The Notion of 'Spatial Diaspora'
and the Geographical Location of Knowledge

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SALL

October 2006

My point here is, on the contrary, that the "idea of Latin" America twisted the past, on the one hand, and made it possible to frame the imperial/colonial period as proto-national histories, and, on the other, made it possible to "make" into "Latin America" historical events that occurred after the idea was invented and adapted. […] As I have said, I am not writing ahere "about" Latin America in an "area studies" framework, but on how Latin America came about.
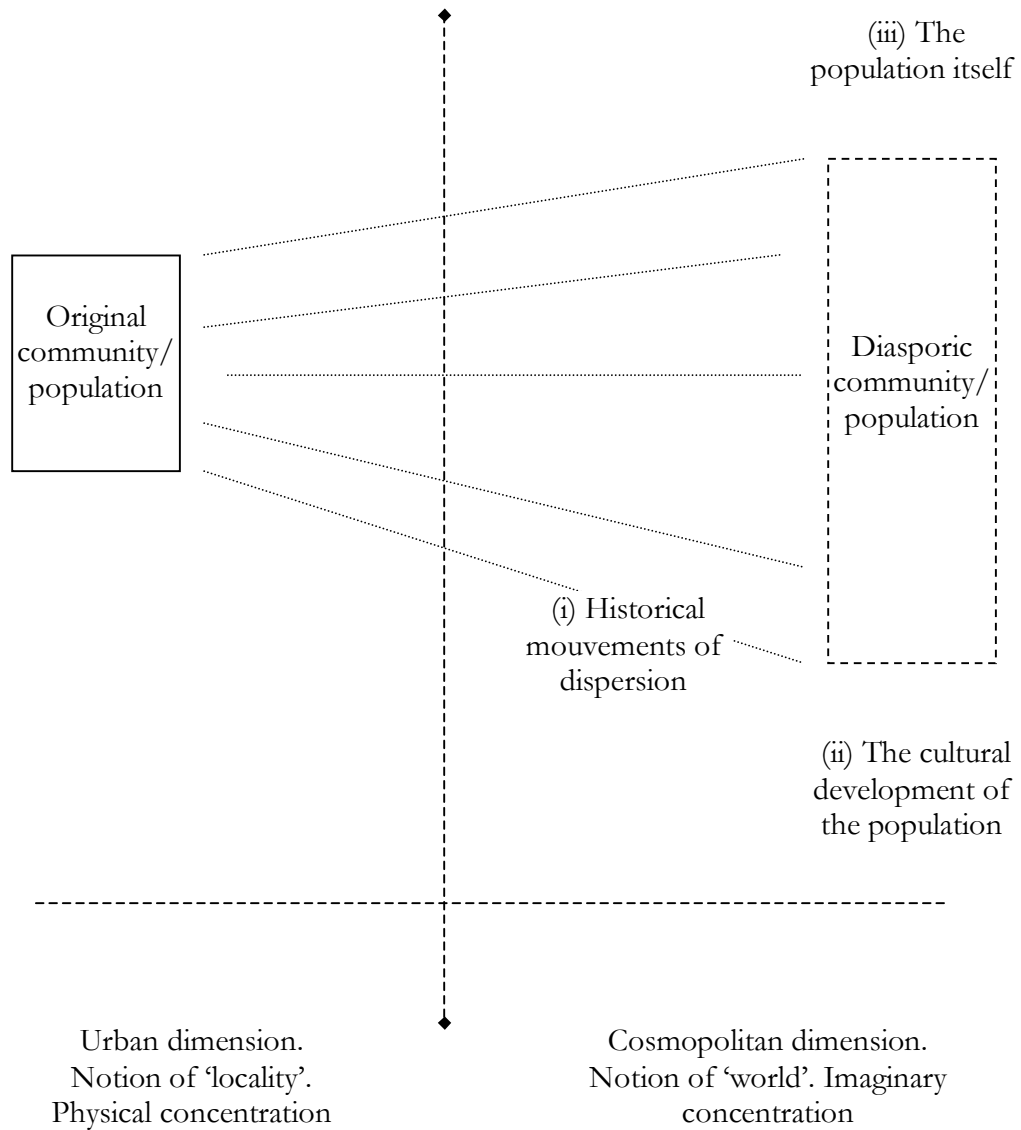
The Idea of Latin America
Walter D. Mignolo

Ground 1

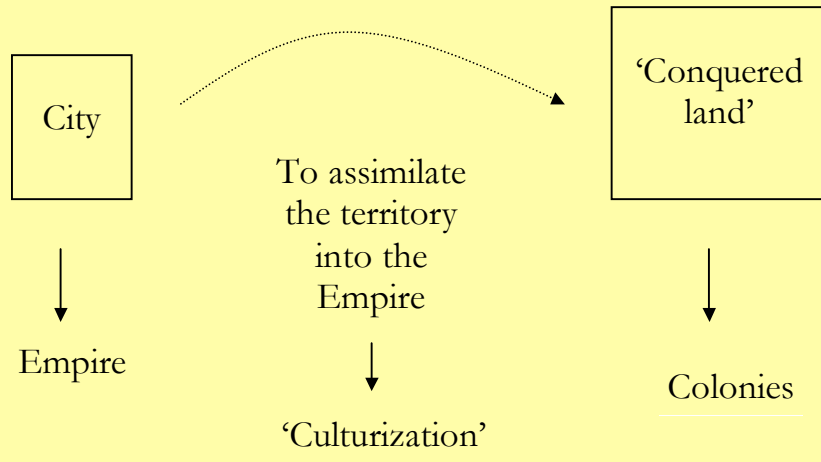Διασπορά/Diaspora: 'Zero degree' Level

Διασπορά

Classical notion — triple meaning

(iii) The
population itself

Original
community/
population

Diasporic
community/
population

(i) Historical
mouvements of
dispersion

(ii) The cultural
development of
the population

Urban dimension.
Notion of 'locality'.
Physical concentration

Cosmopolitan dimension.
Notion of 'world'. Imaginary
concentration

Διασπορά

Historical Notion

Ancient Greeks

City → Empire

To assimilate the territory into the Empire → 'Culturization'

'Conquered land' → Colonies

Post-Greek period

Old testament = Translated into Greek = Deuteronomy [28: 25]

Jews → Exile

1st Moment — Judea 586 BC

2nd Moment — Jerusalem 136 AD

Exile Space
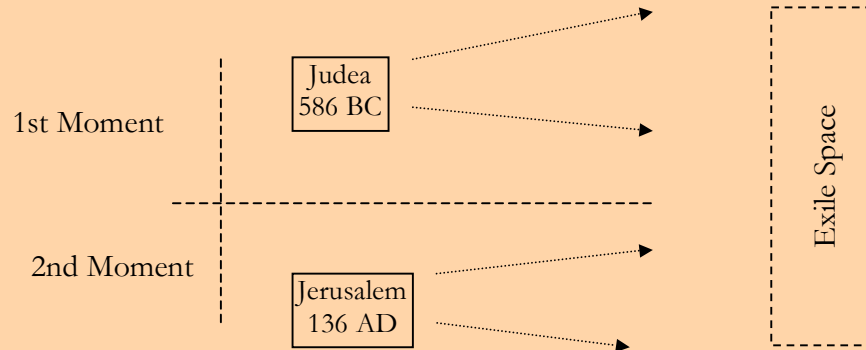
Modern/'Anthropological' diaspora

Past

History

'Original' Community

Imaginary Community

Diaspora

Dispersion, desintegration

Culture

Future

Level of Utopia and Myth

Level of Art and Writing
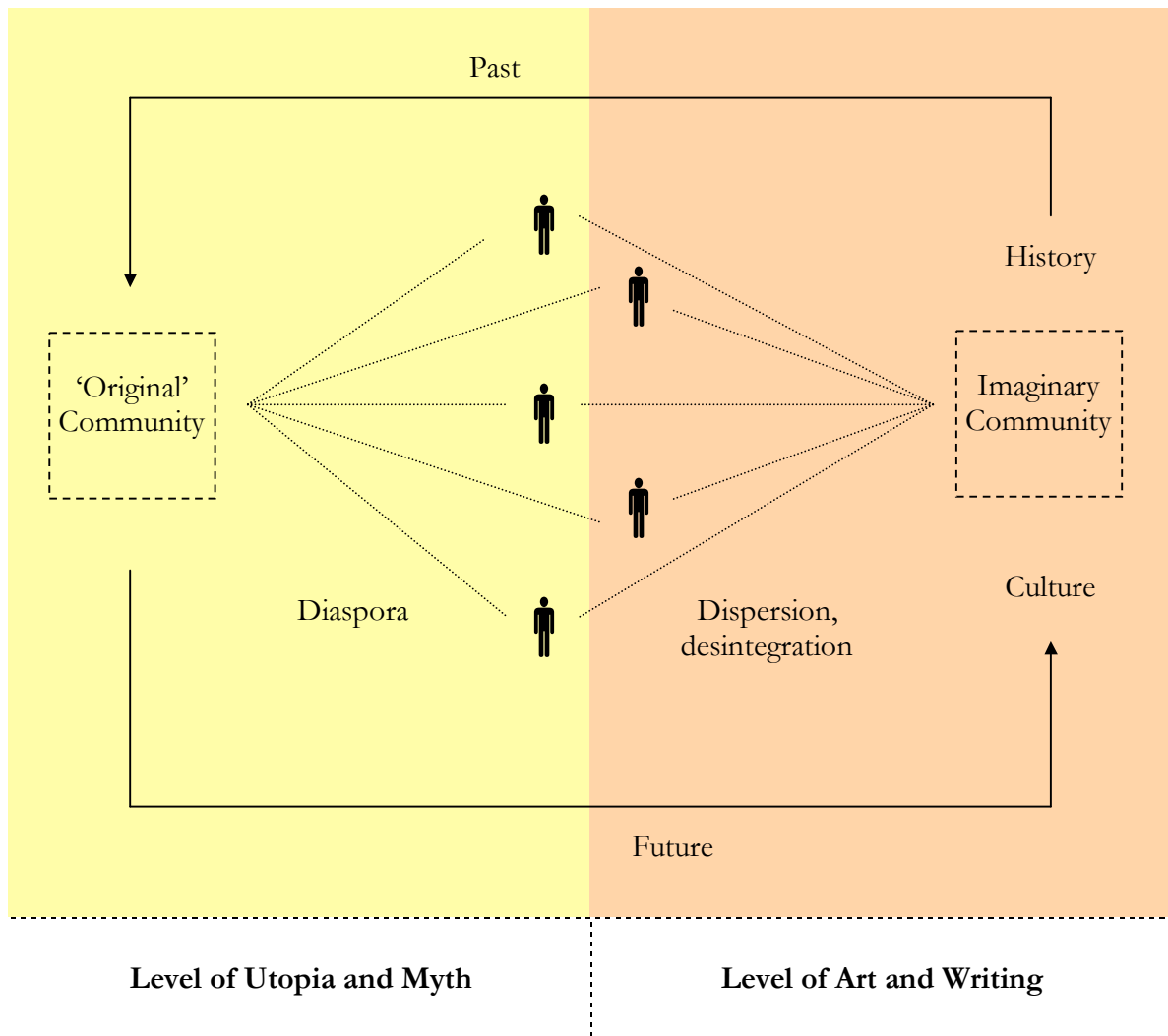
After Modernity/Post-colonial diaspora

Visible ⋮ **Invisible**

Heritage [monuments]/ Cultural
Capital/ [Past]

Re-construction of
individual

'World' /
Totality

Imaginary

'Spatial
Diaspora'
[Diaspora]

War/Conflict
Environment
[Dispersion,
desintegrationl

Construction
of local
dimension

Horizon d'attente/ Principle of
Reality/ [Future]

