LES MÉTHODES MIXTES

pour l'analyse de l'activité et de l'expérience en Éducation physique & en Sport
Articulation des données et des épistémologies

AVANCÉES DES MÉTHODES MIXTES POUR L'ANALYSE OBSERVATIONNELLE DE L'ACTIVITÉ ET DE L'EXPÉRIENCE EN ÉDUCATION PHYSIQUE ET SPORTIVE: REFLECTIONS ET APPROCHE MÉTHODOLOGIQUE

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SYNTHÈSE HISTORIQUE (1)

Confrontation traditionnelle entre les perspectives qualitatives et quantitatives, considérées comme inconciliables.

Considération des deux perspectives comme des paradigmes.

Alternance pendulaire du paradigme dominant.

Confrontation dure pendant des décennies, où tous les efforts ont été consacrés à la critique de la position opposée.

Lente rémission de la confrontation, avec des incursions fugaces dans la complémentarité.

Progression soutenue de la complémentarité (et après intégration), tissée aux niveaux conceptuel, technologique et méthodologique.

SYNTHÈSE HISTORIQUE (2)

Pendant des décennies, les données qualitatives ont été largement discréditées, de même que les données quantitatives, selon la prédominance de certaines écoles de psychologie.

Les données qualitatives étaient considérées comme "non scientifiques" et peu crédibles pour la recherche sur le comportement humain par de grands groupes de chercheurs, tandis que les données quantitatives étaient considérées comme "vides de contenu".

Dans de nombreuses situations dans le domaine de la prise en charge de la diversité, on obtient du matériel visuel et textuel qui peut fournir des informations très riches s'il est traité de manière appropriée.

Depuis le début du nouveau millénaire, l'approche des méthodes mixtes est devenue très populaire et a eu un impact très positif.

ÉTUDES DE MÉTHODES MIXTES

INTEGRATION D'ÉLÉMENTS QUALITTIFS ET QUANTITATIFS

Processus de recherche

- Identification du probleme
- Approche du modèle
- Collecte de données
- Analyse des données
- Interprétación des résultats

- Enregistrement d'observation, entretiens, données d'archives, questionnaires, ...
- Les données qualitatives enregistrées doivent être transformées en matrices de codes.
- Toutes les techniques d'analyse des données sont possibles.
- Processsus d'INTEGRACION finale.

Différentes taxonomies (Creswell, Plano Clark, Onwuegbuzie, Tashakkori, Teddie)

IMPULSION DES MÉTHODES MIXTES

Au tournant du siècle et du millénaire, avec quelques différences de date selon les pays, **les méthodes mixtes ont donné lieu à une véritable révolution méthodologique**.

Elles ont laissé derrière des luttes tribales vides de sens, visant uniquement à l'auto-affirmation de chaque position (qualitative vs. quantitative) et à la critique de la position opposée, afin de dépasser cette forte dichotomisation de la recherche et des chercheurs.

La division existante était très profonde, et profondément enracinée. **Cette troisième option (QUAL, QUAN, MM) est très positive pour l'avancement des connaissances**, mais nous sommes toujours dans une "crise de croissance".

PERTINENCE DE LA MÉTHODOLOGIE D'OBSERVATION DANS L'ÉTUDE DE L'ÉDUCATION PHYSIQUE ET SPORTIVE

L'observation systématique a été progressivement incorporée dans divers domaines de la recherche en éducation physique et en sport, bien qu'elle ait été considérée par certains chercheurs comme étant en marge de la méthodologie conventionnelle.

Les sciences de l'éducation physique et du sport se concentrent de plus en plus sur l'étude du comportement quotidien. **Des études appliquant des méthodologies d'observation systématique peuvent désormais être trouvées dans des revues interdisciplinaires** (par exemple, *Frontiers in Psychology* [Q1] et *Psicothema* [Q1]) **et des revues méthodologiques** (par exemple, *Behavior Research Methods* [Q1]) (avant aussi *Quality & Quantity*).

L'OBSERVATION SYSTÉMATIQUE DU COMPORTAMENT HUMAIN

Quality and Quantity, 13 (1979) 449–484 449
© Elsevier Scientific Publishing Company, Amsterdam – Printed in The Netherlands

OBSERVATIONAL TYPOLOGY

TERESA ANGUERA-ARGILAGA

Qual Quant (2013) 47:1237–1257
DOI 10.1007/s11135-012-9764-6

Qualitative/quantitative integration in the inductive observational study of interactive behaviour: impact of recording and coding among predominating perspectives

Pedro Sánchez-Algarra · M. Teresa Anguera

Psicothema

Psicothema 2013, Vol. 25, No. 3, 396-401
doi: 10.7334/psicothema2012.93

ISSN 0214 - 9915 CODEN PSOTEG
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Sequential analysis of an interactive peer support group

Marina Roustan[1], Conrad Izquierdo Rodríguez[2] and M. Teresa Anguera Argilaga[3]
[1] Psychotherapist, [2] Universidad Autónoma de Barcelona and [3] Universidad de Barcelona

Psicothema

Psicothema 2015, Vol. 27, No. 3, 283-289
doi: 10.7334/psicothema2014.276

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Guidelines for reporting evaluations based on observational methodology

Mariona Portell[1], M. Teresa Anguera[2], Salvador Chacón-Moscoso[3,4] and Susana Sanduvete-Chaves[3]
[1] Universitat Autònoma de Barcelona, [2] Universidad de Barcelona, [3] Universidad de Sevilla and [4] Universidad Autónoma de Chile (Chile)

Behavior Research Methods
2006, 38 (3), 372-381

Hidden patterns of play interaction in soccer using SOF-CODER

GUDBERG K. JONSSON
University of Iceland, Reykjavik, Iceland and University of Aberdeen, Aberdeen, Scotland

M. TERESA ANGUERA, ÁNGEL BLANCO-VILLASEÑOR and JOSÉ LUIS LOSADA
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TONI ARDÁ
University of A Coruña, A Coruña, Spain

OLEGUER CAMERINO
University of Lleida, Lleida, Spain

and

JULEN CASTELLANO
University of the Basque Country, Vitoria, Spain

frontiers in Psychology

METHODS
published: 30 January 2018
doi: 10.3389/fpsyg.2018.00013

Indirect Observation in Everyday Contexts: Concepts and Methodological Guidelines within a Mixed Methods Framework

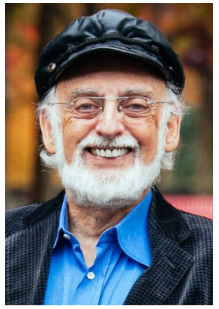
M. Teresa Anguera[1], Mariona Portell[2], Salvador Chacón-Moscoso[3,4] and Susana Sanduvete-Chaves[3]*

L'OBSERVATION SYSTÉMATIQUE DU COMPORTAMENT HUMAIN

"*We define systematic observation as a particular approach to quantifying behavior. This approach typically is concerned with naturally occurring behavior observed in naturalistic contexts.*"

(Bakeman & Gottman, 1986, p. 4)

Roger Bakeman
Professor Emeritus
Georgia State University
Psychology Dept.



John M. Gottman
Professor Emeritus
University of Washington
Psychology Dept.

BREF HISTORIQUE

- Avant 1986: uniquement des études descriptives

- A partir des 1986: développement de l'observation comme méthodologie scientifique, alliant rigueur et flexibilité

- La **période actuelle** (21e siècle, jusqu'à aujourd'hui). Des progrès impressionants sur plusieurs fronts:

  - Conceptuel
  - Technologique
  - **Méthodologique**

AVANCÉES CONCEPTUELLES (1)

1) L'objectif est de **découvrir des modèles de comportement et des structures cachées dans les processus comportementaux observables**. Il s'agit d'une question conceptuelle importante.

> "*Science searching for repeated patterns in nature, and mathematics being the science of patterns, suggests imagining and mathematically describing the abstract structure of the often dimly perceived repeated patterns of everyday life*."
>
> (Magnusson, 2016, p. 5)

La période actuelle (21e siècle, jusqu'à aujourd'hui).
Des progrès impressionants sur plusieurs fronts:

- ❑ **Conceptuel**
- ❑ Technologique
- ❑ Méthodologique

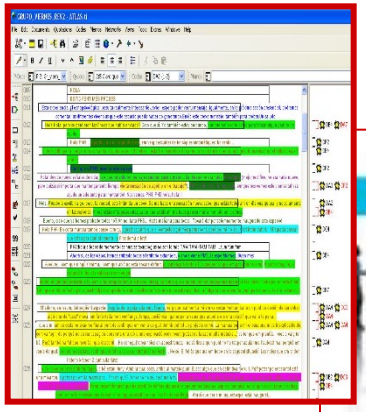
Magnus S. Magnusson
Human Behavior Laboratory
University of Iceland

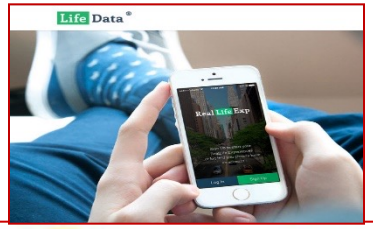
AVANCÉES CONCEPTUELLES (2)

2) Différenciation récente entre:

L'observation directe implique un niveau élevé de perceptivité (perception visuelle) dans les comportements observés.

L'observation indirecte implique principalement l'analyse de matériel textuel généré à partir de transcriptions d'enregistrements audio de comportements verbaux dans des environnements naturels (par exemple, conversations, discussions de groupe) ou à partir de récits (par exemple, lettres de réclamation, tweets, messages de forum).





frontiers in Psychology

METHODS
published: 30 January 2018
doi: 10.3389/fpsyg.2018.00013

Indirect Observation in Everyday Contexts: Concepts and Methodological Guidelines within a Mixed Methods Framework

M. Teresa Anguera[1]*, *Mariona Portell*[2], *Salvador Chacón-Moscoso*[3,4] *and Susana Sanduvete-Chaves*[3]

[1] Faculty of Psychology, Institute of Neurosciences, University of Barcelona, Barcelona, Spain, [2] Faculty of Psychology, Department of Psychobiology and Methodology of Health Sciences, Universitat Autónoma de Barcelona, Barcelona, Spain, [3] Facultad de Psicología, Universidad de Sevilla, Seville, Spain, [4] Departamento de Psicología, Universidad Autónoma de Chile, Santiago, Chile

Narratives are an excellent vehicle for studying everyday life through indirect observation, and one option for studying them is to apply a procedure for systematizing and structuring the information through *quantitization*. This approach makes it possible to integrate qualitative and quantitative elements.

The data used in indirect observation invariably start out as qualitative and the source material varies according to the level of participation of the person being observed and the nature of the source (textual or non-textual).

Integration of qualitative and quantitative elements is the key to any mixed methods approach (Creswell and Plano Clark, 2007; Bazeley, 2009; O'Cathain et al., 2010; Maxwell et al., 2015). Our approach adds another element: the liquefaction of verbal behavior and texts. This process consists of schematically transforming "solid" textual material into "liquid" matrices of codes apt for quantitative analysis (Anguera et al., 2017b; Anguera, in press). The quantitative processing of originally qualitative data with the aim of detecting hidden behavioral patterns or underlying structures, for example, adds an element of robustness to the integration of qualitative and quantitative data, particularly in the case of everyday life events and behaviors.

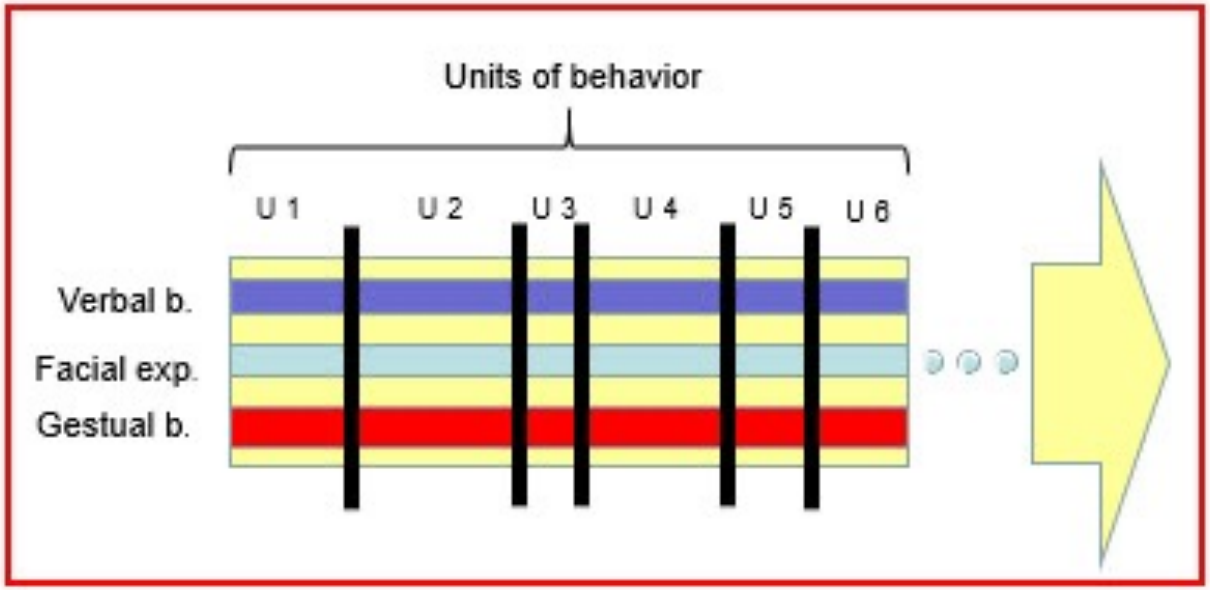
Common sources of material used in indirect observation studies include:

- Recordings of verbal behavior as it occurs (normally in mp3 files). There may be single or multiple dialogues and it is essential to clearly distinguish between the different "voices" recorded.
- Transcripts of audio recordings of verbal behavior in a natural setting (Krueger and Casey, 2009). These may involve an individual (speaking, for example, in person or on the telephone), or a group (dyad, triad, focus group, etc.), in which each person can be clearly identified.
- Written texts produced by the participants in a research study. These include texts produced by the participants or those close to them (e.g., letters of complaint, letters to a newspaper, tweets, ads, messages on a mural, instant text messages). A variety of communication channels are possible (e.g., paper, e-mail, WhatsApp).
- Texts transmitted through the Internet, such as e-mails (Björk et al., 2014) and forum posts (Vaimberg, 2010). These constitute an extremely rich source of information and are particularly relevant to psychological interventions.
- Everyday objects related to the research question(s). While objects may appear to have a secondary role in communication, they can provide relevant insights into everyday life as they evoke or facilitate the expression of emotions through micro-valences (Lebrecht et al., 2012). Examples are graphs, paintings, models, and clay figures. Technological advances have also opened up new opportunities in this area in recent years.
- Graphic material, particularly photographs. These can constitute an extremely rich source of information (Zaros, 2016). A single photograph captures a moment, something static, but a gallery of photographs separated in time can capture the dynamics of an episode or successive episodes in the life of a person, or even a group or institution. This material can be primary (the only source available) or secondary (complementing other sources).
- Unobtrusive objects, also referred to as aggregates (Webb et al., 1966). These may simply be anecdotal, but in some cases they can reveal the existence of certain behaviors, but only after a process of inference involving variable risk. Examples are fingerprints and objects such as cigarette butts or a napkin with notes or drawings left behind in a café.

The above sources of information give rise to a varied set of data that provides empirical evidence and can position specific events and everyday behaviors along a continuum of time. Finally, the information available becomes progressively richer as one gains access to several sources of documentary material.

