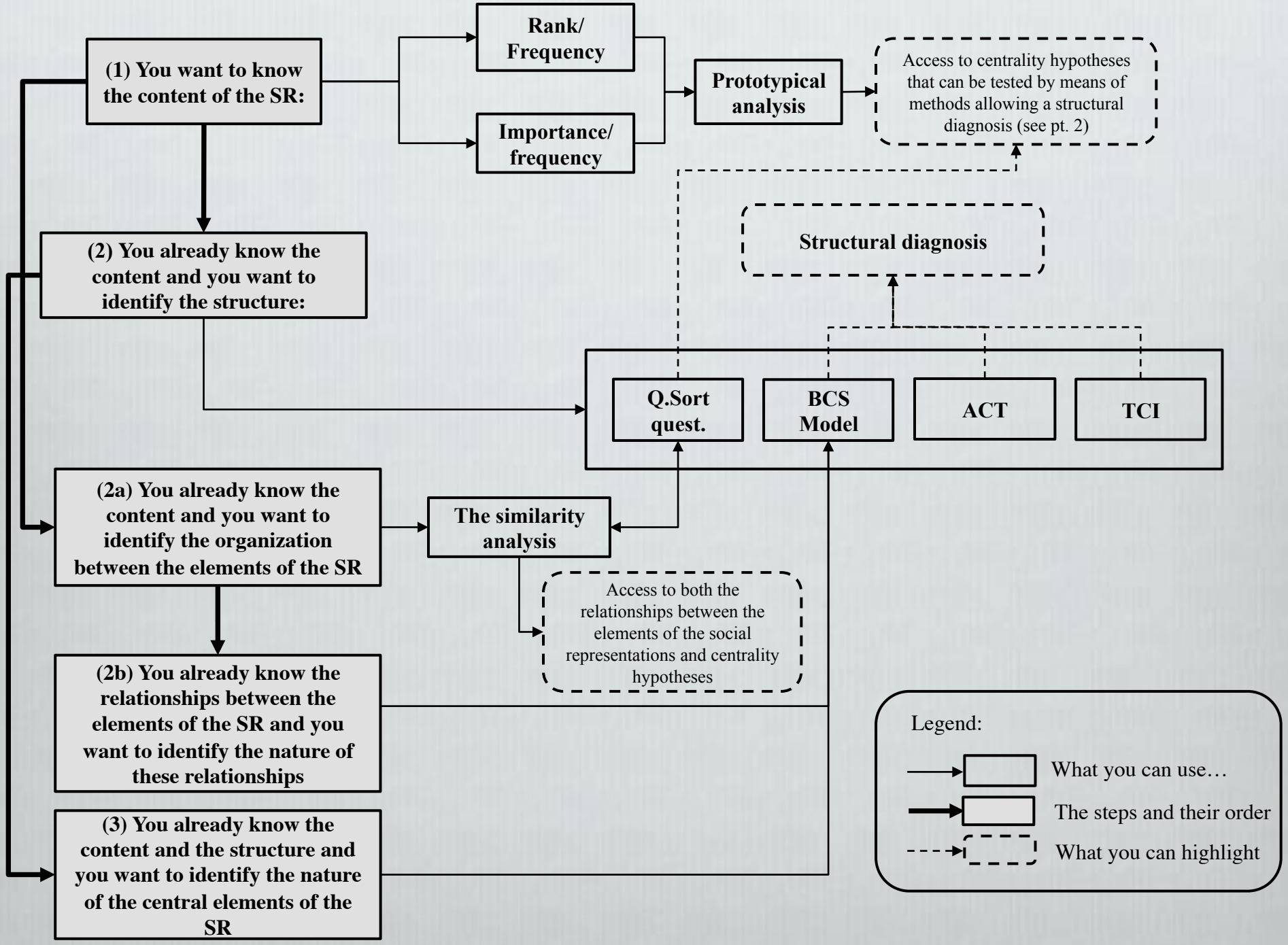
Induction by Ambiguous Scenario

The disadvantages…

- Scenario often complicated to contruct and/or to adapt
- Has been used in a few number of studies
  - *(Moliner, 1993, 2002 ; Papet, Louche & Pansu, 2000)*

Toward a decision tree?

Lo Monaco, G., Piermattéo, A., Rateau, P., & Tavani, J. L. (accepted). Methods for studying the structure of social representations: a critical review and agenda for future research. *Journal for the theory of social behavior.*


(1) You want to know the content of the SR:
Rank/ Frequency
Importance/ frequency
Prototypical analysis
Access to centrality hypotheses that can be tested by means of methods allowing a structural diagnosis (see pt. 2)
(2) You already know the content and you want to identify the structure:
Structural diagnosis
Q.Sort quest.
BCS Model
ACT
TCI
(2a) You already know the content and you want to identify the organization between the elements of the SR
The similarity analysis
Access to both the relationships between the elements of the social representations and centrality hypotheses
(2b) You already know the relationships between the elements of the SR and you want to identify the nature of these relationships
(3) You already know the content and the structure and you want to identify the nature of the central elements of the SR
Legend:
What you can use…
The steps and their order
What you can highlight

Agenda for future research

What about the meaning? Semantic contextualization and verbal associations

When we group terms in categories:

- How to know the meaning given to the word?
- What is the meaning attributed to the relationship between the associated word and the inductor?

Semantic contextualization: a solution?

It consists in asking participants to write a sentence expressing the meaning that they wished to assign to their association in relation to the inductor.

Comparison by means of an inter-judge agreement on the identification of thematic categories and, on the other hand, the inclusion of any such association in any particular category.

Agenda for future research

Structural diagnosis and number of modalities of response

There are variations in the diagnosis of centrality depending on whether an intermediate position is proposed or not.

(i.e., 4 modalities of response vs. 5 modalities of response, Apostolidis et al., 2011; Dany & Apostolidis, 2007)

A comparison between ACT and TCI?

An experimental study could be conducted to compare the results obtained with 4 and 5 modalities with both the ACT and the TCI.

		Type of method	
		TCI	ACT
Number of modalities	4 modalities		
	5 modalities		

Conclusion

- A research program to investigate
- Theoretical questions linked to methodological issues?

- This research program has to follow an agenda related to a methodological logic in order to avoid a "domino effect"

  1. Work on hierarchical evocations : semantic contextualization

  2. Work on structural diagnosis

This afternoon…

- **Test of Context Independence**
  - Piermattéo, A., Lo Monaco, G., & Girandola, F. (in press). When commitment can be overturned: Anticipating environmental program dropouts through social representations. *Environment and Behavior.*

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Thank you for your attention !

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