Physical System ⋮ **Non-physical System**
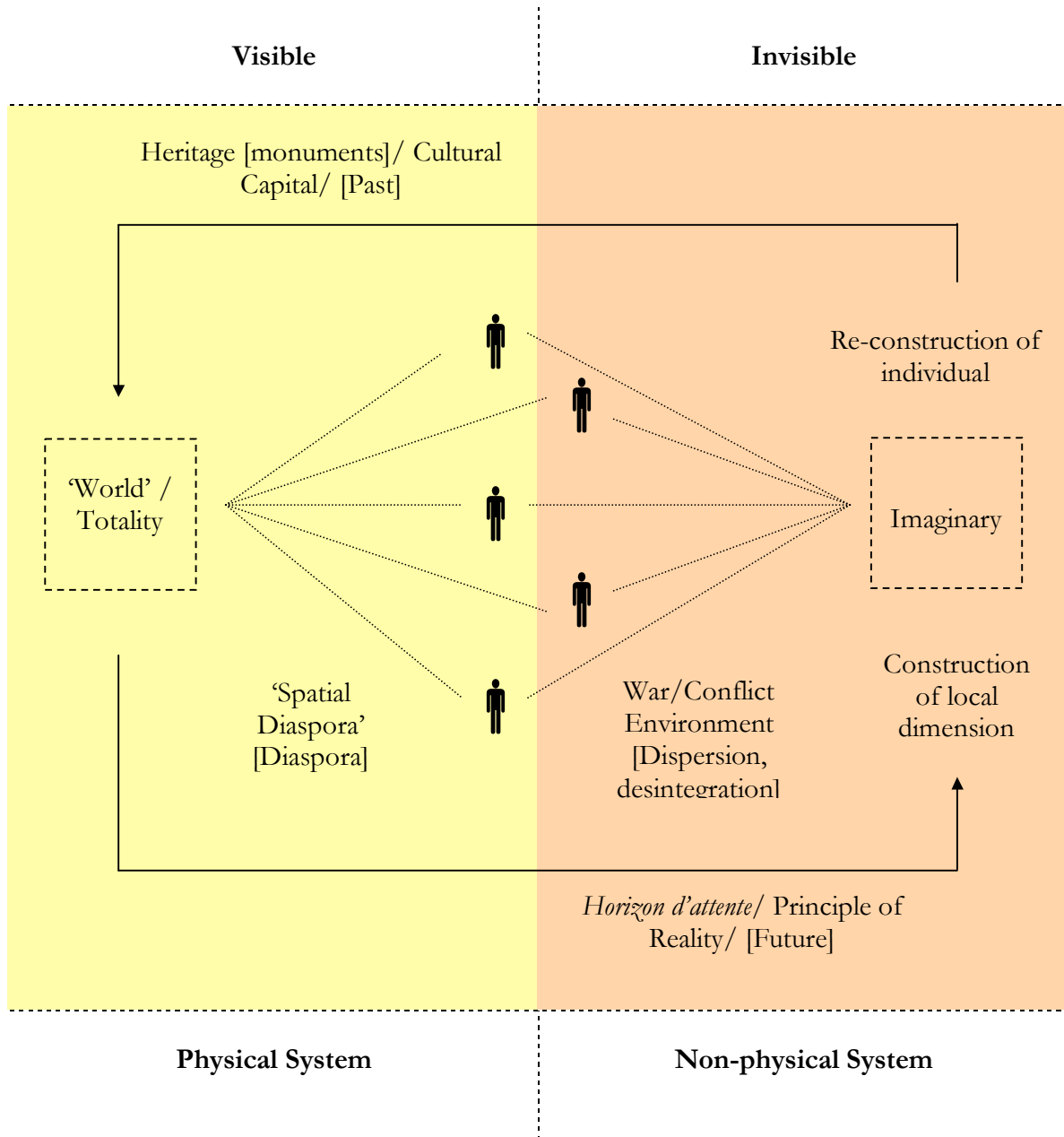
Diaspora — Conceptual Transition

	Modern Notion of Diaspora	After-Modernity Notion of Diaspora
Components	Individuals and their cultural identity/heritage was the main concern.	Individual subjectivity is *subject* to the construction of a local environment, of a 'spatial' dimension. The physical system *demands* a resolution, a *place*.
Characteristics	Travel Exile Writing Knowledge Settlement	Displacement Conflict Capital Information Transition
Instruments	Work Social placement Education/professionalization 'Family'-orientated targets and aims	Sign-meaning [sign-ification] Market placement Training/Job-nalization Individuals/corporate purposes

Contemporary notion of *Diaspora*

Brief Bibliography

BRUNEAU, Michèle. 'Espaces et territoires de diasporas', in: *L'Espace Géographique*, Paris, Centre National de la Recherche Scientifique, eg.1, Paris, 1994.

From *Diaspora*, Volume 2, Number 2, Spring 1991.
'Diasporas in Modern Societies: Myths of Homeland and Return', William Safran.

From *Diaspora*, Volume 5, Number 1, Spring 1996.
'Rethinking Diaspora (s): Stateless Power in the Transnational Moment', Khachig Tölölyan.

From *Diaspora*, Volume 8, Number 3, Winter 1999.
'From the Nation-State to the Transnational World: On the Meaning and Usefulness of Diaspora as a Concept', Dominique Schnapper

From *Diaspora*, Volume 9, Number 1, Spring 2000.
'The Materiality of Diaspora-Between Aesthetic and "Real" Politics Diasporas through Anthropological Lenses: Contexts of Postmodernity', André LevyPnina Werbner.

From *Diaspora*, Volume 10, Number 1, Spring 2001.
'Globalization, the Nation-State, and Imperialism: A Review Essay', Alex Dupuy.
'Remapping the World after the Crisis in Area Studies', Peter Rutland.

From *Diaspora*, Volume 10, Number 2, Fall 2001
'Antonio Gramsci and Post-Colonial Theory: "Southernism".', Timothy Brennan
'Defining Diaspora, Refining a Discourse', Kim D. Butler
'Living Transnational Lives', José Itzigsohn

From *Diaspora*, Volume 10, Number 3, Winter 2001.
'Foreigners, Foreignness, and Theories of Democracy'. Donna Gabaccia.
'Foreign Objects: Finding Solutions to Democracy's Problems', Ali Behdad and Juliet Williams.

From *Diaspora*, Volume 11, Number 1, Spring 2002.
'Postmodernism, Realism, and the Problem of Identity', Shari Stone-Mediatore.

From *Diaspora*, Volume 12 Number 1 Spring 2003.
'World Literature: The Unbearable Lightness of Thinking Globally**,** Gregory Jusdanis.

From *Diaspora*, Volume 12, Number 2 Fall 2003.
'Modernity in Question? Culture and Religion in an Age of Global Modernity', Arif Dirlik.

'Foreigners Transformed: International Migration and the Remaking of a Divided People', Roger Waldinger.

From *Diaspora*, Volume 12, Number 3, Winter 2003.
'Where Do We Go From Here? Marxism, Modernity, and Postcolonial Studies', Arif Dirlik.
'Recent French Conceptualizations of Diaspora', William Safran.

Ground 2

Concept/Concept Evolution: Ἐπίστημος/Episteme' Level

Place of Departure

1) What is a concept?

2) What is the relation between concept/s and knowledge?

3) What is the relation between knowledge and culture?

Two paradigms regarding
to "Latin American" matters/subjects

Conceptual Dimension

3 Steps/Stages

1   2   3

	1	2	3	
'Classic' Approach	"The Imaginary"	'The Symbolic'	'The Real'	Lacan/ Zizek
'Alternative approach'	'Monde possible'	'Visage existant'	'Langage réel ou parole'	Deleuze
Geo-politics of Knowledge	—Meaning —Knowledge	—Representation —Culture —Conventions	—Politics —Public dimension —History	Geo-politics of Knowledge

New Book

Conceptual Dimension

3 Steps/Stages

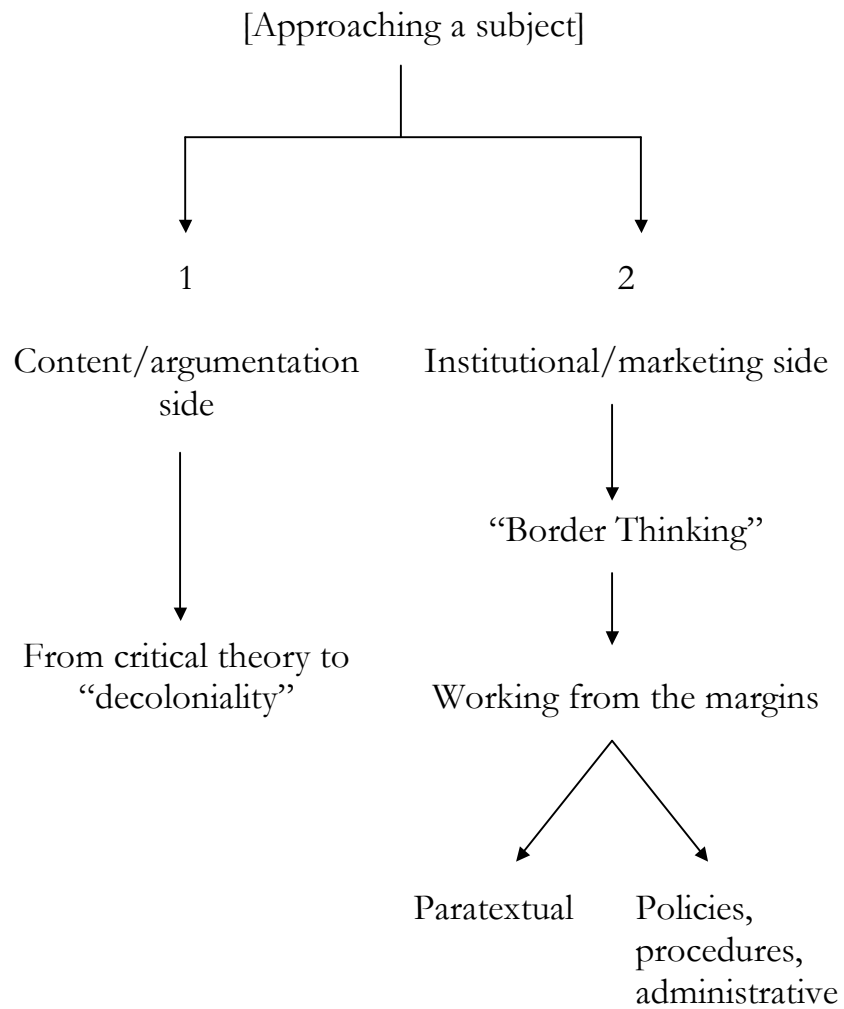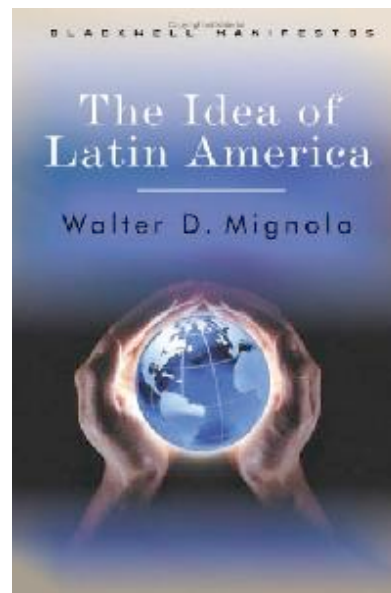|	1	2	3	
'Classic' Approach	"The Imaginary"	'The Symbolic'	'The Real'	Lacan/ Zizek
'Alternative approach'	'Monde possible'	'Visage existant'	'Langage réel ou parole'	Deleuze
Geo-politics of Knowledge	—Meaning —Knowledge	—Representation —Culture —Conventions	—Politics —Public dimension —History	Geo-politics of Knowledge