AVANCÉES CONCEPTUELLES (3)

Cela a entraîné des **répercussions conceptuelles** (proposition de dimensions à partir de cadres théoriques, déclinaison des dimensions en sous-dimensions, critères de segmentation des épisodes en unités de comportement / unités textuelles, etc.).



AVANCÉES TECHNOLOGIQUES (1)

Il y a eu **deux types principaux d'avancées technologiques**:

La période actuelle (21e siècle, jusqu'à aujourd'hui). Des progrès impressionants sur plusieurs fronts:

- ❑ Conceptuel
- ❑ **Technologique**
- ❑ Méthodologique

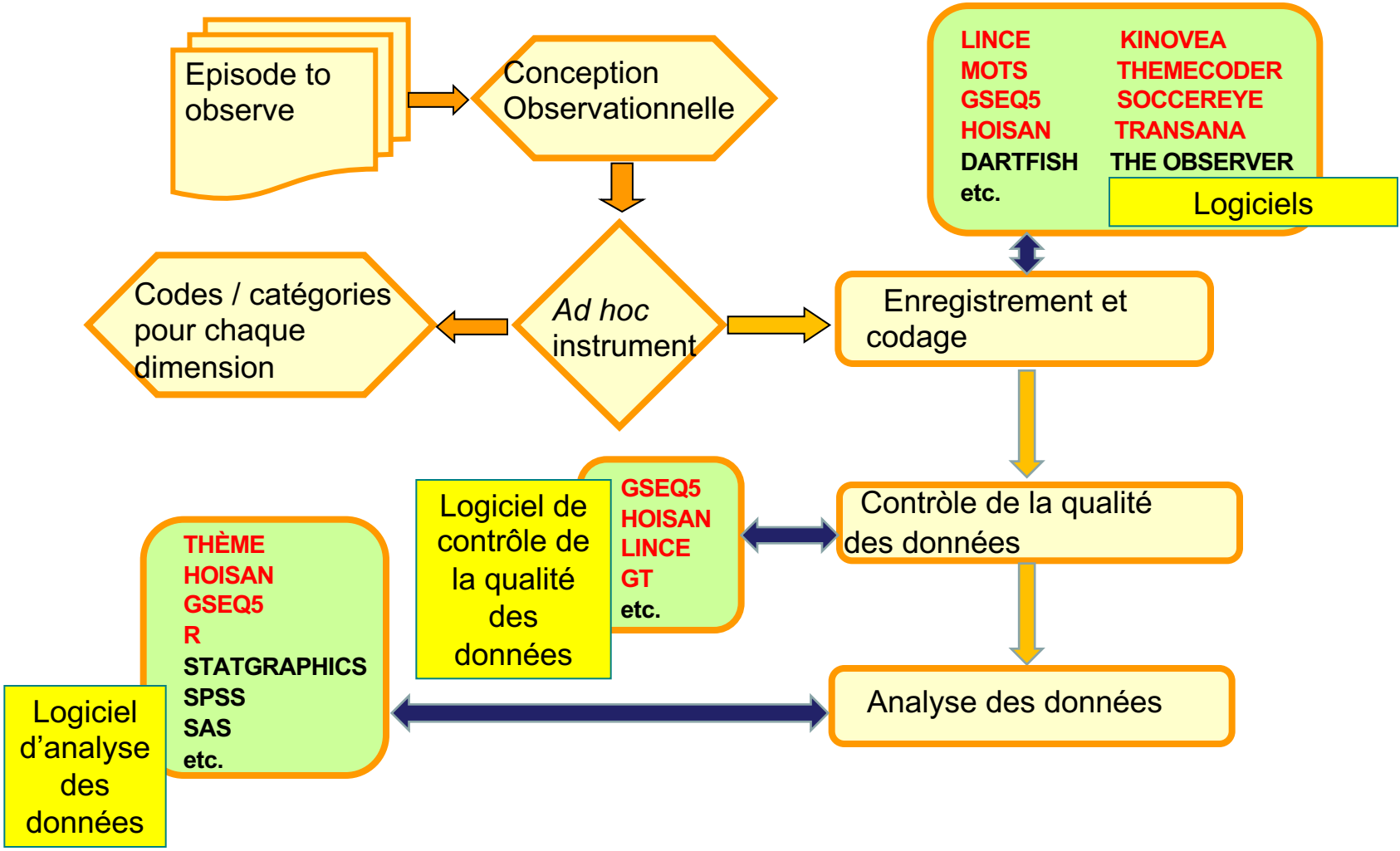
I. LOGICIELS

1. Enregistrer des images, des sons, des textes, etc., sous forme de données catégorielles.

Direct observation	GSEQ5, HOISAN, LINCE, MOOTS, SDIS-GSEQ, etc.
Indirect observation	PRAA, the entire CAQDAS group (ATLAS.ti, IRAMUTEQ, MAXqda, NUDIST, NVIVO, etc.).
Direct and indirect observation	ELAN and TRANSANA

2. Contrôler la qualité des données catégorielles: GSEQ5, HOISAN, LINCE, SDIS-GSEQ, SAS.
3. Analyser les données catégorielles: GSEQ5, HOISAN, SDIS-GSEQ, R, SAS, SPSS.

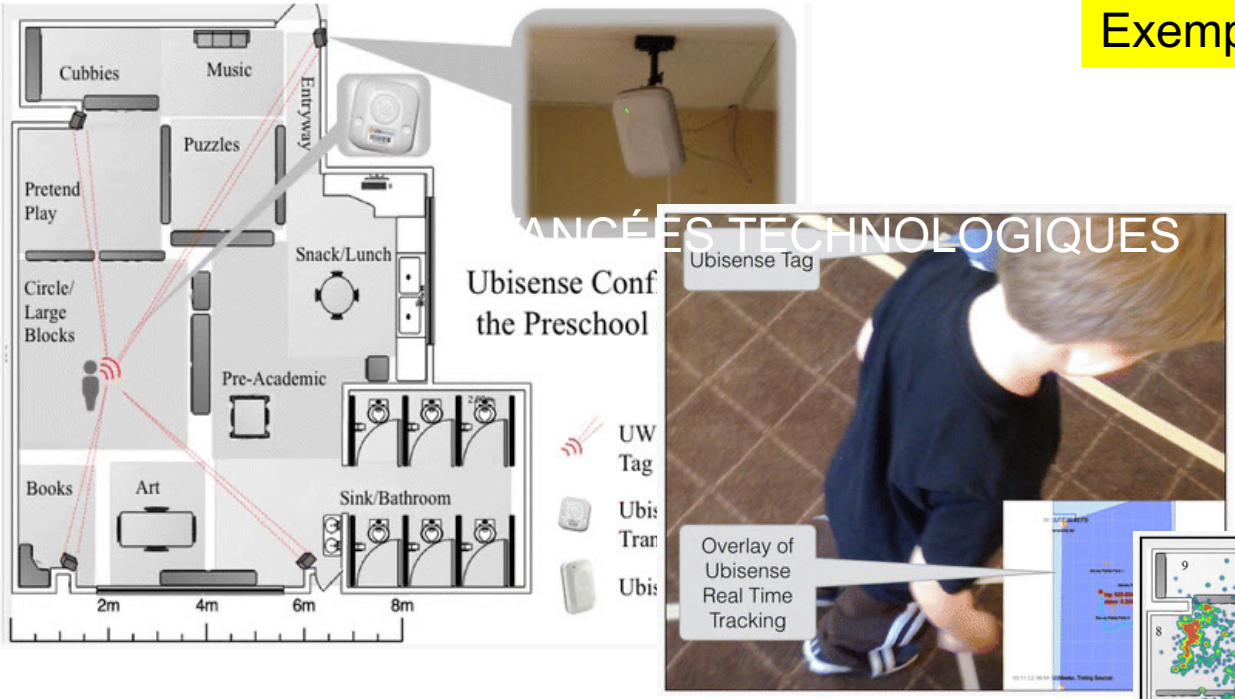
AVANCÉES TECHNOLOGIQUES (2): PRINCIPAUX LOGICIELS UTILISÉS DANS LE PROCESUUS MÉTHODOLOGIQUE



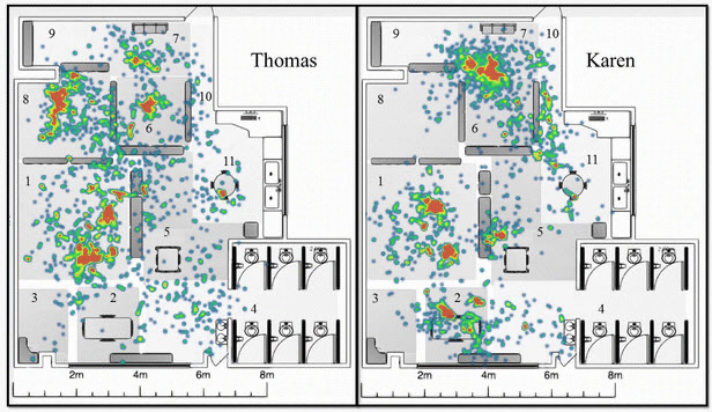
AVANCÉES TECHNOLOGIQUES (3)

II. Enregistrement d'autres types de données (physiologiques, distances, etc.)

Exemple 1

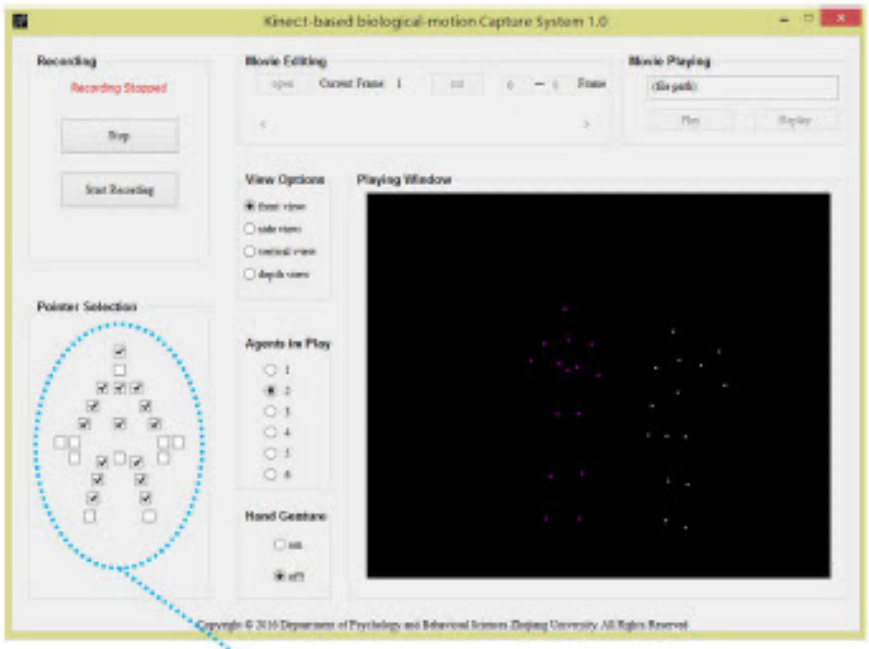


UBISENSE: Les technologies des capteurs numériques permettent d'améliorer la mesure et l'analyse des mouvements naturels.



Irwin, D.W., Crutchfield, S.A:, Greenwood, C.R., Kearns, W.D, & Buzhardt, J. (2018). An automated approach to measuring child movement and location in the early childhood classroom. *Behavior Research Methods, 50*(3), 890-901.

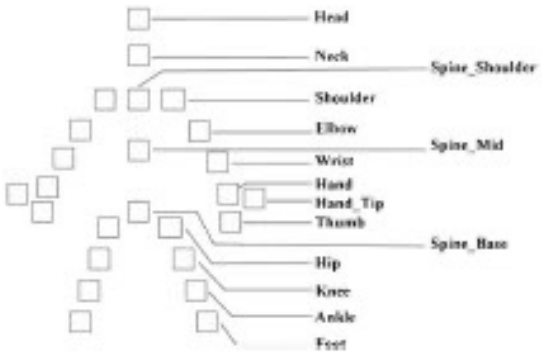
AVANCÉES TECHNOLOGIQUES (4)



Exemple 2

Avantages de la télémétrie pour mesurer et intervenir sur une grande variété de comportements en milieu naturel

Graphical user interface and selectable skeletal joints



Shi, Y., Ma, X., Ma, Z., Wang, J., Yao, N., Gu, Q., Wang, C., & Gao, Z. (2018). Using a Kinect sensor to acquire biological motion: Toolbox and evaluation. *Behavior Research Methods, 50*, 518-529.

AVANCÉES METHODOLOGIQUES (1): MÉTHODES MIXTES

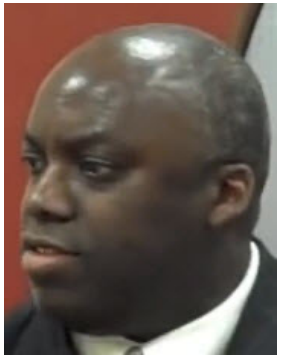
La période actuelle (21e siècle, jusqu'à aujourd'hui).
Des progrès impressionants sur plusieurs fronts:

- ❑ Conceptuel
- ❑ Technologique
- ❑ **Méthodologique**

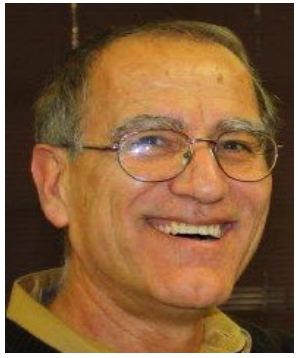
Les études fondées sur des méthodes mixtes ont un potentiel énorme
(Creswell, Onwuegbuzie, Tashakkori, Plano-Clark, etc.).

Bien que l'observation et d'autres sources de données aient fait l'objet d'une certaine attention dans la littérature sur les méthodes mixtes, peu de chercheurs ont appliqué de véritables méthodes de recherche par observation. **Ces dernières années, cependant, le nombre d'études empiriques impliquant l'application de méthodes de recherche mixtes fondées sur l'observation systématique a augmenté dans plusieurs domaines.**

John W. Creswell
U Nebraska-Lincoln



Anthony J. Onwuegbuzie
Sam Houston State U
Disting Prof. U Johanesburg



AbbasTashakkori
U North Texas

Vicki Plano Clark
U Cincinnati

Qual Quant (2018) 52:2757–2770
https://doi.org/10.1007/s11135-018-0700-2

Revisiting the difference between mixed methods and multimethods: Is it all in the name?

M. Teresa Anguera[1] · Angel Blanco-Villaseñor[1] · José Luis Losada[1] · Pedro Sánchez-Algarra[1] · Anthony J. Onwuegbuzie[2,3]

Abstract The literature on *mixed methods* and *multimethods* has burgeoned over the last 20 years, and researchers from a growing number and diversity of fields have progressively embraced these approaches. However, rapid growth in any movement inevitably gives rise to gaps or shortcomings, such as "identity crises" or divergent conceptual views. Although some authors draw a clear and sometimes opinionated distinction between *mixed methods* and *multimethods*, for others, they are synonymous. The concepts underlying both terms therefore have become blurred and generated much confusion. The aim of this article is to explore the origins of the confusion, describe our view of *mixed methods* and *multimethod* studies, and by doing so, help to clearly delineate the two concepts. The authors have presented their opinion of how these terms and concepts should be distinguished and call for a constructive debate of the issues involved in the *mixed methods* and *multimethod* literature. This is a way truly to propel the field forward.