New Book → Figures/ Modes of Thought → Thinking → 'Border Thinking'
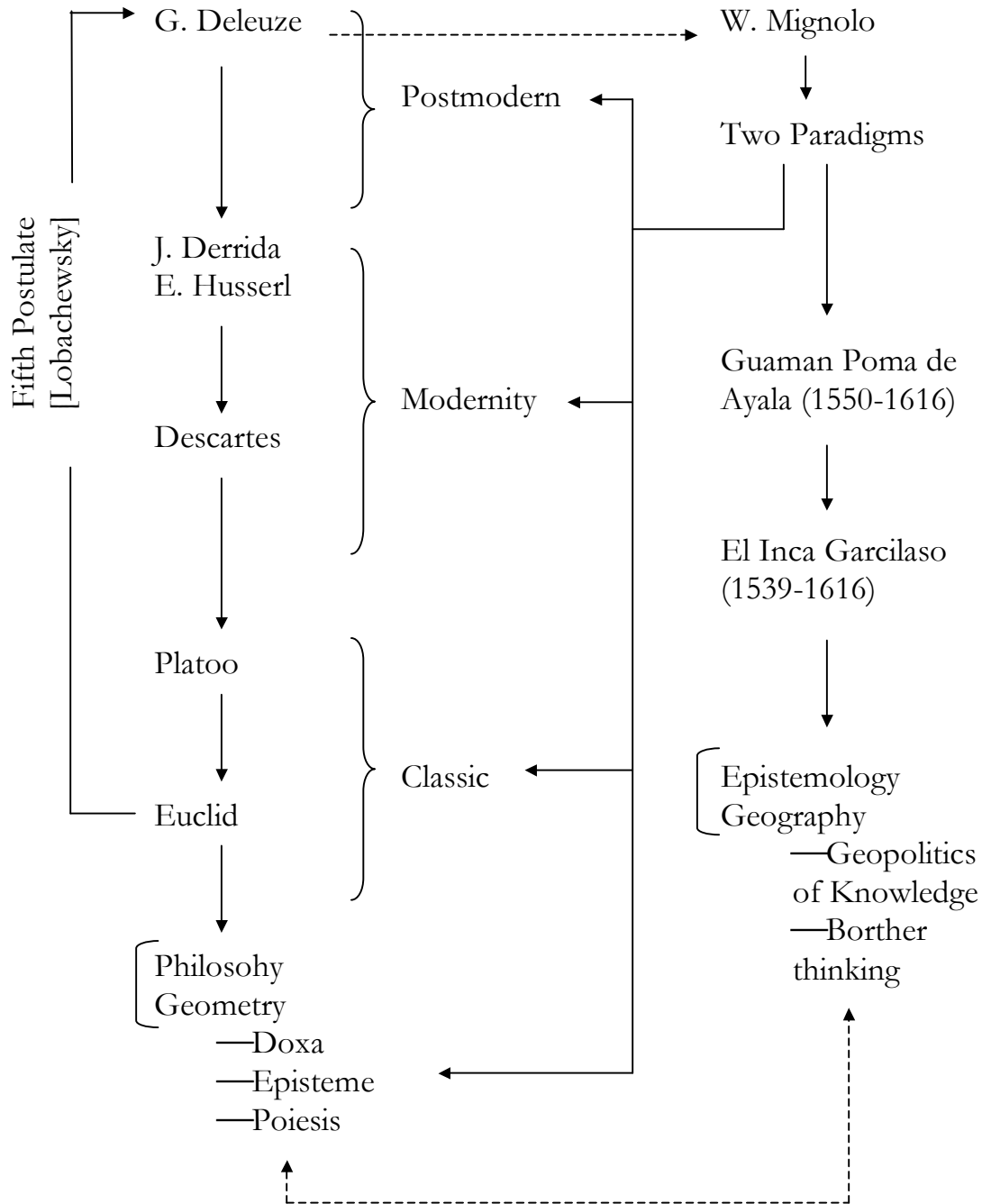
The double side of "located concepts"

[Approaching a subject]

1

Content/argumentation
side

From critical theory to
"decoloniality"

2

Institutional/marketing side

"Border Thinking"

Working from the margins

Paratextual   Policies,
                   procedures,
                   administrative

Development 1
'Géophilosophie' Level

COLLECTION « CRITIQUE »

GILLES DELEUZE
FELIX GUATTARI

QU'EST-CE QUE
LA PHILOSOPHIE ?

✰III

LES ÉDITIONS DE MINUIT

BLACKWELL MANIFESTOS

The Idea of
Latin America

Walter D. Mignolo

G. Deleuze - - - - - - - - - - - - - - - → W. Mignolo

Postmodern

Two Paradigms

Fifth Postulate
[Lobachewsky]

J. Derrida
E. Husserl

Descartes

Modernity

Guaman Poma de
Ayala (1550-1616)

El Inca Garcilaso
(1539-1616)

Platoo

Euclid

Classic

Epistemology
Geography
—Geopolitics
of Knowledge
—Borther
thinking

Philosohy
Geometry
—Doxa
—Episteme
—Poiesis

The double paradigmatic tradition

Universal — Europe   Local — Ad hoc space
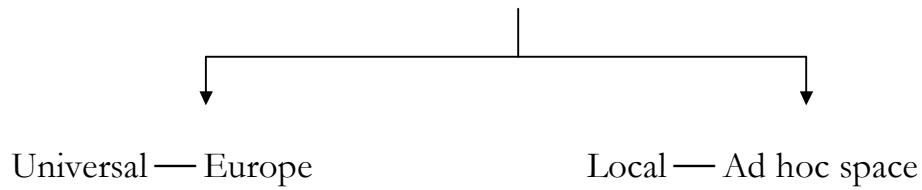
G. Deleuze/F. Guattari   Walter Mignolo

Capitalisme et Schizophrénie 2.
Mille Plateaux. (1980). Trans. A
Thousand Plateaus (1987).

The Darker Side of the Renaissance: Literacy,
Territoriality and Colonization (1995)

Qu'est-ce que la philosophie?
(1991). Trans. What Is
Philosophy? (1996).

Local Histories/Global Designs: Coloniality,
Subaltern Knowledges and Border Thinking (2000).

The Idea of Latin America. (2005).

Shift of Geopolitical
of knowledge

The question of conflicting paradigms		Paradigm of "Discovery" ["Imperial paradigm"]	Paradigm of "invention" ["Decolonial paradigm"]
	Perspective	The notion of "discovery" function in one hand as justified by natural philosophy and, on the other hand, as warrant of new land.	The notion of invention questioned the philosophical naturalism, the *tabula rasa* perspective and tries to de-construct the intellectual, legal and historiographical apparatus established.
	Notion of Land	Define as territory	Define as border, periphery or "Frontera" [Frontier]
	Notion of Language	Device-orientated. Monolinguism. Vehicular	Cultural-orientated. Bilinguism. Constructive (build-up)
	Notion of modernity	Modernity = one side concept ↓ Modernity appear as necessity of development ↓ A set of imposed values is required ↓ Foundation of the State	Modernity ↓ "Out of history" situation ↓ Two side concept ↙ ↘ "Modernity" "Coloniality" [Entangled]

"Conflict of interpretations"

Shift of Geopolitical
of knowledge

The question of conflicting paradigms		Paradigm of "Discovery" ["Imperial paradigm"]	Paradigm of "invention" ["Decolonial paradigm"]
	Perspective	"Modernity"	"New terrain of decoloniality".
	Narrative and historical perspective	Paradigm of newness and historical progression.	Paradigm of coexistence
	Notion of theory	Critical theory Development of modernity	Decolonial theory Decolonization of knowledge
	History and evolution	Linear succession of events Idea of "Nature" and naturalism. ↓ ¨Latin"/ "Latino/a"	Heterogeneous historico-structural nodes Artificial sense of "Nature" ↓ Re-configuration of subjectivities

"Conflict of interpretations"

EXAMPLE 1

"Kant" accoding to Deleuze/Guattari (1991)	"Pensée" is established by images, figures ("images de la pensée", "figures de la pensée"). The philosopher behaves as cartographer/ geographer.
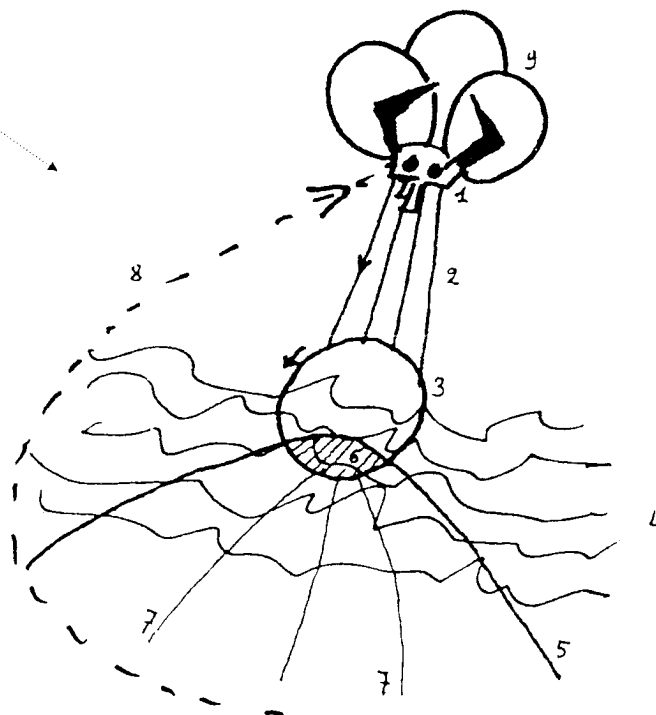
On pourrait imaginer en ce sens un portrait machini-que de Kant, illusions comprises (voir schéma ci-dessus).

1. — Le « Je pense » à tête de bœuf, sonorisé, qui ne cesse de répéter Moi = Moi. 2. — Les catégories comme concepts universels (quatre grands titres) : tiges extensives et rétractiles suivant le mouvement circulaire de 3. 3. — La roue mobile des schèmes. 4. — Le peu profond ruisseau, le Temps comme forme d'intériorité dans laquelle plonge et ressort la roue des schèmes. 5. — L'Espace comme forme d'extériorité : rives et fond. 6. — Le moi passif au fond du ruisseau et comme jonction des deux formes. 7. — Les principes des jugements synthétiques qui parcourent l'espace-temps. 8. — Le champ transcendantal de l'expérience possible, immanent *au* Je (plan d'immanence. 9. — Les trois Idées, ou illusions de transcen-dance (cercles tournant à l'horizon absolu : Ame, Monde et Dieu).

EXAMPLE 2

<mark>Mapping/visualizing the naming and origins (epistemic dimension) of "Latin America" as a concept</mark>

Waman Poma de Ayala, *Nueva Corónica y Buen Gobierno* (1612 *circa*) = "Think" in speculative terms ("Philosophy" in European terms) is here establish a *distinction* in visual terms. "Europe" cannot be read but *watch* (Imperial perspective) or *see* (local perspective).

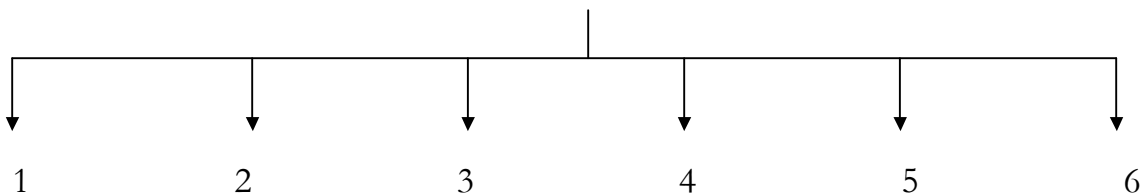The Empire in the/and the colonies *saw* by a native.
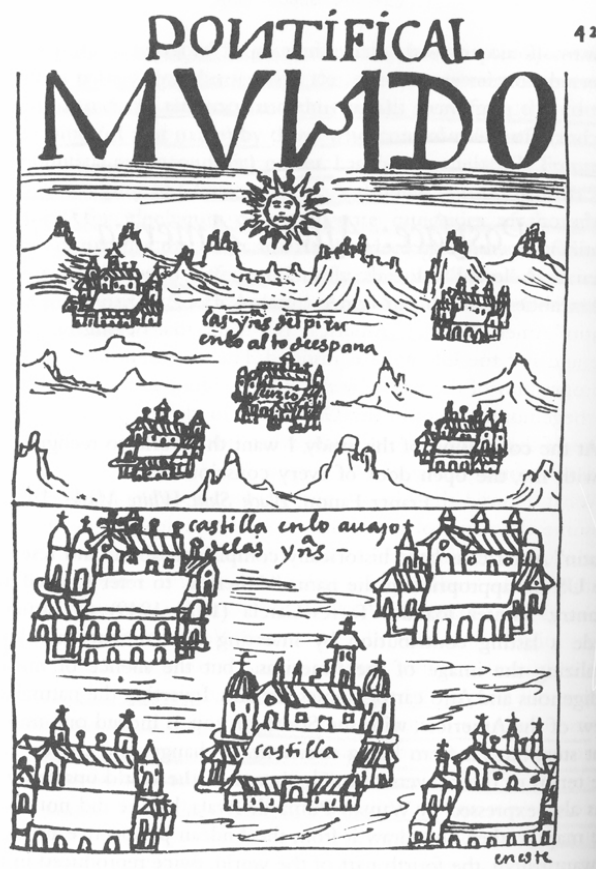
'Native World'

'Western World'
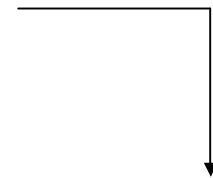
The Empire *watched* by a native