Keywords Mixed methods · Multimethods · Methodology · Integration

frontiers in Psychology

HYPOTHESIS AND THEORY
published: 19 December 2017
doi: 10.3389/fpsyg.2017.02196

The Specificity of Observational Studies in Physical Activity and Sports Sciences: Moving Forward in Mixed Methods Research and Proposals for Achieving Quantitative and Qualitative Symmetry

M. Teresa Anguera[1], Oleguer Camerino[2], Marta Castañer[2], Pedro Sánchez-Algarra[3] and Anthony J. Onwuegbuzie[4,5]*

[1] Faculty of Psychology, Institute of Neurosciences, University of Barcelona, Barcelona, Spain, [2] INEFC (National Institute of Physical Education of Catalonia), IRBLLEIDA (Lleida Institute for Biomedical Research Dr. Pifarré Foundation), University of Lleida, Lleida, Spain, [3] Department of Statistics, Faculty of Biology, University of Barcelona, Barcelona, Spain, [4] Department of Educational Leadership and Counseling, Sam Houston State University, Huntsville, TX, United States, [5] Faculty of Education, University of Johannesburg, Johannesburg, South Africa

OPEN ACCESS

Mixed methods studies are been increasingly applied to a diversity of fields. In this paper, we discuss the growing use—and enormous potential—of mixed methods research in the field of sport and physical activity. A second aim is to contribute to strengthening the characteristics of mixed methods research by showing how systematic observation offers rigor within a flexible framework that can be applied to a wide range of situations. Observational methodology is characterized by high scientific rigor and flexibility throughout its different stages and allows the objective study of spontaneous behavior in natural settings, with no external influence. Mixed methods researchers need to take bold yet thoughtful decisions regarding both substantive and procedural issues. We present three fundamental and complementary ideas to guide researchers in this respect: we show why studies of sport and physical activity that use a mixed methods research approach should be included in the field of mixed methods research, we highlight the numerous possibilities offered by observational methodology in this field through the transformation of descriptive data into quantifiable code matrices, and we discuss possible solutions for achieving true integration of qualitative and quantitative findings.

Keywords: systematic observation, qualitative recording transformation, qualitative-quantitative integration, qualitative-quantitative symmetry, sport and physical activity sciences

AVANCÉES METHODOLOGIQUES (2): MÉTHODES MIXTES

- *The researchers integrate quantitative and qualitative methods of data collection and analysis to best understand a research purpose.* (Creswell & Plano Clark, 2011, p. 8; Plano Clark & Ivankova, 2016, p. 4)

- *Research methods should be integrated or mixed building on their complementary strengths and non-overlapping weakness.* (Plano Clark & Ivankova, 2016, p. 4-5)

- *There are three ways in which mixing occurs:* ***merging*** *or converging the two datasets by actually bringing them together,* ***connecting*** *the two datasets by having one build on the other, or* ***embedding*** *one dataset within the other so that one type of data provides a supportive role for the other dataset.* (Creswell & Plano Clark, 2011, p. 7)

(...)

L'observation systématique répond à ces caractéristiques.

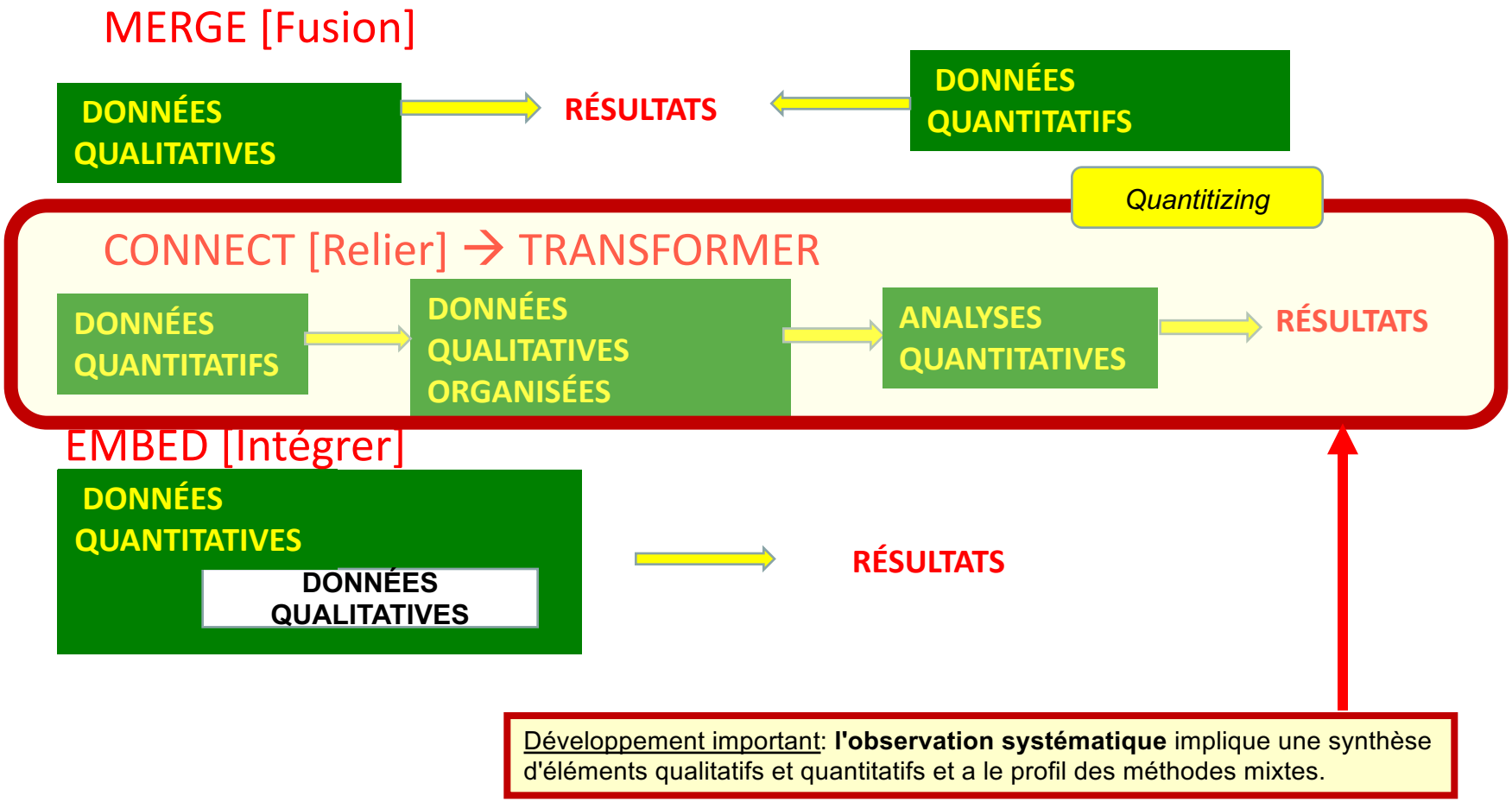
AVANCÉES METHODOLOGIQUES DANS LES MÉTHODES MIXTES (3): INTEGRATION D'ELEMENTS QUALITATIFS ET QUANTITATIFS

MERGE [Fusion]

CONNECT [Relier] → TRANSFORMER

EMBED [Intégrer]

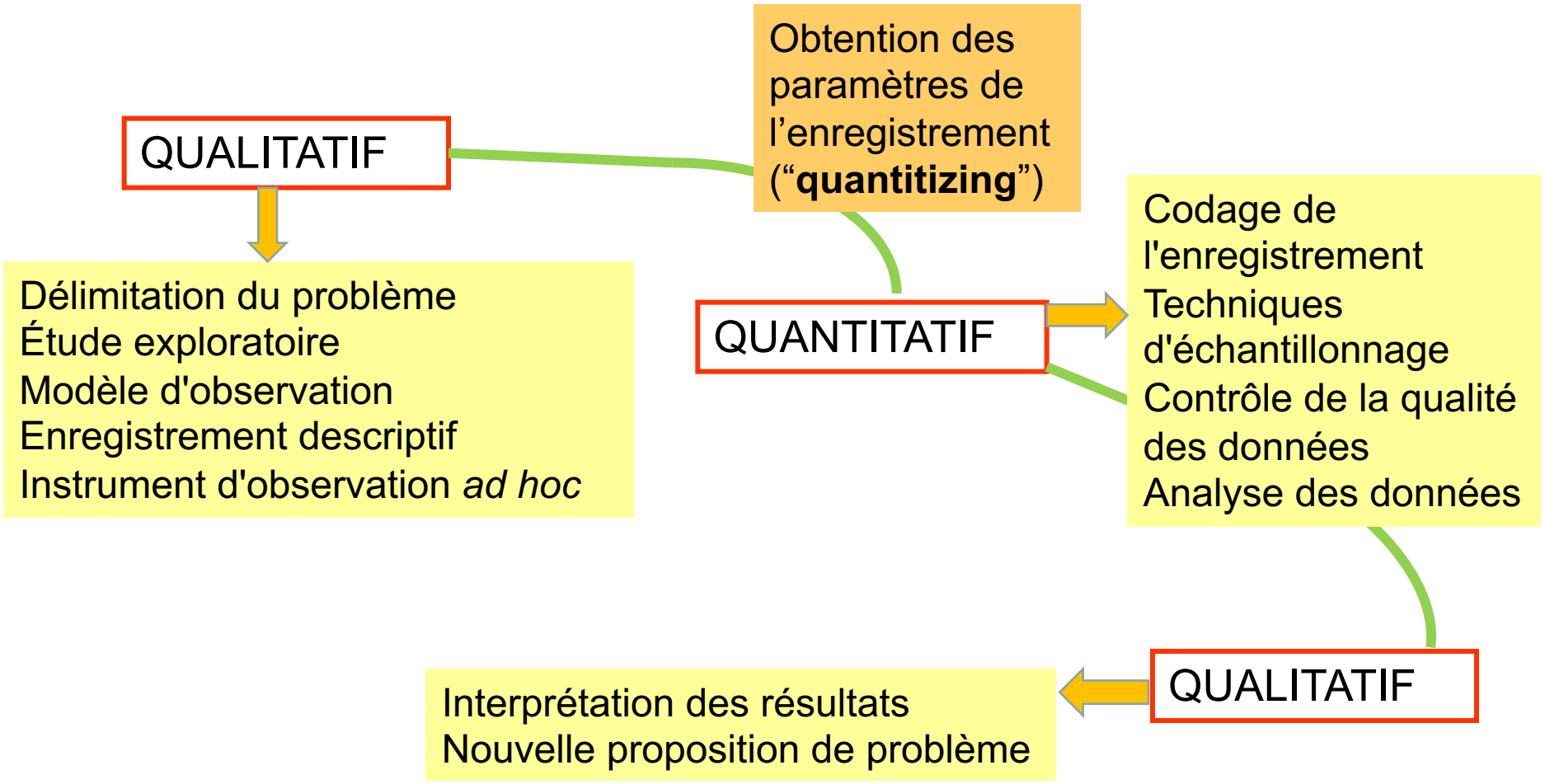
AVANCÉES METHODOLOGIQUES DANS LES MÉTHODES MIXTES (4): INTEGRATION D'ELEMENTS QUALITATIFS ET QUANTITATIFS



Développement important: **l'observation systématique** implique une synthèse d'éléments qualitatifs et quantitatifs et a le profil des méthodes mixtes.

AVANCÉES METHODOLOGIQUES (5): MÉTHODES MIXTES

Macro-étapes du processus d'observation systématique: QUALI-QUANTI-QUALI



AVANCÉES METHODOLOGIQUES (6)

L'observation systématique doit être extrêmement rigoureuse sur trois points, dans la perspective des méthodes mixtes:

- ❑ Le comportement spontané
- ❑ Contextes naturalistes
- ❑ Données nominales / catégorielles

Par conséquent, au cours de cette troisième période (21e siècle, jusqu'à aujourd'hui), les **principales avancées méthodologiques** suivantes ont été réalisées:

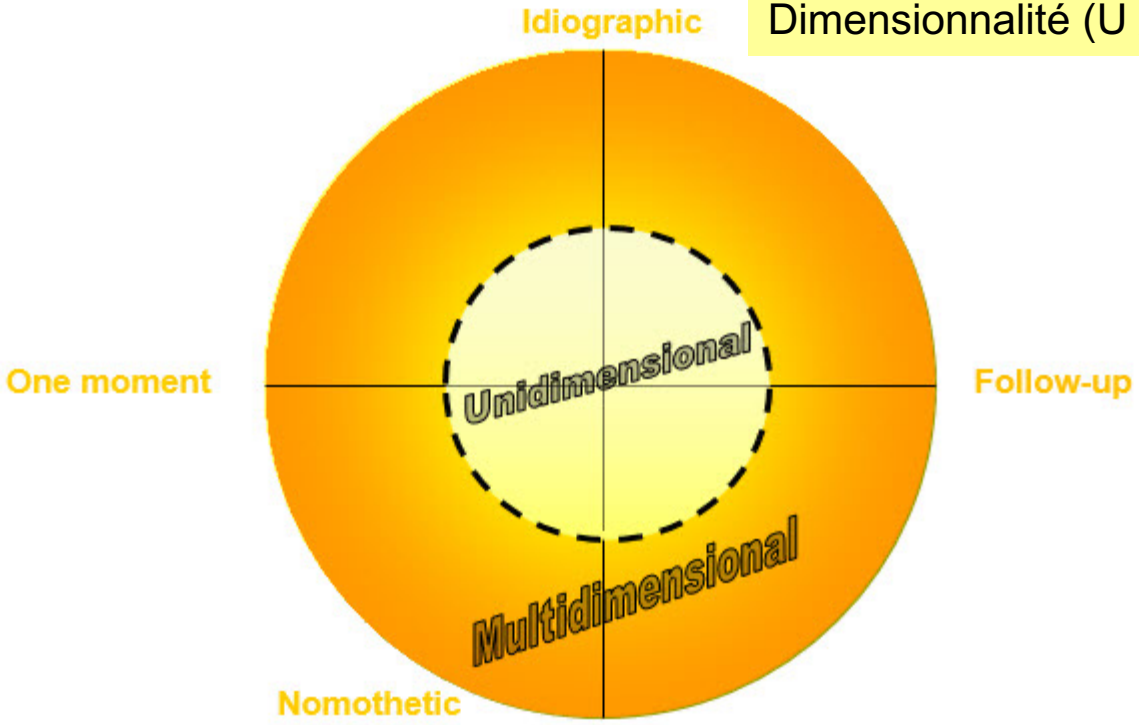
- ❑ Modèles (“designs”) d’observation
- ❑ Instruments d’observation *ad hoc*
- ❑ Enregistrement sous forme de matrice de codes
- ❑ Contrôle de la qualité des données
- ❑ Analyse quantitative des données (recherche de la structure)

AVANCÉES METHODOLOGIQUES (7)

MODÈLES (“designs”)
D’OBSERVATION

Trois axes:
Unités d’ètude (I / N)
Temporalité (O / F)
Dimensionnalité (U / M)

Il existe huit modèles d'observation:
I / O / U
I / O / M
I / F / U
I / F M
N / O / U
N / O / M
N / F / U
N / F / M



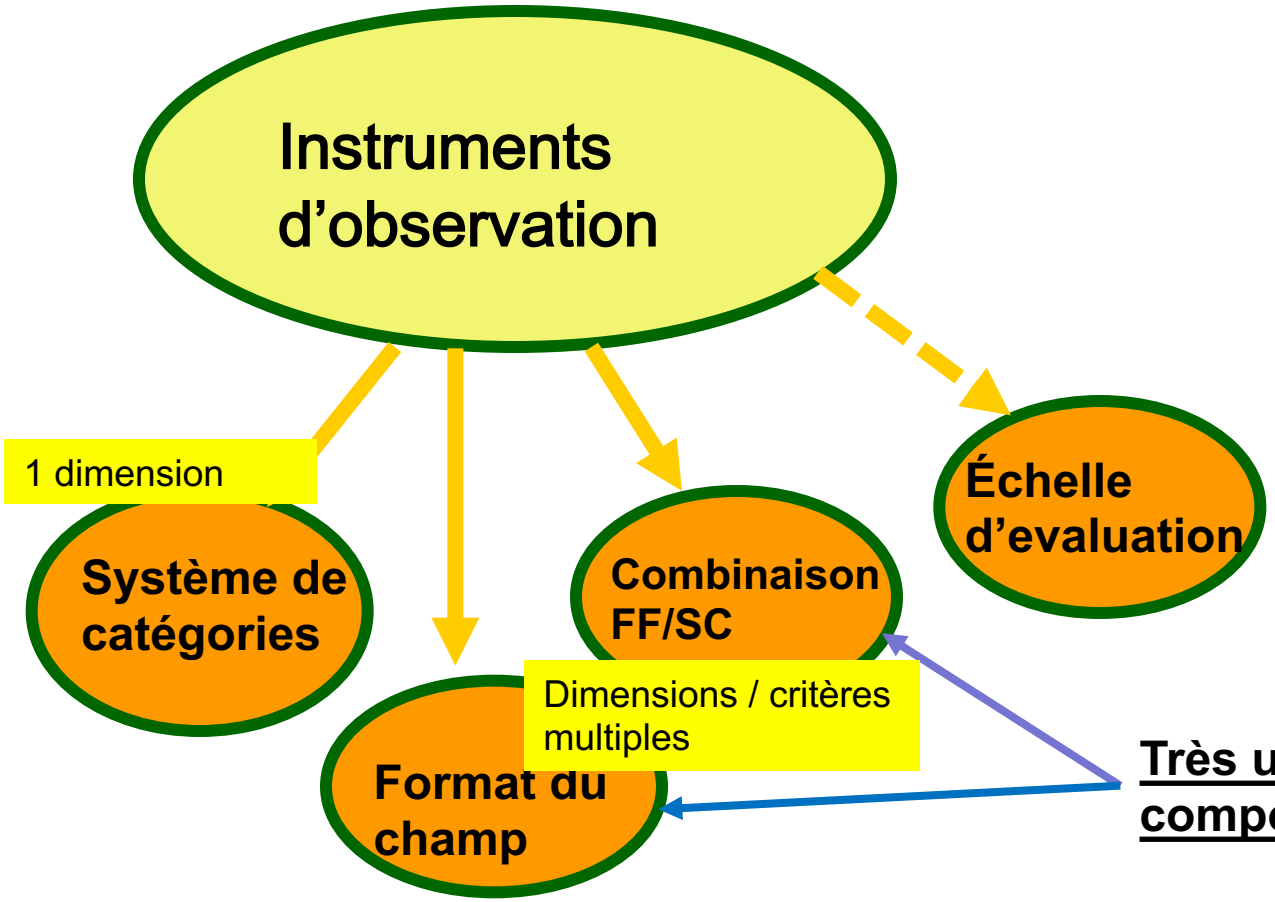
Anguera, M.T., Blanco-Villaseñor, A. y Losada, J.L. (2001). Diseños Observacionales, cuestión clave en el proceso de la metodología observacional. *Metodología de las Ciencias del Comportamiento, 3*(2), 135-161.

Sánchez-Algarra, P. & Anguera, M.T. (2013). Qualitative/quantitative integration in the inductive observational study of interactive behaviour: Impact of recording and coding predominating perspectives. *Quality & Quantity. International Journal of Methodology, 47*(2), 1237-1257.

AVANCÉES METHODOLOGIQUES (8)

INSTRUMENTS D'OBSERVATION *AD HOC*

Le chercheur construit l'instrument d'observation *ad hoc*



Anguera, M.T. & Izquierdo, C. (2006). Methodological approaches in human communication. From complexity of situation to data analysis. In G. Riva, M.T. Anguera, B.K. Wiederhold & F. Mantovani (Coord.), *From Communication to Presence. Cognition, Emotions and Culture towards the Ultimate Communicative Experience* (pp. 203-222). Amsterdam: IOS Press.

Très utile dans les sciences du comportement

AVANCÉES METHODOLOGIQUES (9)

INSTRUMENTS D'OBSERVATION *AD HOC*

Illustration 1

Adaptation of OSMOS Criteria for This Research

Criteria	Categories
Instruction	Exact instruction (Mo): Response that is the same as the instruction proposed by the instructor. Tendency instruction (Mt): Response that is similar to the instruction proposed by the instructor. Different instruction (m): Response that is not similar to the instruction proposed by the instructor or when there is no instruction. Other (a): Motor responses that do not agree with the instruction.
Stability	Support stability (Es): Motor skills that enable body equilibrium to be maintained over one or several body support points, without producing locomotion (e.g., balancing actions). Elevation stability (Ed): Motor skills that enable the body to be projected by elevating it in space, without producing locomotion (e.g., jumps). Axial stability (Ea): Motor skills that enable body axes and planes to be varied from a fixed point, without producing locomotion (e.g., turns).
Locomotion	Propulsion-stop locomotion (Lp): Motor skills that occur at the start and finish of a body movement through space. Sequential rebalance locomotion (Ls): Motor skills that enable a space to be moved through via the priority sequence of actions of the segments of the lower limbs (bipedestrian locomotion) or upper limbs (in inversion). Simultaneous coordinated locomotion (Lc): Motor skills that enable a space to be moved through via the combined action of all body segments (e.g., quadrupedian locomotion).
Manipulation	Impact manipulation (Mi): Motor skills in which certain body zones briefly come into contact with objects or other people. Conduction manipulation (Mc): Motor skills in which certain segments handle (for a given period of time) objects or other people.
Body-space	Body changes (c): Evident variations in body posture and gestures. Change in spatial direction (d): Variations in the spatial direction of the movement. Change of spatial level (n): Change between the different spatial levels (low or floor work, middle or bipedestrian work, upper or aerial work). Combination of variations in body posture/gestures and spatial direction (CD). Combination of variations in body posture/gestures and spatial level (CN). Combination of variations in spatial level and direction (ND). Combination of variations in body posture/gestures, level, and spatial direction (CND).
Temporal	Time (t): When there is a clearly observable change in the tempo of a motor action with respect to the previous one.
Interaction	Dyadic interaction (Id): Interaction with a partner. Group interaction (Ig): Interaction with more than one other group member.

Castañer, M., Torrents, C., Anguera, M.T., Dinušová, M. & Jonsson, G.K. (2009). Identifying and analyzing motor skill responses in body movement and dance. *Behavior Research Methods, 41*(3), 857-867.

AVANCÉES METHODOLOGIQUES (10)

INSTRUMENTS D'OBSERVATION *AD HOC*

Table 3
Second-order category system used in the sequential analysis

Question	Dimension	Macro-category/ code	Basic categories
How does develop the participatory space?	Type of participant	Women (PP)	P1, P2, P3, P4, P5, P6, P7
		Therapist (PT)	Px
	Interactive structure	Unified (SS)	Single speaker in position (S) or position (L)
		Shared (MS)	Simultaneous speech (Ss) Multiple speech (Ms)
	Function of maintaining contact (feedback)	Following behaviour (CF)	Visual following (11) Oral following (13)
		Emotional support (CS)	Visual following with emotional expression (12) Oral following with emotional expression (14)
How does the group therapeutic activity develop?	Discursive function	Limited (DL)	No personal issue (20) Personal issue: telling (21) Personal issue: responding (22)
		Available (DA)	Personal issue: confirming (23) Personal issue: confronting (24)
	Therapist's intervention	Indirect (IN)	Zero (30) Visible following behaviour: not audible, without emotional expression (31) Visible following behaviour: audible with emotional expression (32)
		Direct (ID)	Analytic (40-43) Educational (50-53) Guiding (60-63) Mixed (70…)

Illustration 2

Roustan, M., Izquierdo, C. & Anguera, M.T. (2013). Sequential analysis of an interactive peer support group. *Psicothema, 25*(3), 396-401.

AVANCÉES METHODOLOGIQUES (11)

L'ENREGISTREMENT EN TANT QUE MATRICE DE CODES

Dimension D1 (comportament non verbal)
- Sous-dimension D11 (expressions faciales)
- Sous-dimension D12 (comportement gestuel)
- Sous-dimension D13 (comportement postural)

Dimension D2 (comportament verbal)
- Sous-dimension D21 (dialogique)
- Sous-dimension D22 (agressivité)

Illustration 3

D11 = {a11 b11 c11 d11}
D12 = {a12 b12 c12 d12 e12}
D13 = {a13 b13 c13}
D21 = {a21 b21 c21 d21 e21 f21}
D22 = {a22 b22 c22 }

A partir de chaque sous-dimension, nous avons construit un système de catégories (conditions d'exhaustivité et d'exclusivité mutuelle).

AVANCÉES METHODOLOGIQUES (12)

L'ENREGISTREMENT EN TANT QUE MATRICE DE CODES

Illustration 3

D11 = {a11 b11 c11 d11}
D12 = {a12 b12 c12 d12 e12}
D13 = {a13 b13 c13}
D21 = {a21 b21 c21 d21 e21 f21}
D22 = {a22 b22 c22 }

Enregistrement continu tout au long de la session (parameter de SÉQUENCE)

Unit 1	a11 b12 a13 d21 a22
Unit 2	b11 a12 c13 b22 b22
Unit 3	c11 b12 c13 f21 b22
Unit 4	d11 e12 a13 b21 c22
Unit 5	a11 a12 c13 f21 a22
Unit 6	b11 a12 c13 b22 a22
Unit 7	b11 d12 c13 b21 a22
Unit 8	c11 b12 a13 b21 b22
Unit 9	d11 a12 b13 c21 b22

Chaque ligne correspond à des coocurrences de codes de comportement dans une unité d'observation (observation directe) ou dans une unité textuelle (observation indirecte).

AVANCÉES METHODOLOGIQUES (13)

L'ENREGISTREMENT EN TANT QUE MATRICE DE CODES

Illustration 3

D11 = {a11 b11 c11 d11}
D12 = {a12 b12 c12 d12 e12}
D13 = {a13 b13 c13}
D21 = {a21 b21 c21 d21 e21 f21}
D22 = {a22 b22 c22 }

Enregistrement continu tout au long de la session (parameter de DURÉE)

Unit 1	a11 b12 a13 d21 a22	1'20"
Unit 2	b11 a12 c13 b22 b22	42"
Unit 3	c11 b12 c13 f21 b22	2'10"
Unit 4	d11 e12 a13 b21 c22	1'52"
Unit 5	a11 a12 c13 f21 a22	45"
Unit 6	b11 a12 c13 b22 a22	3'16"
Unit 7	b11 d12 c13 b21 a22	1'17"
Unit 8	c11 b12 a13 b21 b22	58"
Unit 9	d11 a12 b13 c21 b22	1'35"

Chaque ligne correspond à des coocurrences de codes + TEMPS

AVANCÉES METHODOLOGIQUES (14)

MATRICE DE CODES: Structure générale

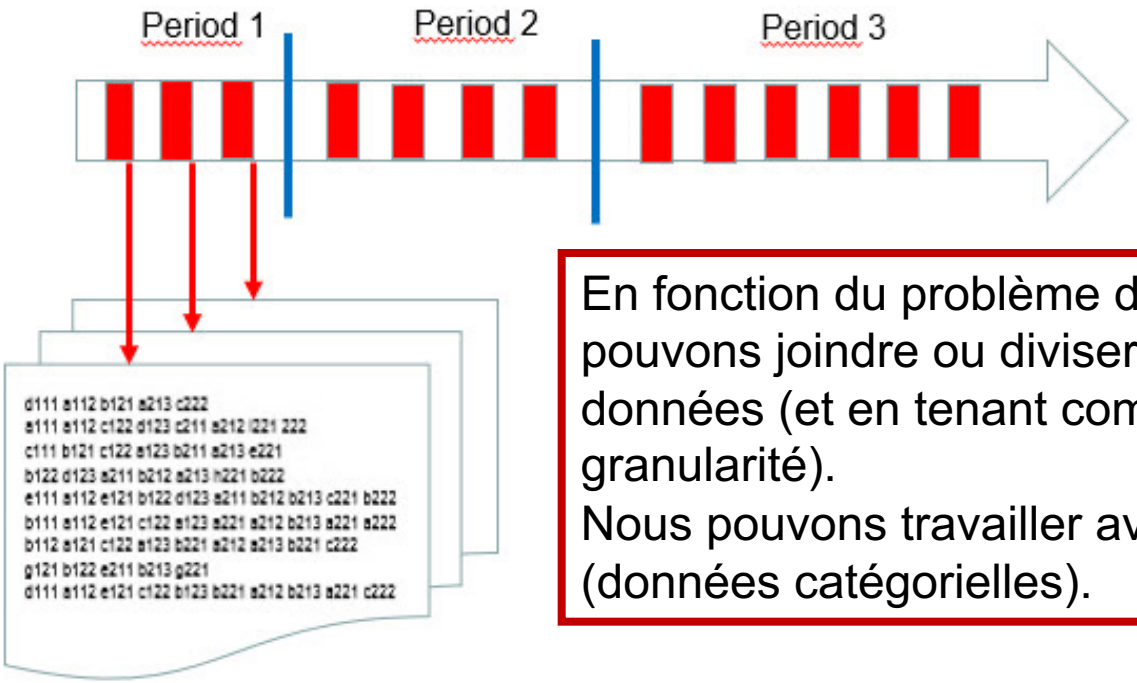
Enregistrement sequentiel

		Criteria and subcriteria (i)												
		C1				C2				..	Ci			
		C11		C12		C21		C22		..	Ci1		Ci2	
		C111	C112	C121	C122	C211	C212	C221	C222	..	Ci11	Ci12	Ci21	Ci22
Units of observation (DO) or textual units (IO)	U1													
	U2													
	...													
	Un													

AVANCÉES METHODOLOGIQUES (15)

JOINTURE / DIVISION DES DONNÉES

Échantillonnage intersession et intrasession

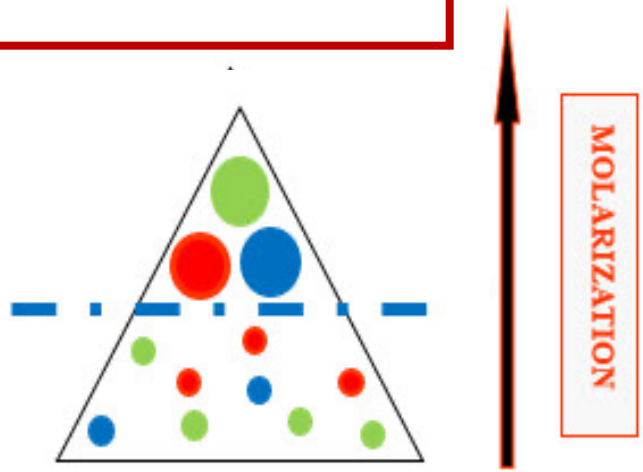


En fonction du problème de recherche, nous pouvons joindre ou diviser des blocs de données (et en tenant compte du niveau de granularité).
Nous pouvons travailler avec des big data (données catégorielles).