EXAMPLE 3

Notion of Territory

Relevant for/characterized by

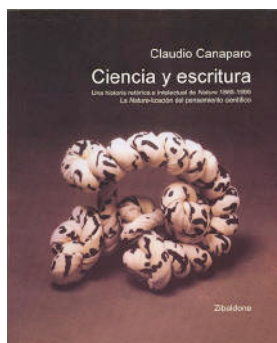| 1	2	3	4	5	6
How the land was territorialized	What is the function of territory	What happens when the territory is not function as territory anymore ("Post-territory")	Territory still in place but its conception and meaning change	Institutions can not rely anymore on territorial basis	Land need to be re-define in spatial terms
			Land and territory are not *entangled* anymore		
—State —"Countries" —"Nation" —Natural law and philosophy	—State —Law	—Capital/capitalism —Invisibility —Post-industrial societies —Values problem	—Visual dimension —"Real" dimension	—Countries without land —Problem of signals and signs	Geo-politics of knowledge
					New Book

Modernity Dimension

Post-modern Dimension

Periphery Dimension

Development 2
'Geographical Location of Knowledge'
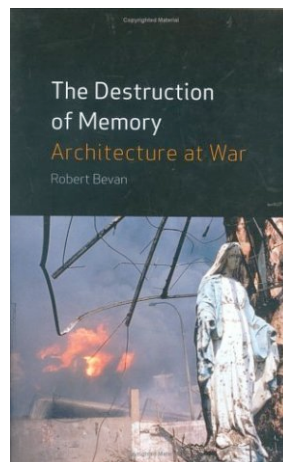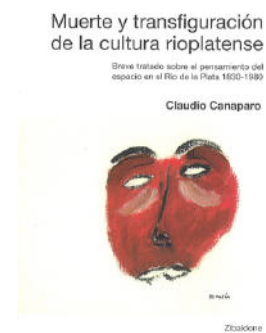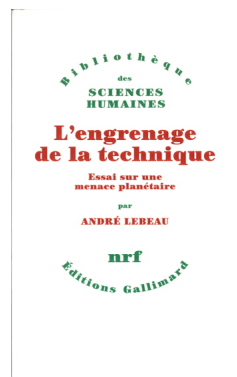
Geo-politics of Knowledge

5 Elements/ideas/problems

Geographical Location	Historiographical location	Condition of enuntiation	Conceptual evolution	Dimension of State/Public Domain/Market

New
Book
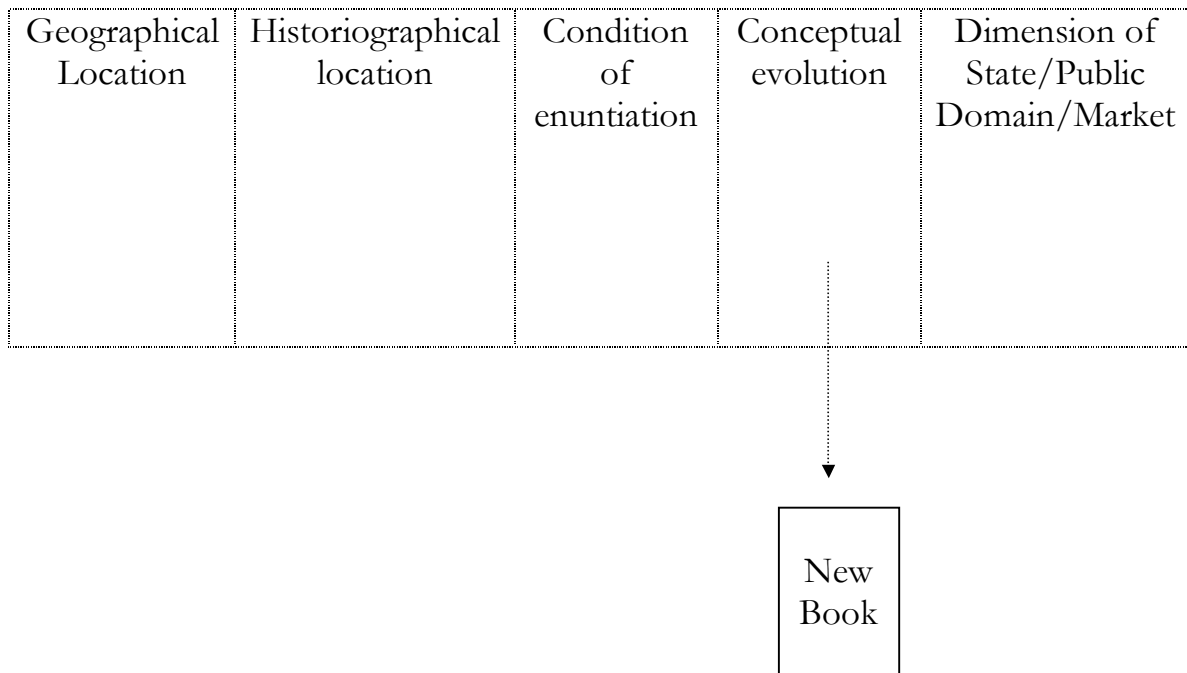
Development 3
Samples/Examples: The problem of the *Exemplum*

1	2	3
Authored Monograph	Co-authored Monograph	Undergraduate Module

Sample One

'El imaginario Patagonia'
[The Imaginary Patagonia ─ Forthcoming book]

'The European Cartography'

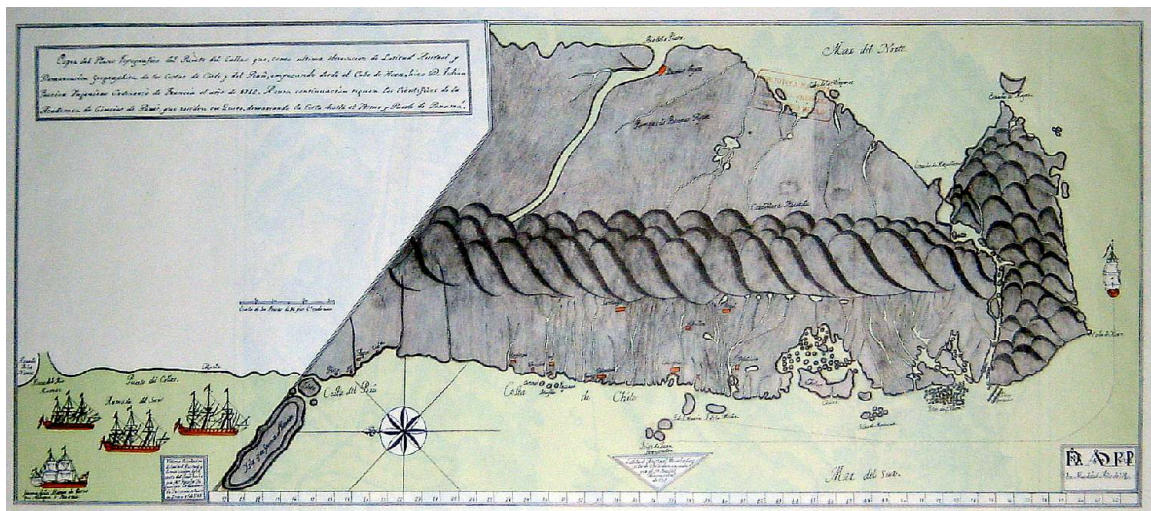['El imaginario Patagonia' — The Imaginary Patagonia]

Abraham Ortelius, 1575.

TYPVS ORBIS TERRARVM

QVID EI POTEST VIDERI MAGNVM IN REBVS HVMANIS, CVI AETERNITAS
OMNIS, TOTIVSQVE MVNDI NOTA SIT MAGNITVDO. CICERO.

TERRA AVSTRALIS NONDVM COGNITA

Archivo de Indias, 1671.

Arnoldus Montanus, 1680

A.Malet, 1683.

MER DU SUD OU PACIFIQUE

PEROV

ROYAVME DE CHILI

300
375
20
30
30
40
40
50
50
60
60
300

Tropique de Capricorne

Sierras

R. de Copiapo
R. de Gasco
P. de Coquimbo
Serena
R. de Topoteama
P. de Vol paradis
Santiago
R. de Maule
R. de Ytata
R. de Biobio
La Conception
L. de la Mocha
R. de Caulin
R. de Talten
Imperiale
R. de Valdivia
Villa Rica
Valdivia
Osorno
Castro

Mendoça

St Iuan de la Frontera

Neuadas delos Andes

PATAGONS

PAYS DES ENVIRONS DE LA PLATA

MER MAGEL LANIQUE

Müller, 1692.

Frezier, 1740.

Bonne, 1780.

dibujantes y cartógrafos realizaban los primeros bosquejos del espacio. La cartografía nace de una de primera imagen-ilustración ("borrador de la Carta") realizada a partir de la escritura.[15]
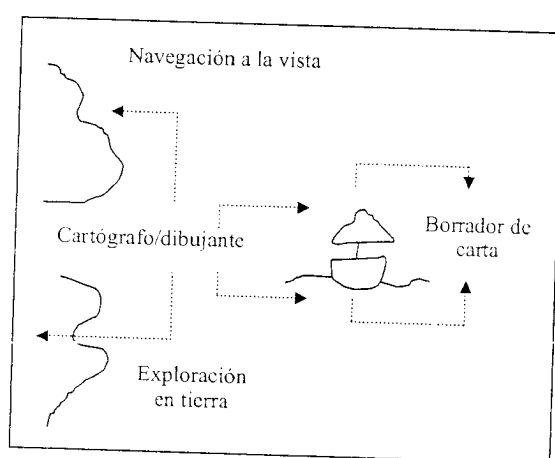
Figura 2. Esquema de realización de la escritura del espacio según los espacios físicos presentes en la narración historiográfica de la expedición.

La figura 2 expresa la situación "espacial" de la producción de la escritura de dos maneras. La primera es directamente física: de la dimensión de la nave a la dimensión del objeto material y viceversa. La segunda es virtual en sentido bergsoniano: de la dimensión de los objetos conocidos (historiografía, enciclopedia) a la de aquellos de los cuales no se tenía referencia con anterioridad (aprehensión del

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[15] "Escritura" es entendido aquí como signo, es decir, como una convención que hace que un conjunto de signos materiales tenga un significado particular. En este sentido la escritura considerada no es sólo la alfabética, por cuanto expresiones gráficas también son "escritura". Sobre el particular puede entre otros consultarse Ruiz, 1992; Harris, 1993; Cardona, 1999.

8

devenir, construcción de significado).[16] De esta manera "cartografiar" es establecer una zona "imaginaria" de negociación entre lo que se conoce por visto —ya realizado en imágenes o ilustraciones— y aquello de lo que aún no se tiene imagen o ilustración.

El espacio se realiza entonces a partir del establecimiento de una serie *provisoria* de nuevos referentes, de manera tal que la cartografía aparece no como una perspectiva *definitiva* de un terreno sino, por el contrario, como un principio aglutinante a partir del cual será posible situar otras cosas o actores.
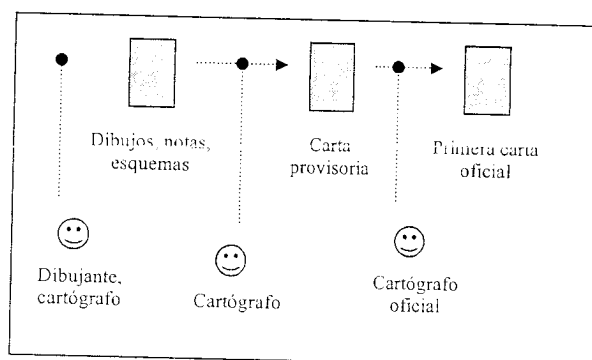
Figura 3. Esquema de realización de la escritura del espacio según los espacios "autorales" presentes en la expedición.

En la figura 3 puede observarse la situación inmediata de los actores ("autores") involucrados en las actividades cartográficas de la expedición.[17] Necesariamente la producción cartográfica era una tarea colectiva y la denominación de "expedición Malaspina" —al igual que

[16] Acerca de la noción de "virtual" en relación con un concepto de devenir o presente en términos cognitivos puede verse por ejemplo Deleuze/Guattari, 1985: 92-128.

[17] Una teoría estrictamente "actoral" debería considerar asimismo otros "actores" no humanos, como por ejemplo las naves, los instrumentos de medición, etc. Sobre el particular puede verse Latour, 1988: 6-7.

10

como compuesto por una no aún resuelta dimensión étnica y antropológica, proviene en gran medida, en su expresión básica, más que de los viajeros, exploradores o militares del siglo XIX como a menudo se ha creído (véase por ejemplo Viñas, 1983), de las consecuencias de las actividades cartográficas realizadas en el siglo XVII, como las provenientes de la expedición de Malaspina.[20] Y, por lo mismo, como veremos, esta idea de que estamos frente a un espacio cambiante e inestable —un "espacio móvil"— favorecerá aún más el carácter *viajero* del nombre Patagonia y, por ende, el aspecto móvil que caracterizará al imaginario en tanto idea y, más tarde, en cuanto concepto.
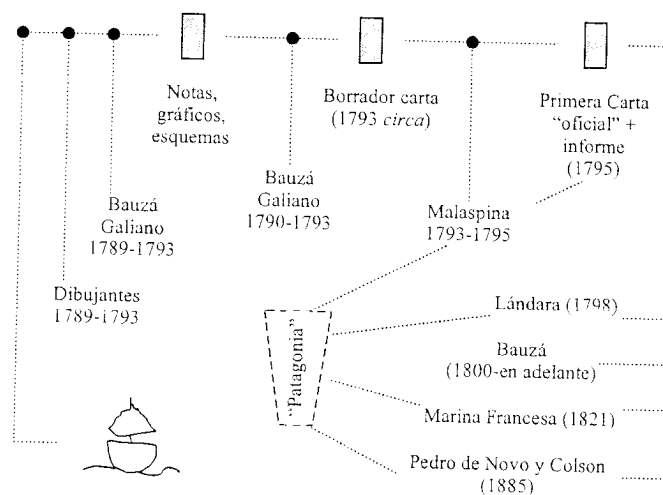
Figura 4. Esquema de realización de la escritura del espacio según los espacios "temporales" presentes en la narración y primera historiografía de la expedición.

[20] Lo cual no obsta, claro está, para que estos viajeros, exploradores y militares decimonónicos, *justamente*, se valiesen de esta orientación espacial ya establecida para situar sus trabajos —los cuales sin duda contribuyeron aún más a este amueblamiento del "espacio indeterminado". Volveremos sobre el argumento al ocuparnos de la expedición de E. Zeballos.

'The European Scientific Theories'

['El imaginario Patagonia' — The Imaginary Patagonia]

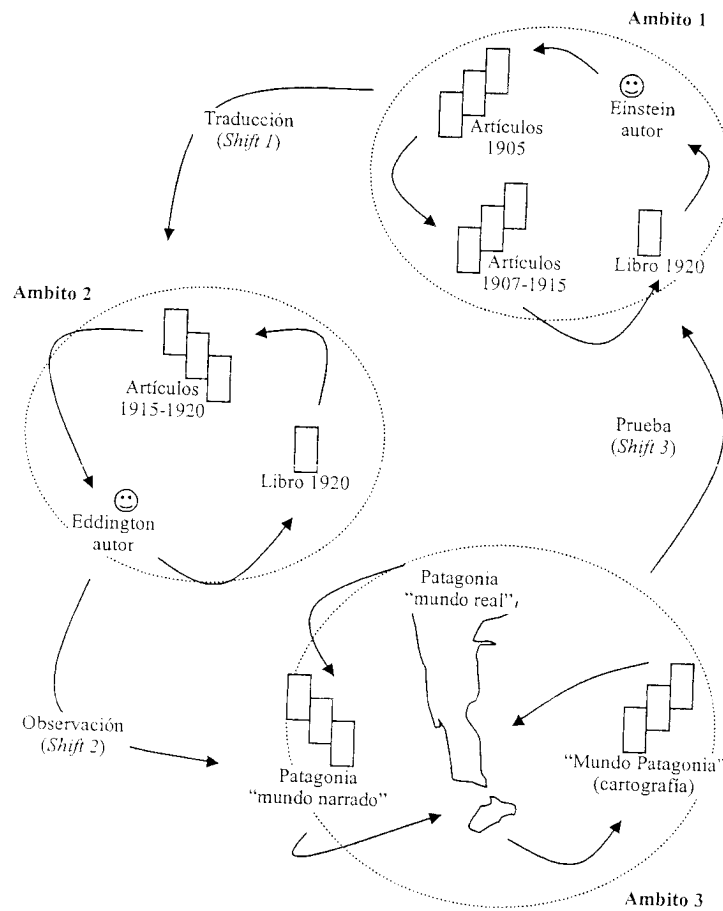Arthur Eddington

Albert Einstein

Bruno Latour

Figura 5. El espacio patagónico "a la luz" de la teoría einsteiniana y en la
interpretación experimental de Eddington.

observacions de las expediciones de 1919, tanto la de Sobral como la de la Isla
de Príncipe, no coincidían ni con una ni con otra y daban resultados que se
ubicaban entre las dos predicciones mencionadas (véase Collins/Pinch, 1998:
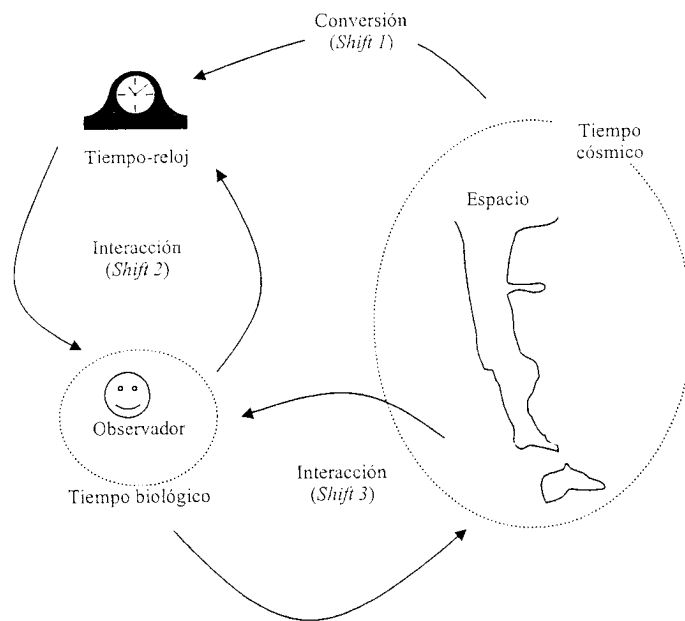48-50).

Figura 6. El espacio patagónico en relación con la perspectiva de observador/observación que se desprende en la interpretación de Eddington de la teoría einsteiniana.

El espacio patagónico como *mundo temporalizado* aparecerá como el resultado de una narración en donde un observador introduce un tiempo cósmico (también indicado como "científico"), un esquema artificial (calendario, relojes, etc.) y un *tempo* autoral-biográfico (dimensión biológica). Como veremos (Capítulo 5 y Capítulo 6), este esquema será con mucho el más difundido entre los exploradores, "conquistadores" y viajeros que recorran la geografía patagónica. Si aceptamos la teoría de Einstein y la interpretación de Eddington, el

'The Deployment of the Local Paradigm'

['El imaginario Patagonia' ⎯ The Imaginary Patagonia]

22

Presente de
enunciación

Carta editada
en 1885

Shifting in

Novo y Colson

Lándara

Malaspina

Shifting out

Cartógrafo

Dibujante
Dec. 1789
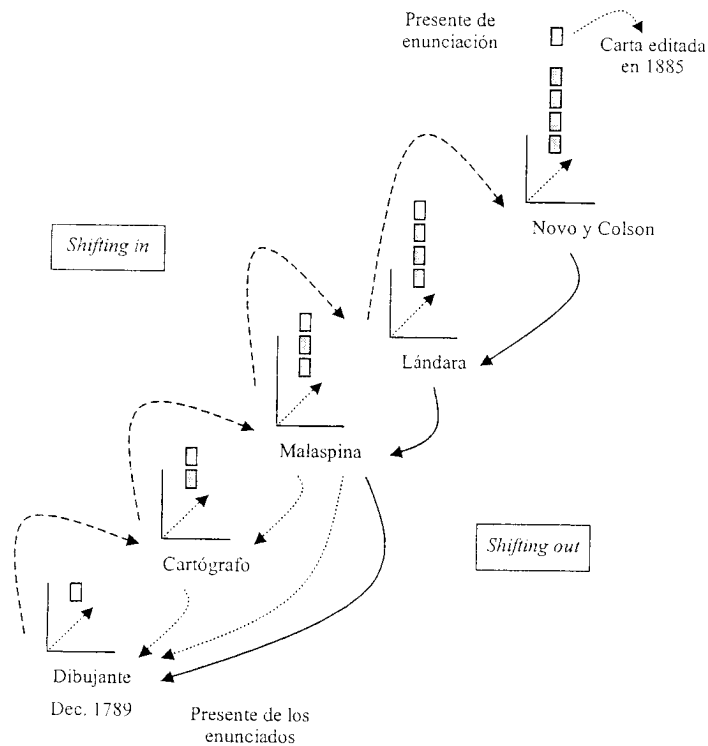
Presente de los
enunciados

Figura 7. El *realismo mundano* de la cartografía malaspiniana considerado a partir de
la edición de *Viaje al río de la Plata en el siglo XVIII* de Novo y Colson en 1885.

Y, en haciendo esto, las realizaciones cartográficas no sólo *fijan*
a las descripciones sino avanzan sobre ellas y erigen a las Cartas
geográficas en narraciones en sí (auto-referenciales),[30] en imágenes

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[30] Por ello creemos es erróneo atribuir una valor imaginario —en la acepción aquí
considerada— a las narraciones de viajeros, por cuanto las mismas, de principio
a fin, se remiten en sentido espacial a esta cartografía existente (véase por
ejemplo Musters, 1871; Payró, 1898; Hesketh, 1902; Theroux, 1979; Dixie,

images que pour autant que d'abord nous les entendons" (Ricoeur, 1986: 220).
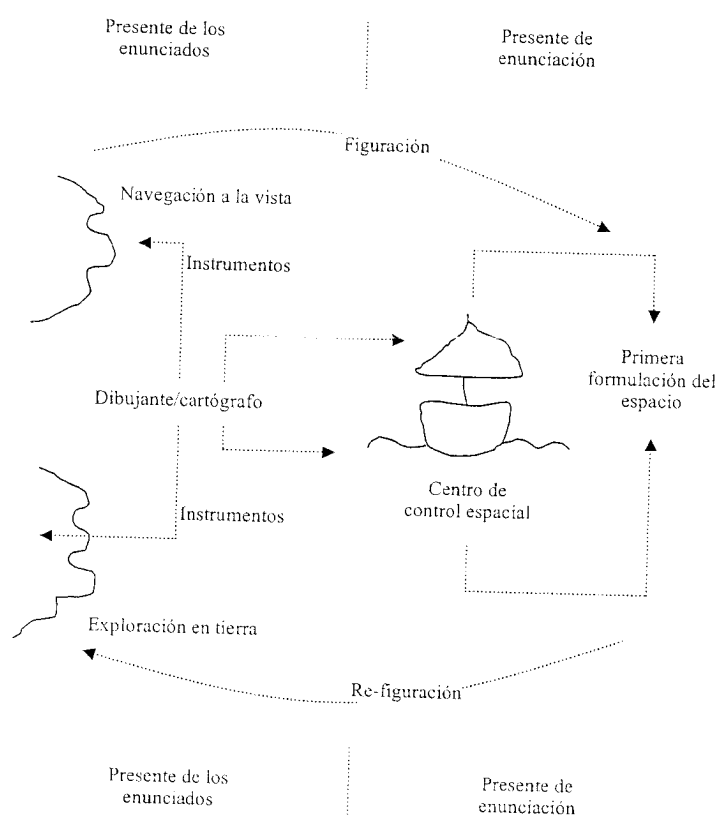
Presente de los
enunciados

Presente de
enunciación

Figuración

Navegación a la vista

Instrumentos

Dibujante/cartógrafo

Primera
formulación del
espacio

Instrumentos

Centro de
control espacial

Exploración en tierra

Re-figuración

Presente de los
enunciados

Presente de
enunciación

Figura 8. Formulación alternativa de la Figura 2 en base a la perspectiva semiótica comentada y respecto de la construcción del espacio.

orientaciones paradigmáticas comentadas obtienen su máxima expresión: (i) cuando la distancia otorgada es intangible y por venir, (ii) cuando las historias múltiples y las expresiones visivas ofrecen combinaciones semánticas que se convierten en *significados de significados* y (iii) cuando se establece una *invisibilidad* en sentido pleno donde otros significados o cosas adquieren nuevos sentidos.

Principio paradigmático	Operaciones de escritura	Tipo de *shifting*
Distanciación (creamos un espacio que no vemos)	*Subscripción* (cada cartógrafo basa su trabajo en el anterior)	Espacial
No coincidencia (narramos algo que sucede en otra parte)	*Transcripción* (de reportes cartográficos de cada autor/actor)	Temporal
Figuración (crea un sistema de referencias a partir de una imagen)	*Inscripción* (el "cuadro" del primer autor es incluido en el segundo y viceversa)	Autoral/ actoral

Cuadro 3. La expedición de Malaspina, vista desde una perspectiva espacial y en relación con una idea de viaje en sentido (i) físico, (ii) estético y (iii) cognitivo, nos lleva al imaginario patagónico y a sus tres características básicas, tal como aparecen aquí expuestos.