On peut aussi molariser les unités par niveaux successifs.

SC={A B C}

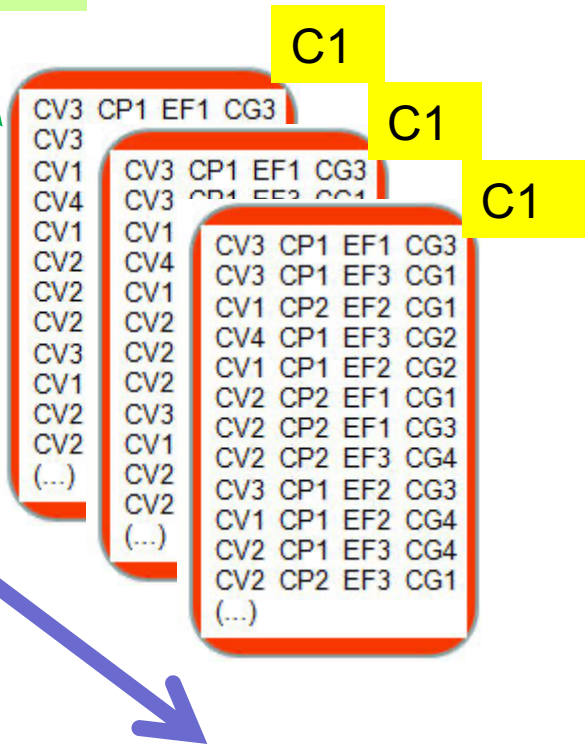
SC={a1 a2 a3 b1 b2 c1 c2 c3 c4}



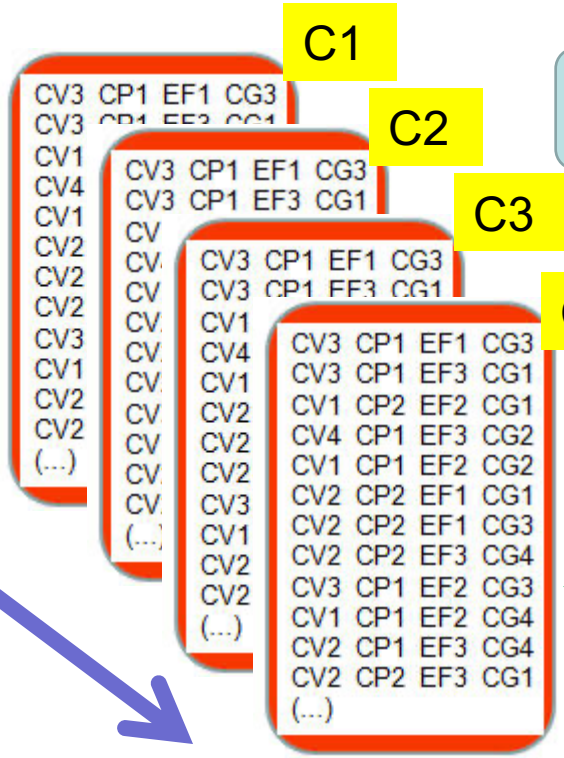
AVANCÉES METHODOLOGIQUES (16)

CONTRÔLE DE LA QUALITÉ DES DONNÉES

Matrice de codes



ACCORD INTRA-CODER À DES MOMENTS DIFFÉRENTS



ACORD INTERCODER

LOGIGIELS

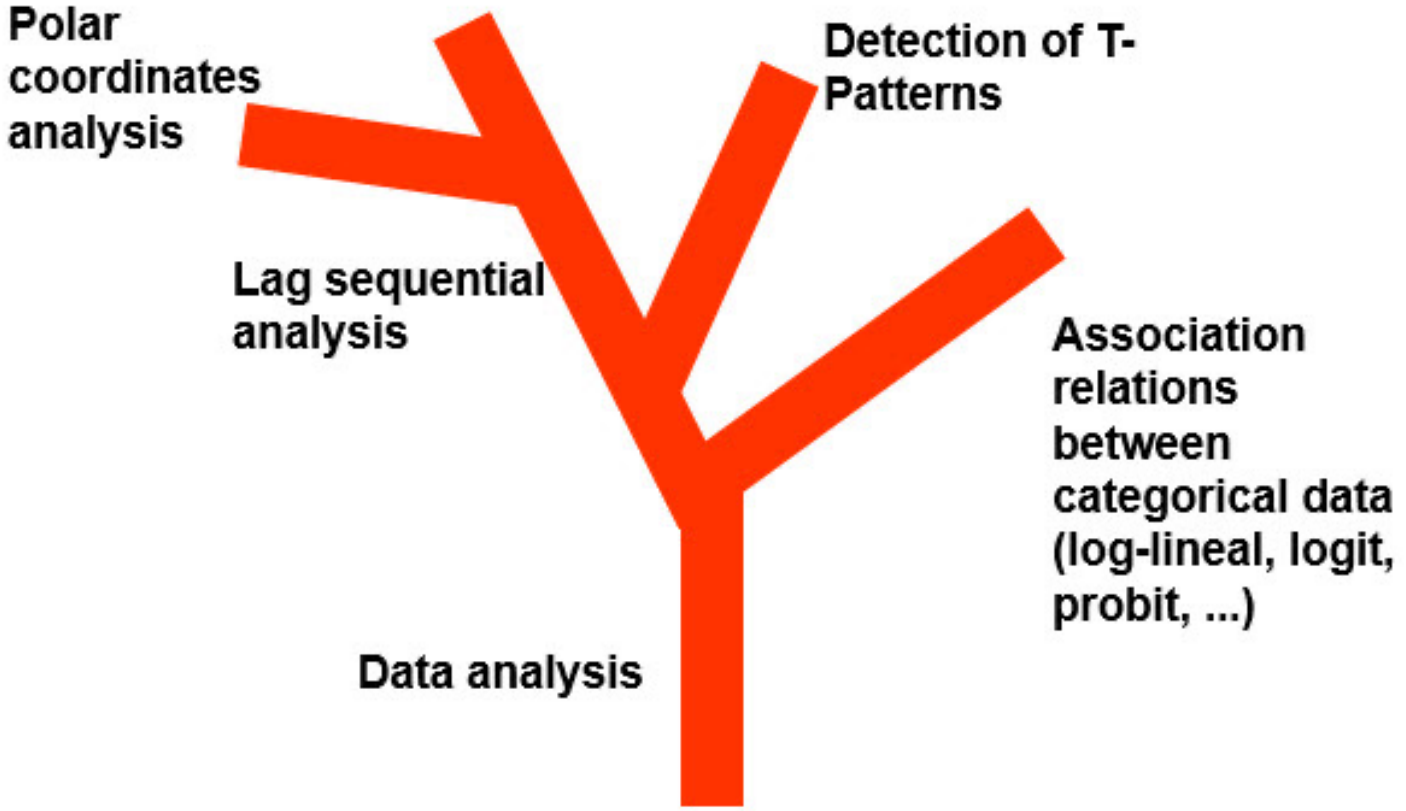
GT
HOISAN
LINCE
SAS
SDIS-GSEQ
SPSS
etc.

Matrice de codes

NOMBRE ÉLEVÉ DE COEFFICIENTS D'ACCORD + ACCORD CONSENSUEL

AVANCÉES METHODOLOGIQUES (17)

CARTE DE L'ANALYSE DES DONNÉES (commune àla plupart des modèles d'observation et à l'analyse spécifique de chacun d'entre eux)



AVANCÉES METHODOLOGIQUES (18)

L'ANALYSE SÉQUENTIELLE

Le 'lag analyse séquentielle', proposée par Bakeman (1978) et étendue par la suite par Bakeman et Gottman (1986) et Bakeman et Quera (2011), s'est avérée très efficace dans divers domaines, et **est extrêmement utile pour analyser des ensembles de données compilées à partir d'observations directes et/ou indirectes qui contiennent des séquences de comportements codés à l'aide d'un instrument d'observation ad hoc.**

L'analyse séquentielle nous permet de détecter des modèles et d'étudier les **associations entre les catégories sur la base du calcul des probabilités conditionnelles et inconditionnelles**. Cette méthode est applicable aux ensembles de données de comportements qui se produisent dans une séquence.

Roger Bakeman
Professor Emeritus
Georgia State University
Psychology Dept.

Vicenç Quera
University of Barcelona

METHODOLOGICAL ADVANCES (19)

L'ANALYSE SÉQUENTIELLE

La première étape de cette analyse consiste à définir nos **comportements donnés** (le point de départ de tout modèle éventuel détecté) et nos **comportements conditionnels**, et à appliquer les délais définis pour l'étude.

Les **résidus ajustés sont calculés pour chacun des décalages à l'aide du test binomial**, en appliquant l'optimisation d'Allison & Liker (1982), le **z hypergéométrique**, qui montre la **force de l'association entre les comportements donnés et les comportements conditionnels auxquels ils sont associés**.

METHODOLOGICAL ADVANCES (20)

L'ANALYSE SÉQUENTIELLE

Comportement donnée → A

Comportements conditionnels

Fréquences appariées

Probabilités inconditionelles

Probabilités conditionelles

SC = {A B C D}

Unité sequentielle d'enregistrement

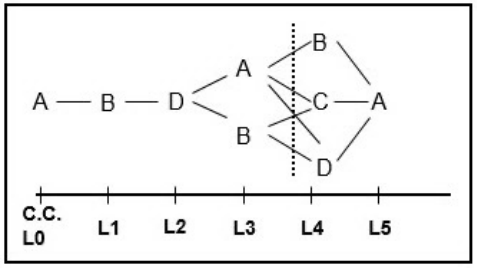
Units	Categ.
U1	A
U2	B
U3	D
U4	A
U5	C
U6	A
U7	B
U8	D
U9	A
U10	D
U11	A
U12	B
U13	C
U14	A
U15	B
U16	D
U17	A
U18	B
U19	D
U20	C

Lag	A	B	C	D	TOTAL	A	B	C	D
	7	5	3	5	20	0.35	0.25	0.15	0.25
1	0	5	1	1	7	0	**0.71**	0.14	0.14
2	2	0	1	4	7	0.28	0	0.14	**0.57**
3	4	2	1	0	7	**0.57**	**0.28**	0.14	0
4	0	2	2	2	6	0	**0.33**	**0.33**	**0.33**
5	4	0	0	1	5	**0.8**	0	0	0.2

La première étape de cette analyse consiste à définir nos critères de comportement (le point de départ de tout modèle éventuel détecté) et à appliquer les décalages définis pour l'étude.

$$p_{esp\ corr} = p_{esp} + z\alpha\sigma$$

$$\sigma = \sqrt{\frac{p_{esp}(1-p_{esp})}{N}}$$



Detection de "pattern of behavior"

METHODOLOGICAL ADVANCES (21)

L'ANALYSE SÉQUENTIELLE

Illustration 4

GSEQ

HOISAN, v.1.6.3
www.menpas.com

Observation directe

L'analyse séquentielle → Pour extraire des modèles de comportement

Table 1. Observation instrument: criteria and categories.

Criterion	Systems of categories and corresponding codes
Start of sequence	In favour of team being observed and inside the pitch: direct free kick (DFK), indirect free kick (IFK), offside goal kick (OK), kick-off (KO); in favour of team being observed and outside the pitch: throw-in (T), corner kick (CK), goal kick (GK); Neutral kick/throw-in (NK); Steal (SL)
Action initiation zone (ZI)	Left safety sector (Z10); central safety sector (Z20); right safety sector (Z30); left creation sector in own half (Z40); left creation sector in rival's half (Z41); central creation zone in own half (Z50); central creation sector in rival's half (Z51); right creation sector in own half (Z60); right creation sector in rival's half (Z61); left definition sector (Z70); central definition sector (Z80); right definition sector (Z90).
Action conclusion zone (ZI)	
Effective play-space at initiation of action	Outside (polygon formed by TCB players) – outside polygon formed by rival players (BOO); Outside – inside polygon formed by rival players (BOI); inside polygon formed by TCB players – Inside (IIO); Inside – Outside (IBO)
Effective play-space at end of action	Outside – Outside (EOO); Outside – Inside (EOI); Inside – Inside (EI); Inside – Outside (EIO)
Technical action	Control of ball (CT); pass (PS); occasional interception with continuation of play (COC); shot (ST); control plus pass (CP); dribbling (DR); control plus dribbling (CD); control, dribbling plus pass (CDP); header (HE)
Conclusion of sequence	Goal (GS); shot intercepted by a player (IS); shot at post (PS); shot wide of posts (OS); shot saved by the goalkeeper (SS); shot cleared (CS).

Instrument d'observation

Table 4. Lag sequential analysis. The given behaviour is shown in the column on the left. The target behaviours, together with the adjusted residual values, are shown in the cells corresponding to the different lags.

Given behaviour	Lag −2	Lag 0	Lag +1	Lag +2	Lag +3	Lag +4	Lag +5
ZE20						SS(3.58)	SS(3.85)
ZE41					SS(2.18)		
ZE50				SS(2.3)		CS(−2.38)	OS(2.18)
ZE51		ST(2.65)			OS(2.42)		
					ST(2.08)		
					IS(−2.37)		
ZE60					CS(2.14)		
ZE61						CS(2.91)	CS(2.65)
ZE70		CS(2.54)		CS(2.31)		CS(2.92)	
ZE80		GS(2.2)		SS(−2.3)	IS(2.22)		
		IS(−2.73)					
		PS(−2.51)					
EOI	IS(2.24)						
EIO			OS(2.26)				
EII					GS(2.06)		
BIO		OS(2.02)					
EOO			PS(2.23)				

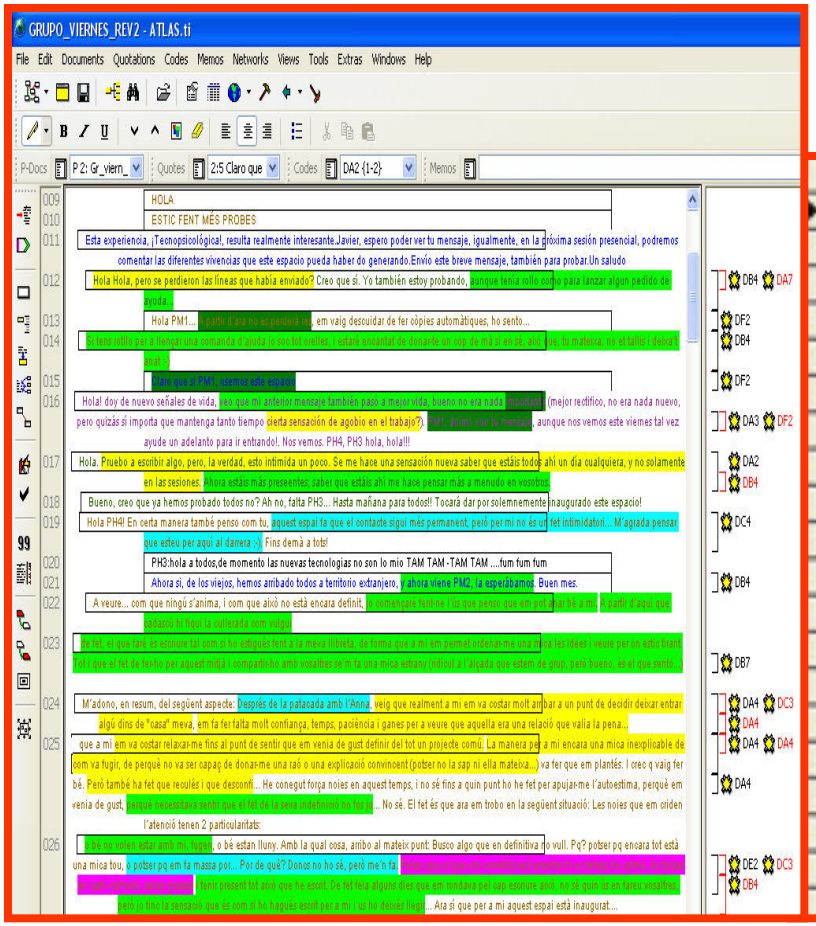
Lapresa, D., Del Río, A., Arana, J., Amatria, M., & Anguera, M.T. (2018). Use of effective play-space by U12 FC Barcelona players: an observational study combining lag sequential analysis and T-pattern detection. *International Journal of Performance Analysis in Sport, 18*(2), 293-309.

METHODOLOGICAL ADVANCES (22)

Illustration 5

L'ANALYSE SÉQUENTIELLE

Observation indirecte



DataName	Time	Event	DA	DB	DC	DE	DF
unidades_texto	1						
unidades_texto	10	da7,db8	da7	db8			
unidades_texto	20	da7	da7				
unidades_texto	30	da5	da5				
unidades_texto	40	da7	da7				
unidades_texto	50	da7,db4	da7	db4			
unidades_texto	60	df2					df2
unidades_texto	70	db4		db4			
unidades_texto	80	df2					df2
unidades_texto	90	db3		db3			
unidades_texto	100	da3	da3				
unidades_texto	110	df2					df2
unidades_texto	120	da2	da2				
unidades_texto	130	db4		db4			
unidades_texto	140	dc4			dc4		
unidades_texto	150	db4		db4			
unidades_texto	160	db6		db6			
unidades_texto	170	db5		db5			
unidades_texto	180	db5		db5			
unidades_texto	190	db7		db7			

DA4	DA5	DA6	DA7	DA8
0.000:	0.000:	0.000:	0.000:	0.000:|
-0.324:	-0.096:	0.000:	-0.240:	-0.067:|
1.530:	-0.275:	0.000:	-0.689:	-0.194:|
3.929:	-0.459:	0.000:	-1.151:	-0.324:|
-0.459:	-0.135:	0.000:	2.802:	-0.096:|
0.000:	0.000:	0.000:	0.000:	0.000:|
-1.201:	2.671:	0.000:	1.640:	-0.250:|
-0.324:	-0.096:	0.000:	-0.240:	-0.067:|
0.000:	0.000:	0.000:	0.000:	0.000:|
0.000:	0.000:	0.000:	0.000:	0.000:|
-0.731:	-0.216:	0.000:	-0.541:	-0.152:|
-1.387:	-0.409:	0.000:	0.090:	-0.289:|
-0.938:	-0.495:	0.000:	-0.284:	-0.349:|
1.200:	-0.409:	0.000:	0.090:	-0.289:|
-0.803:	-0.237:	0.000:	-0.594:	-0.167:|
-0.652:	-0.192:	0.000:	-0.482:	-0.136:|
-0.803:	-0.237:	0.000:	1.237:	-0.167:|
0.000:	0.000:	0.000:	0.000:	0.000:|
0.000:	0.000:	0.000:	0.000:	0.000:|
-0.564:	-0.166:	0.000:	-0.417:	-0.117:|
1.318:	-0.396:	0.000:	1.303:	-0.279:|
-0.564:	-0.166:	0.000:	-0.417:	-0.117:|
-0.731:	-0.216:	0.000:	-0.541:	6.603:|
-0.564:	-0.166:	0.000:	-0.417:	-0.117:|
0.000:	0.000:	0.000:	0.000:	0.000:|
0.000:	0.000:	0.000:	0.000:	0.000:|
-0.564:	-0.166:	0.000:	-0.417:	-0.117:|
1.445:	2.447:	0.000:	-0.959:	-0.270:|
-0.459:	-0.135:	0.000:	-0.340:	-0.096:|
-0.459:	-0.135:	0.000:	-0.340:	-0.096:|
-0.459:	-0.135:	0.000:	-0.340:	-0.096:|
0.000:	0.000:	0.000:	0.000:	0.000:|
-0.324:	-0.096:	0.000:	-0.240:	-0.067:|
0.000:	0.000:	0.000:	0.000:	0.000:|
0.000:	0.000:	0.000:	0.000:	0.000:|
-1.186:	-0.551:	0.000:	0.381:	-0.389:|

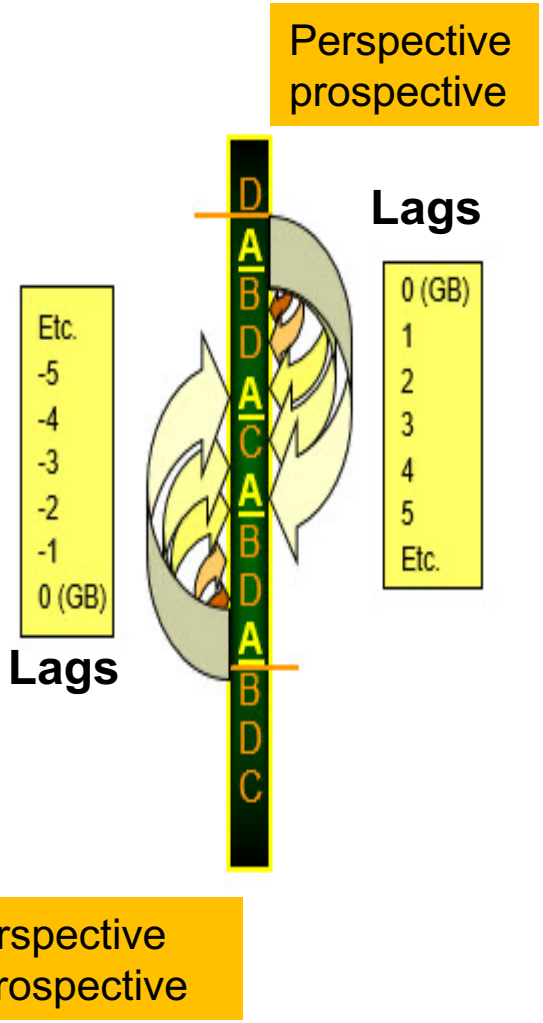
Vaimberg, Raúl (2010). **Psicoterapias tecnológicamente mediadas** (Directors: Adolfo Jarne and M. Teresa Anguera). Unpublished Doctoral Thesis. Barcelona (Spain): University of Barcelona.

METHODOLOGICAL ADVANCES (23)

ANALSE DES COORDONNÉES POLAIRES

L'analyse en coordonnées polaires est une technique de réduction des données qui fournit une **image vectorielle du réseau complexe d'interrelations entre les catégories qui composent les différentes dimensions de l'instrument d'observation**. La structure de l'analyse en coordonnées polaires complète l'analyse séquentielle prospective et rétrospective (Bakeman, 1978).

La perspective **rétrospective**, ou "en arrière", révèle des associations significatives entre le comportement focal et les comportements qui se produisent avant ce comportement (c'est-à-dire des décalages négatifs). L'analyse rétrospective produit une image "en miroir" des associations entre les unités d'observation qui se produisent avant le comportement focal ; la séquence suivie est la dernière, l'avant-dernière, l'avant-dernière, la troisième, etc.



METHODOLOGICAL ADVANCES (24)

ANALSE DES COORDONNÉES POLAIRES

L'analyse en coordonnées polaires fournit des données interprétables grâce à l'application d'une **technique de réduction des données extrêmement puissante impliquant le calcul de la statistique Zsum**, décrite par Cochran (1954) et proposée ultérieurement par Sackett (1980).

Willem G. Cochran
(1909-1970)
North Carolina Institute of Statistics

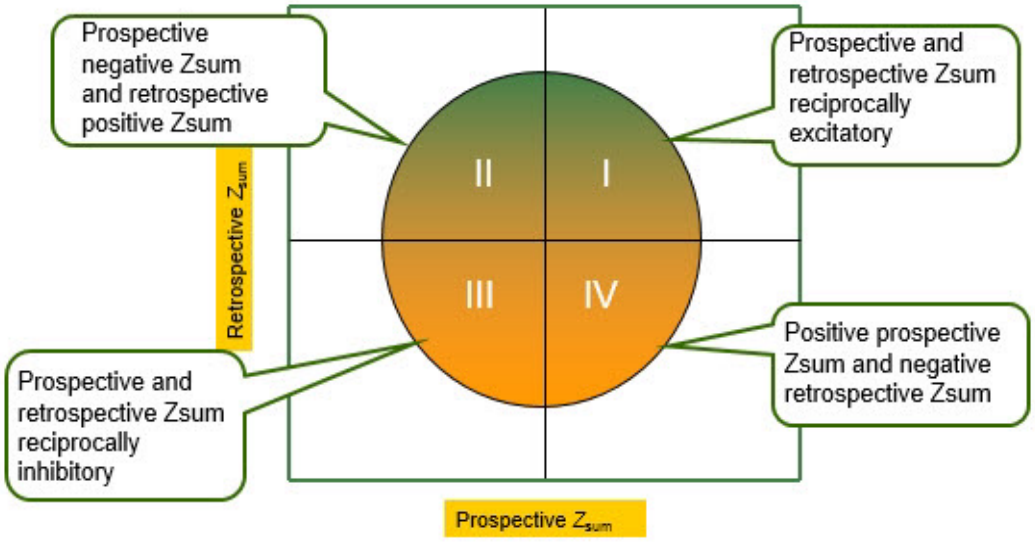
Gene P. Sackett
(1937-2017)
U Washington

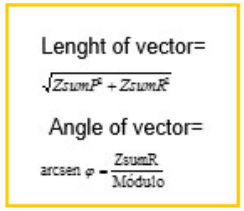
METHODOLOGICAL ADVANCES (25)

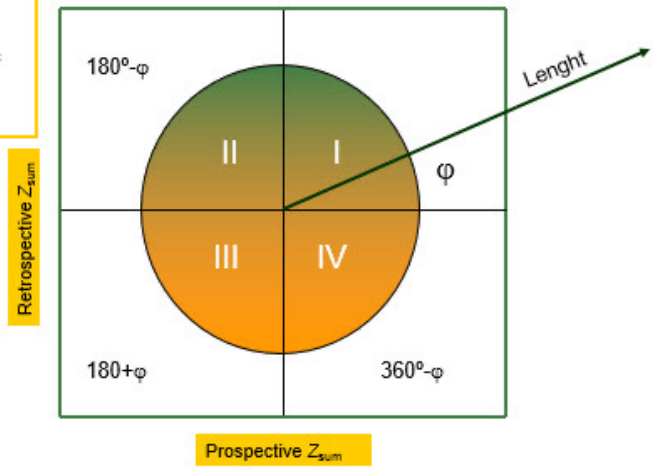
ANALSE DES COORDONNÉES POLAIRES

Les scores Zsum prospectifs et rétrospectifs peuvent avoir un signe positif ou négatif. **Chaque comportement conditionnel est représenté par un vecteur qui, à son tour, est situé dans l'un des quatre quadrants (I, II, III ou IV) en fonction du signe positif ou négatif des scores Zsum prospectifs et rétrospectifs.**

Ces quadrants indiquent si les comportements focal et conditionnel s'activent ou s'inhibent mutuellement.







METHODOLOGICAL ADVANCES (26)

ANALSE DES COORDONNÉES POLAIRES

Illustration 6

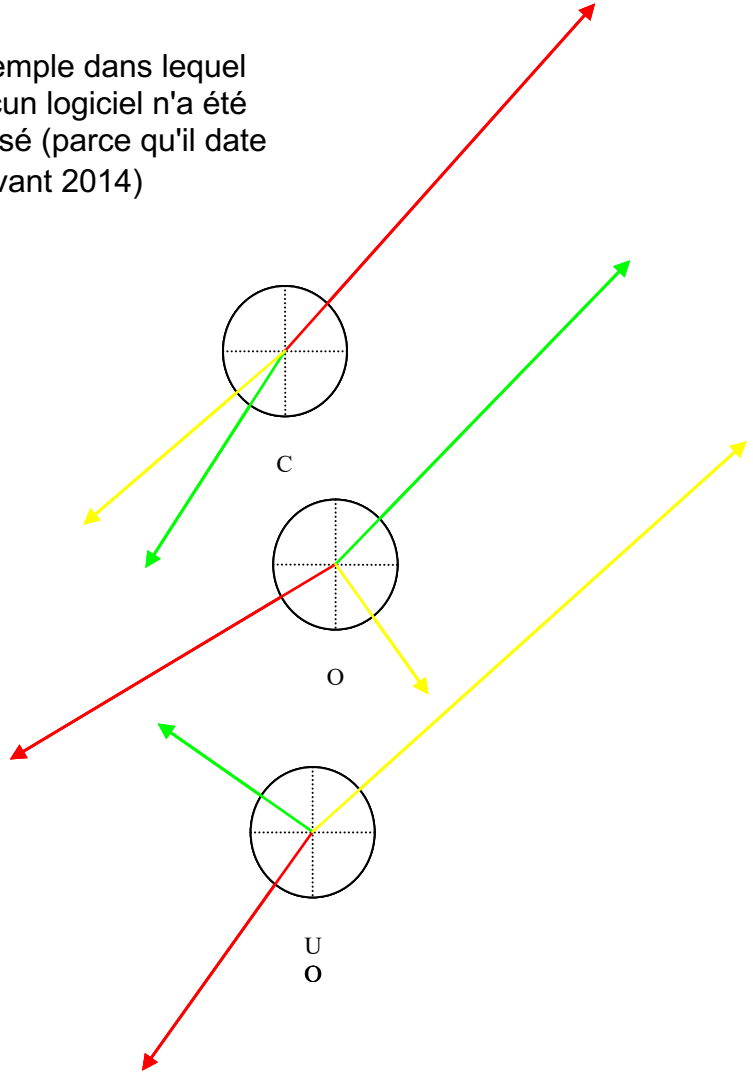
Analyse des coordonnées polaires → *Vectorialisation* du comportement

C.CRITERIO		C	O	UO
	ZSumR	11,7	-8,5	-4,6
	ZSumP	11,7	-2,8	-6,7
C		VECTORES		
	MODULO	16,5	8,9	8,1
	ÁNGULO	45	251	214

	ZSumR	-2,8	10,79	-4,99
	ZSumP	-8,5	10,79	1,48
O		VECTORES		
	MODULO	8,9	15,2	5,2
	ÁNGULO	198	45	286

	ZSumR	-6,73	1,48	13,08
	ZSumP	-4,6	-4,99	13,08
UO		VECTORES		
	MODULO	8,1	5,1	18,3
	ÁNGULO	235	164	45

Exemple dans lequel aucun logiciel n'a été utilisé (parce qu'il date d'avant 2014)