Y esta constitución del imaginario patagónico a partir de estas tres orientaciones, que como destacamos posee un componente visivo fundamental, podría también expresarse en ese sentido a partir de los tres estadios de la imagen que plantea Jacques Aumont en su clásico

Sample Two

'Cartography, Imagination and Philosophy'
[S. Plata/C. Canaparo — Forthcoming book]

The Philosophical Problem of Measurement
By Sergio Plata

A crucial problem in any human activity is measuring. In science it is clear that quantitative methods (which at the end are concentrated on measuring) are of the utmost importance, in industry and business the issue of controlling, and planning involves directly the concept of measurement, for example measurement of objectives. In general measurement is always an argument in which many decisions are taken.

The locality of the concept of percent change.

Concepts in economics do not float in abstract spaces, they are grounded in some space in which they take form and acquire meaning. Following [Deleuze, 1984], concepts are fractal parts that can only live in the context of a plane. This plane of immanence is, in the case of economics, allows concepts to span infinite ideas. It would be wrong to consider that these concepts in economics change. In this case the space in which they exist is the one that changes.

What kind of information are the economic parameters.

Statistics, and other methods of information management play an important role in the interpretation of economic information. But in a contradictory sense, the effectiveness of the method used to derive the information is measured more in the technological part, i.e. the explanation of how the final outcome of a process was achieved.

For example the methods used in neural networks, like the "back regression perceptron" is at the end another dynamical system which consists of linear transformation alternated with non-linear transformations, in order to simulate the way in which the human brain works and to give an effective result of some information given. Nevertheless, the explanations are not as clear as in other methods like the so-called artificial intelligence or the classical statistical models.

Knowledge in economics.

Concerning the cases in which some parameters are measured, knowledge is still given in the form of a great narrative; in fact this narrative is constructed in such a personal way, that there are many interpretations made on the same information.

Measurement in Science: Empirical Methods.

Statistics, and in general all the areas of applied mathematics involve first of all empirical methods, in that sense there are some theoretical assumptions in which the research or the simple user of the methods in applied mathematics rely on.

Conventionally, these theoretical assumptions obey to a tradition; a tradition of thought, and academia that together with a set of beliefs constitutes a whole body of

reflections on the area. Theories on the one hand are absorbed by the researcher and reflected in his "feeling" to tackle problems but on the other hand they are written in the literature that constitutes the basic pillar of the discipline in which all meaningful knowledge is feed backed in the same way, for example [Dantzig, 1963] or [Kantorovich, 1939] the fathers of linear programming and operational research methods follow this epistemology.

In this sense theories and methodologies can be analysed under this epistemic frame. The first epistemological reflection in applied science revolves around the "place of knowledge" in reference to the "cognitive subject". For example in statistics, which is used in many areas of knowledge as a tool, we have that according to [Michie, 1994], the core of the discipline, in other words, the space in which knowledge is generated is dual: the practice and the theoretical background in which the practice is achieved. This to some point obvious argument, can be easily extrapolated to any area of applied mathematics, as in [Hand, 1996, 446] where he refers to a "physical process" and repeatedly extrapolates the statistical methods making them become a crucial concept in the meaningfulness of the subject: "representational theory hinges on a homomorphism between the empirical and numerical systems [positive numbers]" [Hand, 1996, 460][1].

In this sense, practice is perception and theory is memory which is feed backed by the same iteration of the process: the "procedure is then some formal method for repeatedly making such judgement in new situations" [Michie, 1994, 1] or as put by Henri Bergson in his *Matiére et Memoire*, "Tout moment de notre vie offre donc ces deux aspects: il est actuel et virtuel, perception d'un coté et souvenir de l'autre". Nevertheless the form of "souvenir" in applied science, in the sense of Bergson, which makes reference to the likelihood of explanations and results, appears in a written form, or if preferred, in terms of J. Derrida "enunciation".

This becomes clearer in the sense that the "contexts in which a task is fundamental include, for example, mechanical procedures" [Michie, 1994, 1-2]

Therefore, in the specific case that concerns us knowledge equals narrative, and the presentation form is given via a text, therefore language and its meanings will be an important line of analysis in this work.

Another interesting approach is the epistemological analysis that will show how in this case, the statistical knowledge or any other empirical knowledge works as a base

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[1] In this paper empirical systems are systems of things directly connected with the "real world". One thing I cannot figure out is the concept of homomorphism in Hand's paper. In category theory the term is used to indidcate that a transformation preserves the structure of a set, however the interesting homomorphisms are given between groups (in the algebraic sense). It might be arguable to say that an empirical system is a group, but the set of positive numbers is definitely not. In fact the only thing we can say is that if we want to use astonishing terms like "homomorphism" to express that the function preserves the structure of sets, one has to be more careful in his language because at some point one does not understand if he refers to a precise concept or he is just referring to a colloquial terms and simple notions. However in any case, the function to which Hand refers could be better described as an automorphism, or epimorphism or even a homeomorphism, or dipheomorphism (I can give extense arguments on this), but moreover, given the structure of the sets he is describing, what it should really be is an endomorphism, in other words, a measure preserving transformation.

for the creating of a reality principle instead of only comparing some parameters as seen in the canonical way: comparing methods and distinguishing tasks.

In this way our analysis becomes cognitively independent of the methods themselves and can give us degrees of freedom to analyse their effectiveness.

So this discussion will be divided in two parts: a) the generation of the act of cognition and the subsequent identification of cognitive subjects in the process, and b) Hermeneutical analysis in order to transform data or abstract models into meaningful knowledge, in which measurement is a basic concept.

For example, since the beginning of modern applied mathematics, in Kantorovich's discourse on linear programming the main discourse revolves around the concept of measure control, (as the optimum is a measure) as well as in other cases of Operational Research. Moreover measurement and Measure Theory are the theoretical basis of Statistics, for example Birkhoff's recurrence theorem, in which the measurement becomes a main issue in the discussion.

My position on measurement is clearly contrary to Hand's as he states in his [1996]:

> Measurement then involves the discovery of the relationship between different quantities of the given attribute. The key word here is "discovery"… the classical theory discovers pre-existing relationships [Hand, 1996, 457].

Under this epistemic view classical theory does not discover anything at all, does not invent either. In fact the question of discovery and the pre-existence of relationships imply the existence of a *pure heuristic act*, which in any case becomes the core of statistical analysis and should deserve further explanations.

Discovery in any case deals with a way of knowing. If knowledge is to be a description or image of the world, as suggested by Hand, we need criteria that might enable us to judge when our descriptions or images of the world are "right" or "true". And it is in this sense that the meaningfulness and the foundations of applied sciences including statistics should be.

Following for one moment Hand's argument, the circumstance (in the sense of Ortega y Gasset) in which human beings appear is a ready-made independent world and man as a "discoverer" has the task of exploring and *knowing* that *reality* in the truest possible manner, with this scenario the path of scepticism should be there from the outset. The notion of *semblance* or in this case likelihood, which, according to Xenophanes accompanies all human knowledge, is elaborated and applied above all to the concept of perception.

The unanswerable question is up to what point, any picture transferred by our perception might correspond to the *objective reality*. This is still today the problem of theory of knowledge. [Von Glasersfeld, 1984].

Following Von Glassersfeld, using an apple as example; to our senses it appears smooth or hard, sweet or sour, and red or green; but it is far from self-evident that the

real apple possesses these properties, just as it is not immediate that these are the only properties that define the apple as an apple, there might be properties that are not grasped by our senses!

The question is unanswerable, because no matter what we do, we can check our perceptions only by means of other perceptions, but never with the apple as it might be before we perceive it. The sceptic's argument made philosophers' life difficult for more than 2,000 years. Then Kant added a second, even more problematic argument, by "considering space and time aspects of our way of experiencing, he shifted them out of reality into the realm of the phenomenal, therefore, he made questionable not only the sensory properties but also the thinghood of the apple". (see [Von Glasersfeld, 1984]).

In this way, it is not only the properties of the apple the ones that are uncertain, but the existence of the apple as an object as well, i.e. apart from the rest of the world as a unitary *thing*.

That is the main question which many theories of knowledge try to answer, nevertheless, in the case of applied science; we think that radical constructivism can answer many of these issues in the field in a consistent way.

Contructivism can be traced to Giambattista Vico in 1710, for him, "God's truth is what God comes to know as he creates and assembles it, so in the same way, human truth is what man comes to know as he builds it, shaping it by his actions. Therefore science (scientia) is the knowledge (cognitio) of origins of the ways and the manner how things are made" [Von glasersfeld, 1984].

Vico, of course, still tries to establish a connection between human cognitive constructions and God's creation. In his treatise on metaphysics, the theory of knowledge he has developed is logically closed because man's knowledge is seen as man's construction and does not (and could not) pertain to God's ontological creation,

Vico's maximum "Verum ipsum factum" (the truth is the same as what is made) applies to the explanations of statistical and other applied sciences. Unfortunately, his avant-garde epistemological ideas are rarely mentioned, and never explained.

According to him, the only way of "knowing" a thing is to have made it, for only then we know what its components are and how they were put together. Thus God knows his creation, but we cannot; we can know only what we ourselves construct.

In this sense, statistical knowledge is a construction of the statistician and in no way a *discovery* as Hand states. Moreover if we try to fit Hand's explanation of statistics in Berkeley's empiricists theory contradictions arise immediately as he says: "Classical theory requires relating the hypothesised quantitative attributes to observable quantities" [Hand, 1996, 457] assuming the *construction* of a hypothetical statement (contrary to Berkeley's philosophy).

This discussion begins in the problematisation as it tackles the problem of analysis concerning the efficiency of the methods used, therefore one must put the highest attention to the epistemology of the process, more than merely comparing classical

parameters like the error rate or computing time, which are only partial steps of the whole process. To think that this kind of measures mirrors the whole epistemic steps of applied mathematics is to dismiss the richness of the methods and to strip the discipline of its potentialities (not mentioning the terrible confusion between epistemology and methodology).

This study goes beyond the comparison of some parameters, and goes to what can be consider the heart of the problem: explaining the epistemic and knowledge problems of the so-called heart of applied mathematics: Operational Research[2] and try to identify some of the foundations in this area of knowledge.

It seems that when talking about the principles and foundation of some applied science like statistical theory, the authors have discussions on the methodology and not what lies behind the methods, like the basic definitions and enquiries of meaningful cognitive processes. For example in [Hand, 2001] the title of the book suggests that the principles of data mining are going to be found in the book, moreover, as we read in the preface that "This text has a different bias. We have attempted to provide a foundational view", certainly one expects that foundational questions should be treated; for example if one reads works in the foundations of mathematics questions like What is number?, (a crucial and basic concept of the foundation of the discipline) are treated at length[3]. Nevertheless, and unfortunately in such texts we did not find any discussion on the foundations of the discipline.

Furthermore, sometimes their language is slack and imprecise: at some point in the discussion, they specify the difference between theoretical and mathematical concepts concerning the realization of data analysis algorithms (a main point in the field), but never specify what is the difference between *theoretical* and *mathematical* (is there a difference, I wonder?), or is it that they consider mathematics as an empirical science?, in which case, big contradictions in the second and fourth chapters of Hand's attempt to write with a philosophical flavour can be spotted, like the that fact of calculating measures in some space, (which I will explain at length later).

In addition, terms like "real world", which is a fundamental concept and objective of the field is treated in the first chapter differently than in the second, in which the term can be used for basically anything:

> Our aim is to discover relationships that exist in the "real world", where
> this may be the physical world, the business world, the scientific world,
> or some other conceptual domain. [Hand, 2001, 25]

Clearly if the concept of "real world" can be physical (my notion of physical world is the one that we can grasp with our immediate senses and that correspond to a physical objective stable system in the sense of [Canaparo, 2000]) or abstract as mathematical, then "real world" is anything at all (covers all the possible ontological spectrum); moreover, if they mean a physical world as a "conceptual domain", how can we

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[2] In this case, Operational Research refers to Linear programming, statistical methods and other applications of mathematics to problems of real life.
[3] See the classical literature like Whitehead and Russell's *Principia Mathematica*, or the work of Georg Cantor on the set theory.

explain the term "observational data" in their basic, first and most foundational definition:

> Data mining [statistics] is the analysis of (often large) observational data sets to find unsuspected relationships and to summarize the data in novel ways that are both understandable and useful to the data owner [Hand, 2001, 1]

Moreover, in chapter four, the discussion on the "theory" involves another contradiction concerning the concept of "real world":

> The theory, on the other hand, leaves scope for perspectives on the mapping from the real world[4] to the mathematical representation- i.e., on what probability is. [Hand, 2001, 95]

So if "real world" as exposed in the previous chapters of the mentioned book could be the scientific world (which clearly includes mathematics), then what is the true meaning of "mapping from the real world to the mathematical representation" in the above quotation?; in other words, if the theory, implies "mapping" from "real world" to "mathematical representations", the three basic questions are: "what is mapping, what is real world and what is mathematical representation?, beginning with the simplest: What is "real world", the authors have quite a nice (and ridiculously laughable) salad in which any religious theory (as a conceptual domain) can fit as "real world". Frankly at this point I could not follow anymore the discussion on their foundational arguments, which led me from left to right and from up to down.