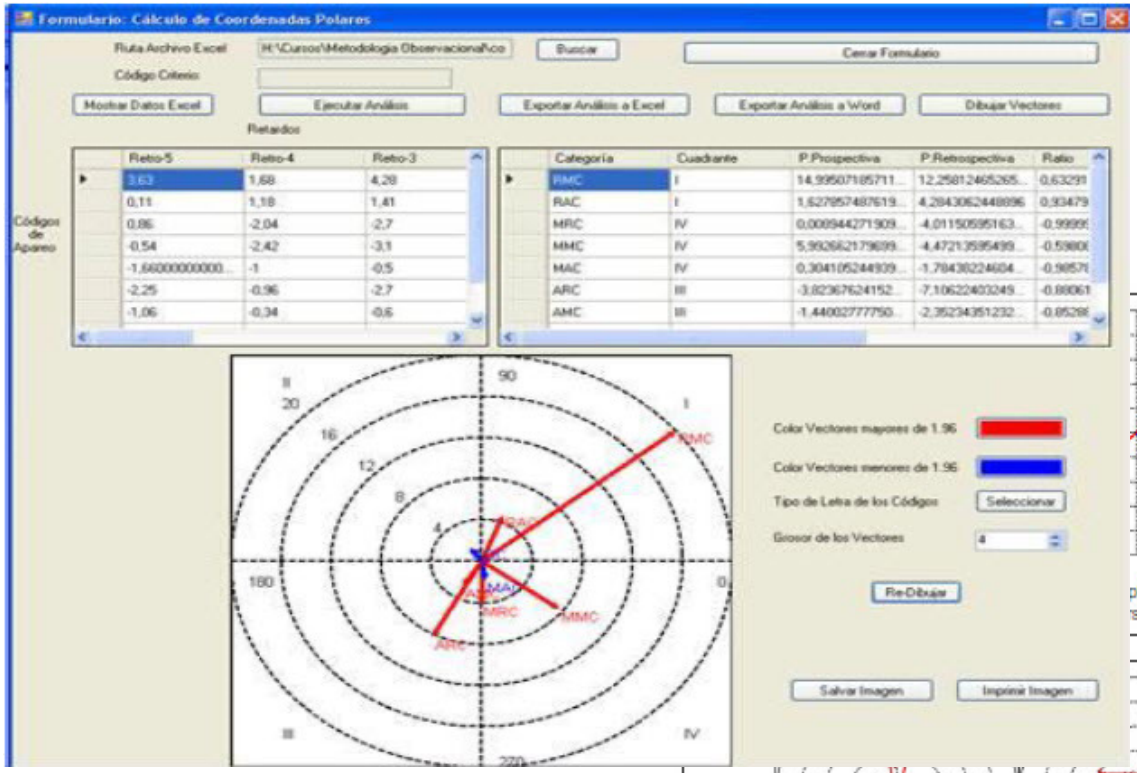


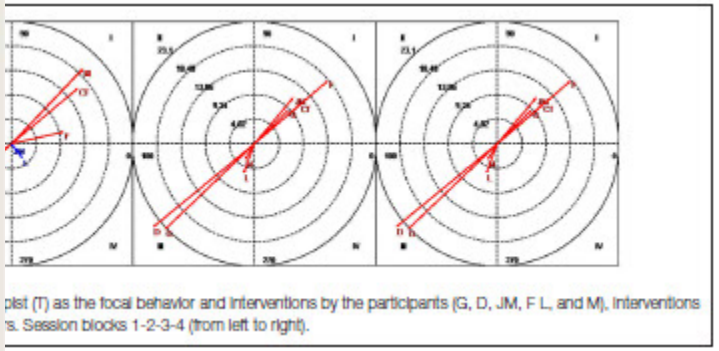
Anguera, M.T., Santoyo, C. & Espinosa, M.C. (2003). Evaluating links intensity in social networks in a school context through observational designs. In R. García Mira, J.M. Sabucedo Cameselle & J. Romay Martínez (Eds.), *Culture, Environmental Action and Sustainability* (pp. 286-298). Göttingen: Hogrefe & Huber.

METHODOLOGICAL ADVANCES (27)

ANALSE DES COORDONNÉES POLAIRES

Illustration 7





plst (T) as the focal behavior and interventions by the participants (G, D, JM, F L, and M). Interventions
s. Session blocks 1-2-3-4 (from left to right).

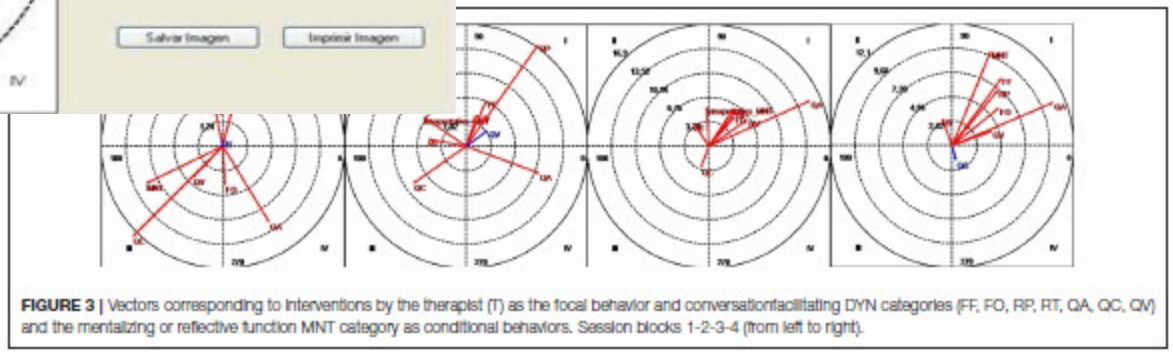


FIGURE 3 | Vectors corresponding to interventions by the therapist (T) as the focal behavior and conversationfacilitating DYN categories (FF, FO, RP, RT, QA, QC, QV) and the mentalizing or reflective function MNT category as conditional behaviors. Session blocks 1-2-3-4 (from left to right).

HOISAN, v.1.6.3
www.menpas.com

Arias-Pujol, E. & Anguera, M.T. (2017). Observation of interactions in adolescent group therapy: A mixed methods study. **Frontiers in Psychology**, *8*:1188. DOI: 10.3389/fpsyg.2017.01188

METHODOLOGICAL ADVANCES (28)

frontiers in Psychology

ORIGINAL RESEARCH
published: 12 May 2017
doi: 10.3389/fpsyg.2017.00741

Illustration 8

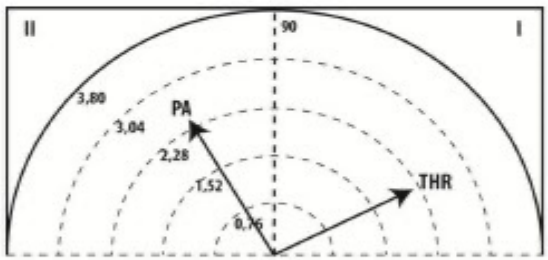
Mastery in Goal Scoring, T-Pattern Detection, and Polar Coordinate Analysis of Motor Skills Used by Lionel Messi and Cristiano Ronaldo

Marta Castañer[1], Daniel Barreira[2], Oleguer Camerino[1], M. Teresa Anguera[3], Tiago Fernandes[2] and Raúl Hileno[1]*

FOOT CONTACT ZONE

MESSI

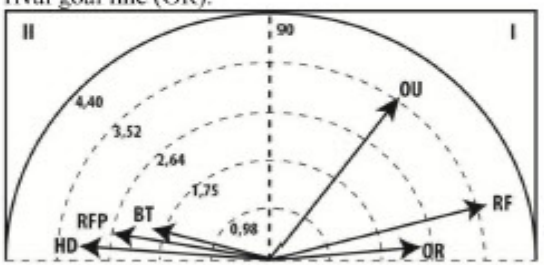
Focal category: OU (outside of the foot)
The use of the outside of the foot (OU) is activated (QII) by absolute numerical inferiority (PA) and is mutually activated (QI) by the use of three steps between touches of the ball (THR).



Category	Q	P.Prosp.	P.Retro.	Radius	Angle
Centre_PA	II	-1.19	2.10	2.42 (*)	119.60
Locomot_THR	I	2.13	0.72	2.25 (*)	18.74

RONALDO

Focal category: OU (outside of the foot)
The use of the outside of the foot (OU) is activated (QII) by the use of the head (HD), facing backwards with respect to the rival goal line (BT) and pivoting over the right leg (RFP), and is mutually activated (QI) with the use of the external zone of the foot (OU) and the right foot (RF) and the right orientation of the body with respect to the rival goal line (OR).

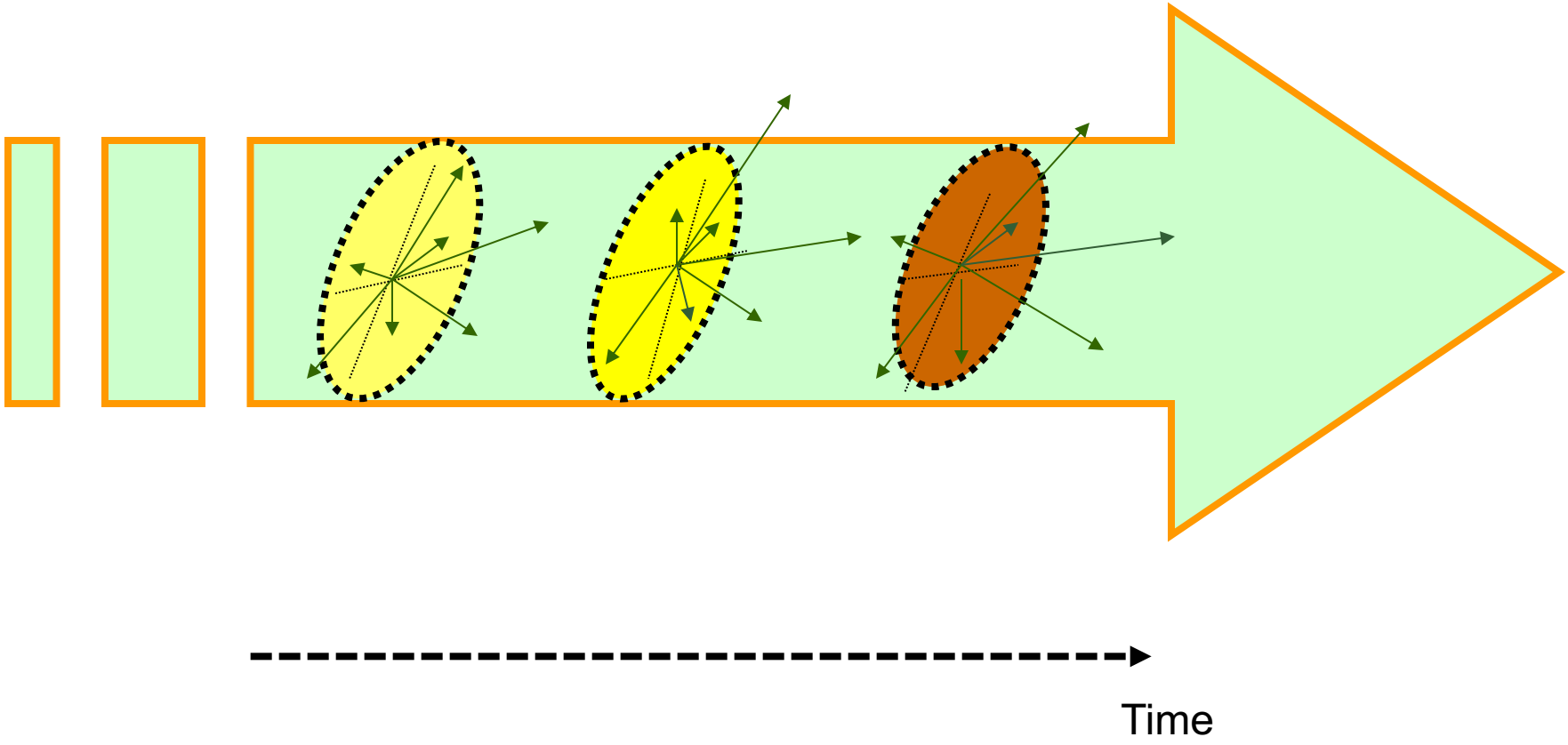


Category	Q	P.Prosp.	P.Retro.	Radius	Angle
Bodypart_HD	II	-3.16	0.12	3.16 (*)	177.80
Bodyorient_BT	II	-1.96	0.30	1.98 (*)	171.34
St.Pivotfoot RFP	II	-2.72	0.25	2.73 (*)	174.72
Footczone_OU	I	2.50	2.50	3.54 (*)	45
Bodypart_RF	I	3.65	0.46	3.68 (*)	7.13
Bodyorient_OR	I	2.38	0.16	2.39 (*)	3.80

FIGURE 7 | Maps of polar coordinate analysis for the Foot Contact Zone criterion.

METHODOLOGICAL ADVANCES (29)

Cartes successives de vecteurs le long d'une période de temps



METHODOLOGICAL ADVANCES (30)

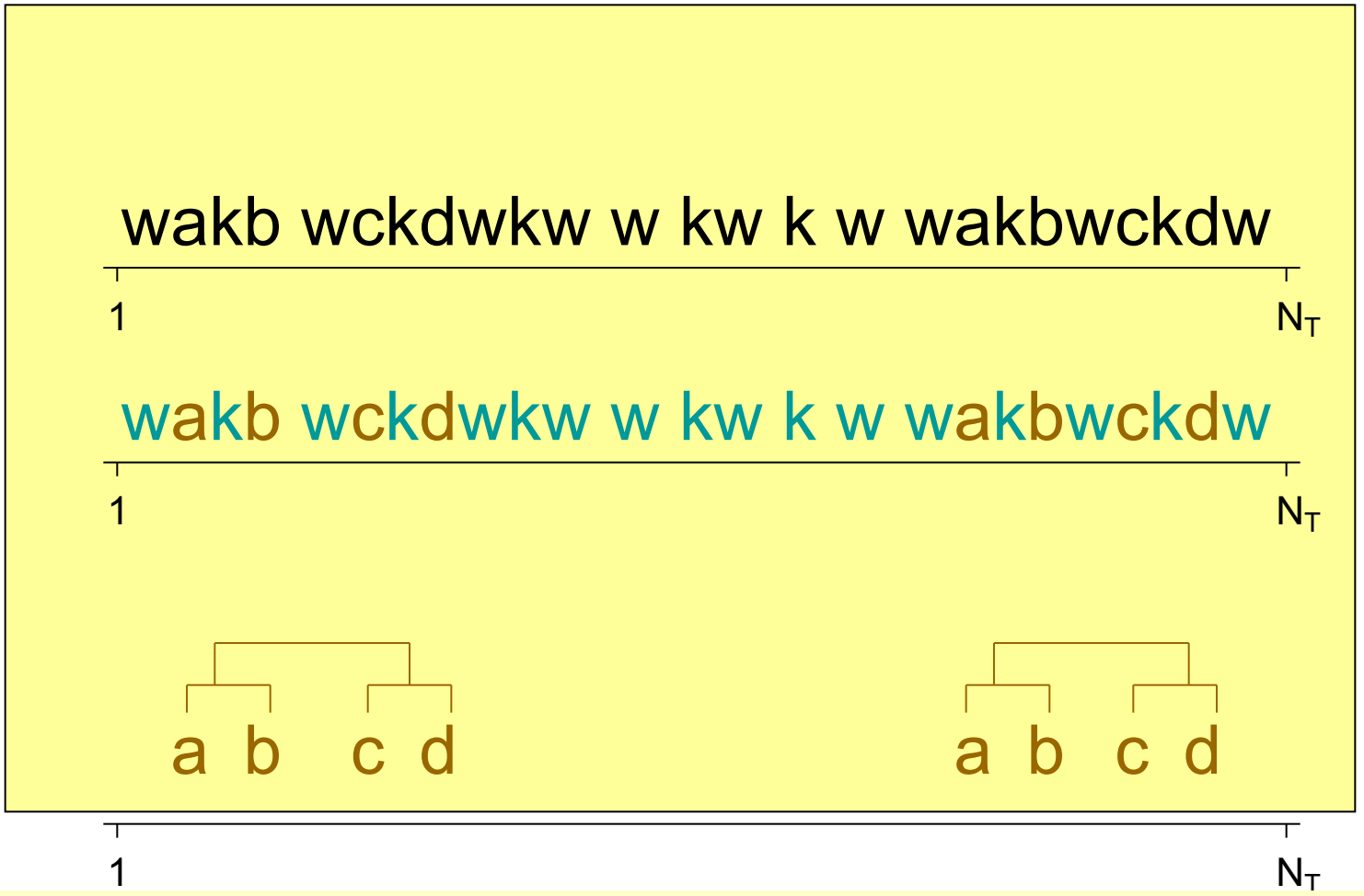
DÉTECTION DE T-PATTERNS

L'hypothèse sous-jacente de la méthode de détection des schémas en T est que les comportements humains complexes ont une structure temporelle qui ne peut pas être entièrement détectée avec les méthodes d'observation traditionnelles ou la simple logique statistique quantitative (Magnusson, 1996, 2000). En détectant les schémas en T, ou "schémas temporels", **cette méthode permet de déceler des analogies structurelles entre des niveaux d'organisation très différents, ce qui rend possible un passage important de l'analyse quantitative à l'analyse structurelle**.