It is not my intention, to be picky on the definitions and language used in this kind of texts, the notion of "real world" as a physical stable system or objective reality might be enough for some purposes, but certainly not if the discussion is about the foundations of the discipline, and bibliography as [Suppes, 1994] in its three volumes, [Landauer, 1997] and [Fayyad, 1996] is quoted as *Referimenti*.

Of course I do not judge their absolute expertise in the management of the tools and principles (in the technical or methodological sense) of the discipline, but one can see that in this book they have not tackled fundamental questions concerning the epistemology of statistical analysis[5].

In this case I consider that the precise definition of "real world" is of the utmost importance, as it constitutes one of the axes of analysis and its interpretation as informational domain and codomain[6] (i.e. where the data come from and end in) however, it seems to care little. Of course that if the book is centred in the methods it is reasonable to dismiss this kind of enquiries, however this is not their intention (to deal with the methodological approach): "there are already many other books on data mining on the market… [they] emphasise specific methods and algorithms rather than general principles (such as parameter estimation or computational complexity)…

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[4] This time "real world" is not in quotation marks. We could not find out why or what was the purpose of the author in striping this concept of the quotation marks.

[5] Epistemology in this case should be taken as in Deleuze definition of draw plans and create concepts.

[6] Domain and codomain are to be taken in the mathematical sense and statistical operations as functions.

There are other texts on data mining [that] have been written largely from a computer science viewpoint" [Hand, 2001, xxvii-xxviii], and continues, "Rather than discuss specific data mining applications… we have instead focused on the underlying theory and algorithms that provide the "glue" for such applications". In this case one expects to know how this theory works as "glue" in the applications. However, the theory is reduced to comments and explanations of the methods, taking for granted that this conforms the algorithms that serve as "glue" for the applications.

In this axiomatic approach, fundamental epistemological and methodological questions (such as at what point the method begins and ends) are left in the air, furthermore, the underlying theory is not a theory, but a technique, problem that anyone might consider fundamental in the foundations of data mining.

In this sense, many texts as Hand's have the Jupien effect[7].

However, this work tries to analyse some of the foundational principles of applied sciences that are directly reflected in the epistemology of the discipline.

And for that I will begin with the problem of measuring with respect to the construction of a person with respect to space, which will throw light in this apparently obscure relationship between the real and abstract world of mathematics.

The construction of a person with respect to space.

In the first place, as exposed in the case of empirical methods above, the construction of a cognitive subject has to deal immediately with a writing activity in the first place.

In a way Operational research and other applied disciplines, seen like a space of knowledge, are not a result but a necessary condition of knowledge; in this sense narrative as exposed by [Lyotard 1989] can illuminate the concept of knowledge in applied mathematics. This is due to the nature of the construction of knowledge from an intellectual perspective in this kind of discipline.

In this sense we can identify two things in the world: firstly a "physity" [Canaparo, 2000], in which facts "live" and secondly another field which is an intellectual space in which "events" happen or better said in which "events" are constructed from a defined and personal perspective (the perspective of the researcher or statistician).

I this sense the concept of report is of the utmost importance; report as "rapport" or "recit" in the sense of Paul Ricoeur, in which we can interpret that the person who has written or signed a certain terminology (in applied mathematics) did it as a cognitive element, or if one prefers as an epistemic element.

Under this meaning, the "word" holds a signification of a "plot" a "mise en intrigue" which induces naturally a conceptual and abstract ordered structure to the rational

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[7] Jupien, is a character in Proust's La recherché du temp perdu, he is the porter in the hotel, a very handsome and proper gentleman, he is very appealing and attracts customers to the hotel, however this situation is very deceitful because inside the hotel is very different. See [G. Genette, 1987], In this case great and appealing titles appear, but in the text they do not do what in the title, in the introduction nor in the preface says.

thinking, in other words, there is not such a thing as a common sense, but only a narrative or "recit".

Applied mathematics are dealing all the time between the real and abstract world (as in Hand's description of the obvious), in epistemic terms, this "dealing" can be analysed in the steps of observation, perception and representation to have a proper cognitive act.

Under this view there is a distinction (I would say a clear distinction) between the terminology used in order to distinguish from what we mean with perception -or in Piagetian terms a <sensory-motor> abstraction- and a cognitive act.

Movement

Let's begin with the concept of movement; firstly we have to specify that "movement" is not identical to "displacement". Displacement happens in the physical world and movement in the narrative cognitive world, in this sense (see [Deleuze 1986, chapter 4]), we can conclude that movement is the iteration process of images on which we over-imposed a certain time and rhythm to appear, like in cinema, where we can identify movement as a presentation of static frames at a speed of 24 per second, in fact, our human brain is so slow, that we have more than 24 per second we don't notice it, and if we have less we can see the "skipping" of the images. But indeed, movement and the concept of image is a true epistemic step, which tells us the way in which we think. In this sense I agree with Canaparo (and his literary theory) that our knowledge coming from a literary source is firstly visible and it leads to the construction of images, and I would add that therefore immediately to movement and dynamics (or kinematics). In fact, when we analyse movement we do it analysing frame by frame, and that is how we think: by static images.

Therefore movement is invisible ([see Virilio, 1989]) because it is not part of the physical world. Movement is explained and identified not as a perception (displacement), but as a depiction of the effects of some action (for example subatomic particles, which thanks to Rutherford and others we imagine, but no one has ever seen one of those!), and for more of this we can follow even the argument of Zeno of Elea and his famous paradoxes of movement.

In this sense velocity as a MEASURE of movement is the only consistent and immutable factor between perception and knowledge, in mathematical terms, we call these factors "invariants", of course there are many invariants, invariants under transformation, under composition, etc.

What we see is displacements of objects and bodies (including wholes systems if you want), but what is clear is that we cannot see movement: movement belongs to a narrative rational plot. Thus movement belongs to a cognitive linguistic area and not to the physical world.

In the case of science this is very relevant, because it is not the work of a scientist to explain the world of perceptions, but to refer to a linguistic world images of perception, which should be built according to a tradition (writing tradition, scientific

tradition if you want). Therefore science most have a historiograhical principle, because science does not deal with the physical world, technology does.

As a brief parenthesis here I can say that the object of history of science as we know it in the literature is not clearly science, but technology, historians of science do not do such, they do history of technology in most of the cases.

Therefore it is important to make a clear distinction between science and technology, and establish their respective links and connections under a certain epistemological frame. In our case, it would be enough to say that technology deals with objects and situation so reality "physity" and that they DO NOT HAVE POSSIBLE WRITING.

Therefore science is history of science; and technology deals with physical objects in a totally opposite activity that does not have historical or even narrative approach.

In conclusion, displacement are perceptions of change of relative positions of bodies or systems and velocity is the factor (concept) that relates displacement, denoted by "s", or change of relative positions of objects with respect to time. In this case, time is another construction that might be better explained in the theory of dynamical systems (it is a non-homogeneous and non-uniform factor). Time is only a measure of iterations of a dynamical system that serves as an explanation of that physical system. It is naturally an action of an abstractly constructed set on another set. And the formula of velocity is:

$V=S(x)/t$

Or

$S=delta\ s/delat\ t$

But In the following system si(x), iin Naturals and x in X, our first measure is not a measure, but a description of a change; we are not measuring anything yet!, in fact what we know in physics as "change of state" is not measurable in the first approximation in the linguistic sense; the only measurable things live also in the system of knowledge generated as a plot.

Applied mathematics is then, in this sense, the literature that relates science with technology (science and technology understood as above).

Measure in this sense is not the relationship between objects of the physical worlds and an abstract system as Hand's naïve conception. Measure is only a linguistic activity, because measure implies the existence of a well-ordered set and the construction a-priori of a unit.

If I want to measure the <u>number</u> of units of something and as a result of that I get a <u>number</u>, everything lies then in the construction of the discourse in which number is a notion or a "amschaung" as said by Georg Cantor in his set theory, that leads us to the question of the chicken and the egg.

However there should be a connection between the system of numbers and the physical world (again the perogruyada!, but necessary), and this is precisely that act of choosing a unit. In fact, scientists are not measuring, but choosing a unit (already an abstraction) and applying the characteristic function to a set under that unit, and at the end, the act of adding is calculating the integral of a characteristic function on a given set.

Therefore we must choose:

a) A Unit
B) A set
C) A belonging concept

The other concepts such as Xa and integral de Chi de A are done by the historiograhical tradition (or by the historiographic tradition called science0. So if I want to measure a tree can say:

1. It is 20 years old
2. It has y branches or w leaves
3. It has x metres long or z wide
4. etc.

But in order to say that, I must have first:

1. A unit: branch, metre (this one already is a literary convention), leave, rings, etc.
2. A set a tree a trunk, etc.
3. A way to count units

The example of the tree can be seen as:

Let A be a tree, let x a branch, then the characteristic function XA as defined in the mathematical literature is :

XA(x)= 1 or 0

Now the process of gathering branches, not double counting, etc. is a technological process, more than scientific.

In fact what we have to do in the physical world is to choose a unit and put it in relation to the set, and when I say "please measure the tree" what we will do is to add the number of "1's" that I put in correspondence with the set which is the tree, and not an abstract set of numbers or any other thing; (taking care of not double counting) and give a result.

But measuring something is a process by which we have to apply only an abstract concept to another abstract concept not to anything in the real world.

Cognitive subject and the allocation of knowledge.

The first object is to define what meaningful knowledge in applied science is, and the natural way to do it is following the epistemic proper way of the discipline revising the literature in it. As seen above, Kantorovich, and other pioneers of the area have developed not only the methods in a mathematical way, but also a speech in which the explanations and developments are given. Furthermore, this discourse is given in different context (as in different political and economic regimes) acquiring a special status of scientific narrative, or what Lyotard calls the "Great Narrative".

First of all, meaningful knowledge in this area is given in a written form, so the cognitive subject appears after the observations and the gathering of data have finished (see [Hand, 2001]). In other words, if there is a biological dimension outside of the recording of data and further writing activity in these problems, certainly it does not have possible writing and it is strange to any possible communication.

This idea is linked directly with the principle of inverse probability, in which working under its assumptions means the rejection of any possible source in the biological dimension, therefore, Bayesian approach has a core explanation in the translations and ontological interpretations of the objects of the "real world" into a writing activity, <actividad escrituraria>.

In general when talking about applied mathematics one must relate an abstraction process correlated with an <objective reality>. Therefore the notion of objective "truth" in the process, as we have seen above in the case of the fundamental questions of philosophy, is of the utmost importance.

This work is supported in the assumption that experience is decomposable in certain kinds of elements and each of the observers or experimenters build it in a particular way, basically according to their experience. Then data as such is generated.

But first we will define the cognitive subject in applied sciences. The cognitive subject is clearly not the data owner, if it is, then an obvious corollary can be drawn: For example, Operational Research (including linear programming) is reduced to a mere technique to manage data in which meaningful knowledge does not exist.

In this case we will have to assume that the analyst is the cognitive subject, i.e. the cognitive subject is not the general public, the government, the military or in general the data owner, but the mathematician (statistician, analyst) himself; and it is in the mathematical process in which the generation of knowledge takes place.

We want to make clear that, by assumption, (see [Hand, 2001]), cognition does not take place in the computational process, if cognition was given in the computational phase[8], then knowledge would equal symbols and the act of cognition would equal the manipulation of symbols.