Des études de détection de schémas en T ont été menées dans un large éventail de domaines scientifiques. Étant donné que les enregistrements d'observation du comportement humain ont une structure temporelle et séquentielle, un outil analytique [**THEME**] capable de décrire cette structure ne peut qu'améliorer la compréhension du (des) comportement(s) cible(s). **L'analyse des schémas en T peut révéler des structures cachées mais stables qui sous-tendent les interactions qui déterminent ce qui se passe dans un épisode de comportement.**

METHODOLOGICAL ADVANCES (31)

DÉTECTION DE T-PATTERNS



Adapté de:

Magnusson, M.S. (2000). Discovering hidden time patterns in behavior: T-patterns and their detection. *Behavior Research Methods, Instruments & Computers, 32* (1), 93-110.

METHODOLOGICAL ADVANCES (32)

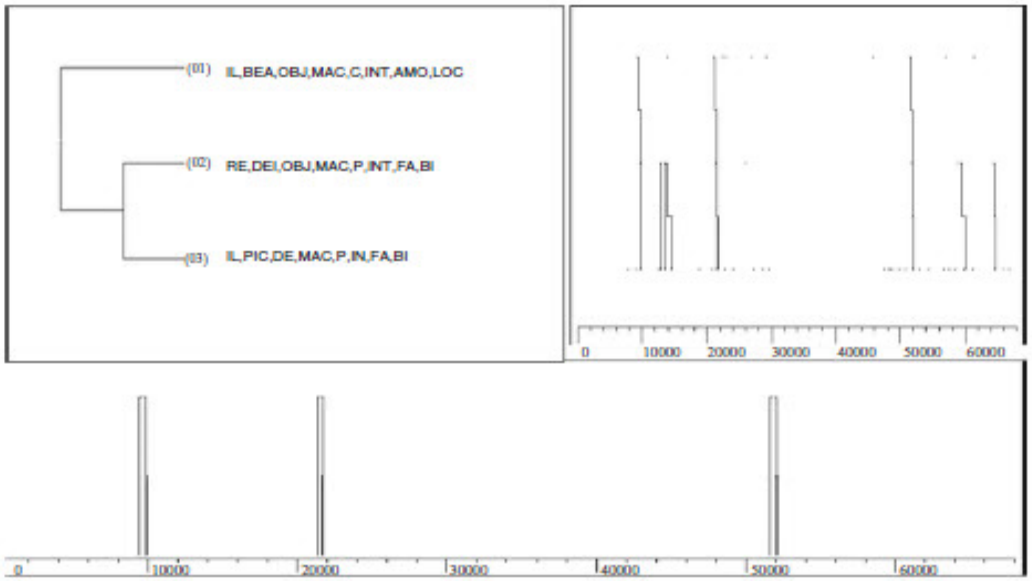


Fig. 4 This relevant T-pattern is related to interaction with the whole class/group of students. It consists of three levels and a sequence of three events, each one of which comprises a complex combination of codes (combinations of eight codes), occurring on three occasions during the observation period with the same sequence of events and significantly similar time intervals between each event occurrences. This T-pattern shows the alternation between the use of illustration (IL) and regulation (RE), as defined previously. As can be seen in (*01*), most illustrative (IL) situations involve expository, narrative, and descriptive phrases that are usually accompanied by gestures whose morphology takes the form of beats (BEA), and also accompanied by locomotion (LOC) or movement by the teacher around the classroom or among the students (AMO). As can be seen in (*02*), situations of regulation (RE), in which the teacher uses imperative, interrogative, or instructive phrases, are usually accompanied by deictic (DEI) gestures and made from a peripheral (P) area of the classroom. In (*03*) one can see another trend in the illustrative function accompanied by more defined gestures, in this case pictographs (PIC) that are usually used when the teacher has a fixed bipedal (BI) posture. It seems that maintaining a fixed posture helps to focus the attention required to make highly defined gestures such as kinetographs or pictographs. The object adaptor (OBJ) appears frequently, except when the teacher begins to demonstrate (DE) (for example, holding a piece of chalk in his hand (OBJ) but then beginning to write with it (DE), or putting it down so as to demonstrate something with his hands more clearly)

DÉTECTION DE T-PATTERNS DANS L'OBSERVATION DIRECTE

Illustration 9

THEME, v. Edu

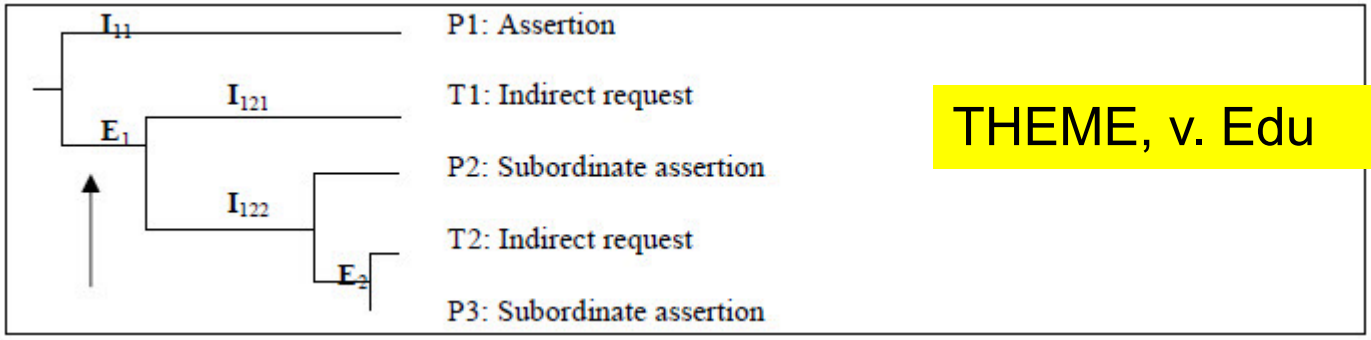
Castañer, M., Camerino, O., Anguera, M.T. & Jonsson, G. (2015). Paraverbal Communicative Teaching T-patterns using SOCIN and SOPROX observational systems. In M.S. Magnusson, J.K. Burgoon, M. Casarrubea & D. McNeill (eds.), *Discovering Hidden Temporal Patterns in Behavior and Interactions: T-Pattern Detection and Analysis with THEME* (pp. 83-100). New York: Springer.

METHODOLOGICAL ADVANCES (32)

DÉTECTION DE T-PATTERNS DANS L'OBSERVATION INDIRECTE

(P1) Patient: I feel alive to some extent but at the same time, I feel like I've been dead for some time, you know? You see, I mean…
(T1) Clinician: Dead
(P2) Patient: Yeah, yeah, dead because I wasn't alive; it wasn't me who was alive. I was living through heroin. It wasn't me expressing myself, you know?
(T2) Clinician: You said "dead"; you didn't say "hibernating."
(P3) Patient: No, I can't say I was hibernating because somehow through heroin I was also searching for a kind of death.
(T3) Clinician: You think so?
(P4) Patient: Well, yeah, somehow I was…
(T4) Clinician: You thought that.

Illustration 10



THEME, v. Edu

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METHODOLOGICAL ADVANCES (33)

DÉTECTION DE T-PATTERNS

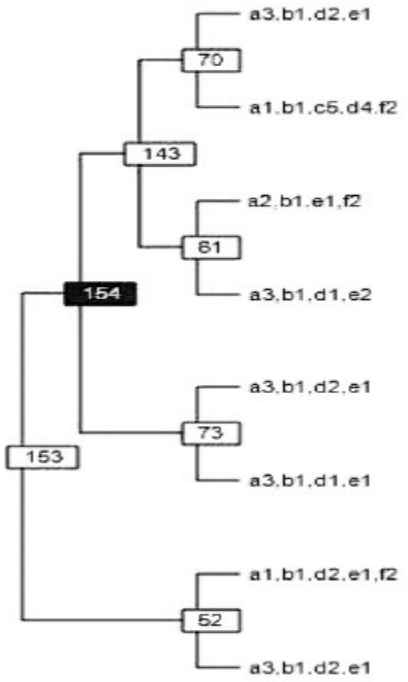
Illustration 11

Context: Conflict between divorced ex-husband and ex-wife in relation to compliance of the agreement on their daughter's education

No. textual unit	Transcribed dialogue	Co-occurrence codes
1	A2: I totally disagree with my daughter not attending to her schoolwork when she is with her father	A2,B1,C1,D1
2	A1: When my daughter is with me, I make the decisions about her education, and I am not giving one inch to what her mother wants	A1,B1,C1,D4
3	A3: We do have time, and first it would be better to talk about secondary issues that we can resolve easily.	A3,B2
4	A2: They may be secondary issues, but we think very differently, and I don't believe this will work, so I'm keeping neutral.	A2, B2,C4,D2,E3
5	A3: We can make a list of these secondary issues, and we can see how far we get for now.	A3,B2,D2
Etc.		

Instrument of indirect observation (see text for details).

Dimension	Categories	Codes
Participant (A)	Ex-husband	A1
	Ex-wife	A2
	Mediator	A3
Conflict (B)	Central issue	B1
	Secondary aspect	B2
	Related issue	B3
Position (C)	Confrontation	C1
	Markedly different	C2
	Different	C3
	Slightly different	C4
	Approachable	C5
	Coincident	C6
	Totally coincident	C7
Reasoning (D)	Strong	D1
	Clear	D2
	Weak arguments	D3
	Does not argue	D4
Proposal (E)	A proposal is made	E1
	No proposal is made	E2
Response to proposals (F)	Full acceptance	F1
	Partial acceptance	F2
	Neutral acceptance	F3
	Partial negation	F4
	Full negation	F5



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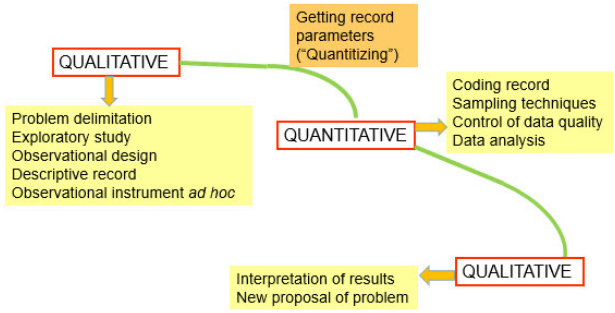
METHODOLOGICAL ADVANCES (34)

TROISÈME MACRO-ÉTAPE DU PROCESSUS

RÉSULTATS QUANTITATIFS → INTERPRÉTATION QUALITATIVE

- ❑ Discussion des résultats en function des objectifs
- ❑ Accord / absence d'accord avec les auteurs de référence
- ❑ Autocritique méthodologique
- ❑ Proposition d'une nouvelle étude



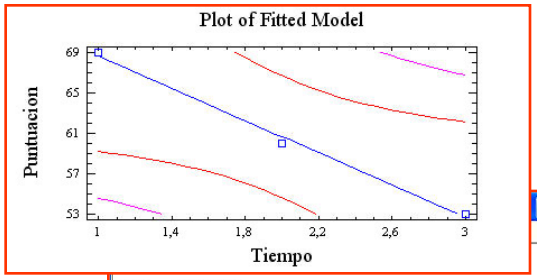
METHODOLOGICAL ADVANCES (35)

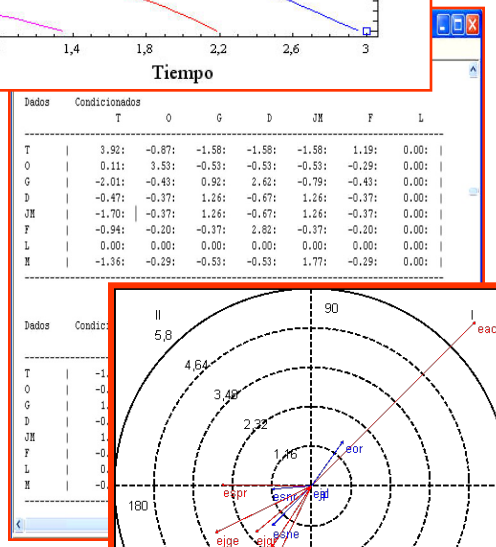
Mon professeu
coup d'œil aux
ont été publiée
conneries" et les a rejetées. Elle pense que les normes sont souvent impossibles à atteindre et qu'il faudrait être un super-professeur avec des super-élèves pour arriver à couvrir toute la matière. Je n'utilise pas non plus les normes. Je pense que mes cours intègrent de nombreuses normes, mais je ne les conçois pas en fonction des normes. Je les conçois en fonction des besoins des élèves de ma classe.

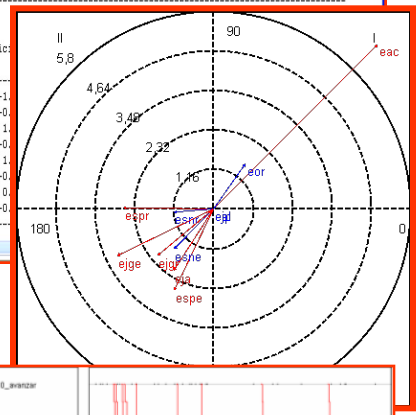
INTÉGRATION

Approche qualitative

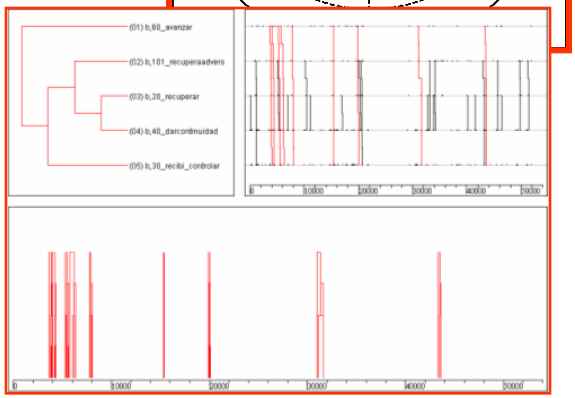
Approche quantitative







PROCESSUS D'OBSERVATION SYSTÉMATIQUE (DIRECTE ET INDIRECTE)



POUR L'AVENIR ...

- Accélérer le processus de *quantitizing* (par le biais d'une matrice de codes)
- Explorer de nouvelles possibilités d'intégration
- Associer les enregistraments d'observation à d'autres sources de données (entretiens approfondis, donnees psysiologiques, ...)
- Améliorer la complementarité entre l'analyse quantitative et les données qualitatives

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