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[8] We take the definition of computation methods of [Hand, 2001], which states that computational methods are procedures for searching and optimising over parameters and structures guided by the available data and our score function [235], having in mind that computational methods have all the properties of algorithms except a method for guaranteeing that the procedure will terminate in a finite number of steps [141] and the remarks that "mathematical modelling" and "computational algorithm" are two different things [xxviii]

In this sense, one can argue that many mathematical theories are epistemologically equivalent to the case of computing, nevertheless, in the case of statistics, the main difference is clearly the hermeneutical process. This assumption leads us to an outline of the main characteristics of knowledge in statistical theory.

We can say that symbols in statistics are different from symbols in computation; in the first case they have a semiotic reference in which representamen, interpretant and object form a sign in the classical sense of Peirce. Therefore the reader of statistics becomes a *lettore in fabula* [Eco, 1976] concept that would never be possible in computing.

In a way the symbols used in the statistical process are a reflection of an image created from an object of the real world:

> Mais youte perception attentive suppose véritablement, au sense étymologique du mot, une réflexion, c'est-à-dire la projection extérieure d'une image activement créée, identique ou semblable à l'objet, et qui vient se mouler sur ses contours [Bergson, 1903, 105]

Applying Bergson's idea to this case, the fundamental question of knowledge is a reduction of information in a procedure of symbolic computation, leading to a relationship with the physity, to the extent of expressing the definition of computational process in reference to statistics as in [Hand, 2001]; i.e. computing means the algebraic manipulation of symbols, and the way in which it operates; this is only achieved in the form of symbols and operates outside of any possible meaning. In this sense, the syntax of the symbolic codes encodes its semantics, making it limited to the programmer's range of contexts.

In this case, the true value of the process is minimised when the symbols do not reach a representation of some aspects on the physity and the information (as communicative data)[9] leads only to a successful solution of the problem given to the internal system.

As far as the methods illustrate, cognition is split in two: on the one hand it consist of conscious contact with reality, and on the other an abstract computational symbolic process.

One of the most important epistemological goals is to establish the relationship between the phenomenological and the computational mind.

In order to base a concrete and solid ground for our study, we chose a constructivist approach to explain and analyse the methods used to classify data.

The proper question of this work is to see what kind of explanation do these methods give in the base of the duality established above: The human mind with its human problems which have a phenomenological view, i.e. in this sense, we can apply Berkeley's principle "esse est percipi" (to be is to be perceived), however, we do not consider Berkeley a constructivist; the main difference between Vico and Berkeley, as

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[9]See [Segal 2003]

well as with later idealists, is that Vico considers man's rational knowledge and the world of rational experience simultaneous products of man's cognitive construction. Therefore under this view (Berkeley's) *knowledge* is an awareness of the operations that result in our experiential world. Berkeley presupposes the activity of the intellect, his accent always lies on the being, whereas Vico invariably stresses human knowledge and its construction, for example we perceive colours, three-dimensional space, etc. but we do not perceive subatomic particles, nevertheless, statistics seen from constructivism offers methods to explain what a conscious experience is[10].

Jackendoff calls this problem the 'mind-mind problem' in contrast with Descartes's 'mind-body problem', for it centres on the relation between the computational mind and the phenomenological mind.

Experience in this sense is not knowledge; in fact, the main epistemic question in this work is how experience leads to cognition via methods of data mining or more generally statistics.

Under this analysis the main difference between algorithms in the field of statistics or any other applied mathematics theory, and computational methods, is clear and lies in the epistemological view of the lack of referent in the general semiotics and the definition of knowledge in one and the other areas.

Therefore the main difference, is not that which states that computational methods have all the properties of algorithms (in statistics) except a method for guaranteeing that the procedure will terminate in a finite number of steps, as said in [Hand, 2001][11]; in fact this difference which is totally methodological does not attack the foundations of the discipline and does not draw clear lines in these fields.

The case if it does not terminate or it does, is irrelevant and very arguable, as I can imagine pure computational methods that terminate and does not necessary are considered outside the field. In this sense, the remarks that "mathematical modelling" *en tant que* manipulation of symbols are equivalent to any "computational algorithm" contradicting remarks made in [Hand, 2001].

So knowledge in computational methods is not related directly to the <physity>[12] of the world, but with an already made abstraction of it into a quantitative set. In fact, as said in [Hand, 2001, 3] the relationships that are sought in the process are within data sets. Therefore, the ontological level in which computational theory or statistics move in the methodological step does not change. That is why a lot of confusion is generated between these disciplines.

It is important to note that a meaningful relation with the physity is taken for granted and it is not analysed until the end of the process. Hermeneutical equivalence only takes place in the measurement of effectiveness of the models and algorithms. And

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[10]See [Varela, 1993]

[11] This comparison is purely methodological and dismisses totally the epistemic frames and powers of applied mathematics.

[12] For the term physity, see [Canaparo, 2002] in which he refers to the nineteenth century conception of real world as a physical stable system in which a possible consensus can be achieved and where the generation of invariants (as in mathematics) can be measured; se als o [Plata, 2004].

the space generated in this process is defined as where the cognitive subject acts and active knowledge is constructed.

In other words. The main difference between statistics and computation does not lie in the algorithms, but in the epistemic definitions. Knowledge in Statistics is *Narrative* and in computing is *Symbols*; in the same way, cognitive acts in statistics are communicative as in computing are manipulative. Spotting these differences, the methods, being infinite or finite can overlap, but the cognitive borders between the fields are clearly drawn.

The narrative identity versus the cognitive subject.

If it was justified the previous section that knowing in statistics is equivalent to a sort of narrative, the next question is who is the narrative identity, i.e. who is the person who talks in the cognitive discourse, in other words who constructs knowledge. It is important, under this epistemic view (of narrative = knowledge) to delimit who knows and who constructs a cognitive act. In this sense we can say that for Operational Research, the narrative identity and the cognitive subject are the same person, however, analysing the case of Kantorovich and his contributions to the optimal allocation of resources, one can see that these epistemic characters diverge.

As seen in the previous sections, it is the mathematician or in general the scientist who is analysing and solving the problems in other words, he is the cognitive subject. It is the person that performs cognition. However in Kantorovich;s case cognition is two-folded due to the nature of narration. Narration has to poles as in any communication process: the emitter and the receiver. An important analysis is to identify who are they and what are their respective positions in the process[13]. The main difference to identify these characters can be found in the process of representation.

A crucial step in these methods is the problem of representation. Representation is not only a construction process by which some objects of one domain are mirrored in some other domain, but also is about its transformation.

This notion of representation or I would say re-presentation becomes stronger as it is linked to the previous corresponding ontological level, in other words, the task is to answer the question representation of what?. As said by [Mundy, 1994, 61-62] the main difference between representational and analytical method is the ontological references to which the objects are considered; in the former, objects refer directly to entities in the real world as conceived before the nineteenth century (see [Mundy, 1994]).

In this sense we agree with [Wojcicki, 1994] in the sense of the awareness of ontological differences between methods. Nevertheless we consider that a general implication of the methodology is reflected in the writing activity, or in other words a fiction constructed from the internal epistemology. One can infer from here that there

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[13] If we want to be picky with the use of language we can say that applied mathematics has processes and procedures. Discsussion on the difference on these terms can be found in Saussure's *Course General de linguistique* (for an English version see [Saussure, 1959, 176]).

exists a strong relationship between the notion of discourse and understanding the ways of applied science.

Therefore in this frame, we want to identify the narrative identity, or more specifically what P. Ricoeur says, identify "variations sur la faille entre le temps vécu et le temps du monde" [Ricoeur, 1985, 231] to locate his concepts of refiguration and configuration *en tant que* hypothesis in agreement with this discontinuity.

This "variations imaginatives produites par la fiction" constitute the base of the writing activity in Ricoeur's book *Temps et Récit*, and it is in this same writing activity where philosophy, science and literature found the same historiographical foundation

According to P. Ricoeur,

> L'histoire procède toujours de l'histoire. Il en va de même du travail de correction et de rectification constitutif de la perlaboration analytique [refering to Durcharbeitung proponed by S. Freud [14]]: un sujet se reconnaît dans l'histoire qu'il se raconte à lui-même sur lui-même. [Ricoeur, 1985, 444-445].

Applying this concept to Kantorovich's case, concerning his activities in applied mathematics, the <narrative identity> is characterised by its constant evolution in many planes.

Moreover, adding that,

> Le rejeton fragile issu de l'union de l'histoire et de la fiction, c'est l'assignation à un individu ou à une communauté d'une identité spécifique qu'on peut appeler leur identité narrative. [1985, 442].

In this way, "identité narrative", exposed in *Temps et Récit* solves the problem of the gap between the actually experienced, which in the sense of knowledge can be translated into <writing>, and the physity of the world, or if one prefers in Heideggerian terms [Weltzeit or "time of the world"], what is better described as <devenir puro> or in terms of Canaparo, <puro acontecer>. It is in these borders in which the writing activity and the biological dimension coincide; in this sense a huge epistemic problem in Kantorovich's work[15] can be delimited.

The simultaneity of the biological and representational items is a problem to be treated in this context. Moreover if

> Le dilemme disparaît si, à l'identité comprise au sense d'un même (idem), on substitue l'identité comprise au sens d'un soi-même (ipse); la différence entre idem et ipse n'est autre que la différence entre une identité substantielle ou formelle et l'identité narrative. [Ricoeur, 1985, 443]

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[14] *Durcharbeitung* is the discovery, gradually, of the various plans of construction which make opaque the view of the origin, the infinity of the past, and threaten to prevent being in the moment, the present.
[15] In general this can be applied to other cases of applied mathematics.

In this sense there is a double role of the scientist, as he is the cognitive subject and the narrative identity simultaneously, although he performs from different places, which leads us to a philosophy of space, *en tant que* <movement> or the creation of territories (in the sense of Delueze-Guatarri).

In Kantorovich's work, one can identify the beginning of the movement towards a possible world (between real world and its mathematical abstraction), produced in a relationship between this narrative identity and the cognitive subject, but only in the pursue of, not the principles of nature or origins of a production economic theory, but of a writing activity in the sense of the construction of "expecting horizons".

The idea of a "mathematical representation of normal language" is not of interest for Kantorovich, but the construction of what Barthes call a "Sign Code" in which the writing activity builds language itself, therefore the idea of representation and reference is not relevant. A writing theory, in the sense of Kantorovich, takes charge of learning the functions between a rhetoric past and the subjectivity of the narrative identity (which, as we have seen is in constant change) and the necessity of creating images to sustain a *horizon d'attente* with which we can navigate in the <puro acontecer>, in other words, the way in which we face the present happening which lacks of name or writing, is by emulating what we already know (past) in the possible knowledge (future). In this sense, Kantorovich is not concerned about any reality, in any case, he produces the reality, i.e. he concentrates in the gnoseological limits of writing determined by the narrative identity.

In other words, the territorialisation as necessary condition of any narrative identity, chases and acts on the appropriation of enunciation defined by the sets of images in the form of a scientific discourse. What the narrative identity is actually doing is acting as a Principium Individuationis16, and not just functioning into a "real referent". This explanation takes the problem of representation into further considerations, not only the nineteenth century idea of copying from a universal model, as authors like Hand, pretend us to believe.

The question of dealing with reality as stated by many authors, such as, [Brachman, 1996], [Hand, 2001], [Buntine, 1996] or [Luce, 1994], this last one with the comments of Patrick Suppes, as a mathematical method imposed on the reality, is totally a nineteenth century idea. These authors, on the one hand, consider the existence of an independent reality and see the scientists a discoverer of those things in the world outside, fact that could be arguable, even more after the development of science in the twentieth century; on the other hand, it is obvious why they close the discussion at this point and do not consider questions such as the well-ordering of the world or seen the scientist as a creator of <facts> (because it is the duality subject-object that is blurrily grasped). This nineteenth century conception of science leads to ideas such as the conception of fact and a chronology as a succession of deeds, in which the separation of perception and thought reaches inconceivable logical limits.

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[16] Schopenhauer's term, the *principium individuationis*, or 'principle of individuation', symbolizes man's separation from the chaos of life when under the protective influence of Apollo. In opposition to this principle of calm reason, there is Dionysus, who represents the collapse of the *principium individuationis*, the inability to discern the boundaries between appearance and reality

If we want to follow this sort of argumentation, we would have to link the notion of applied science to a status of "reality representation". In the case of Kantorovich it is obvious the contrary, the determination of a reality principle taken from his discourse and its epistemic procedure, is linked not with a representation of reality, but with a production of a "common sense", from which "anyone" can discern a principle of the real. This is not applications, but a reflection towards an applicatory action. As said by [Gardner, 1990, 646]:

> Kantorovich said, "A major achievement of the mathematical economic direction was the elaboration of a series of problems of planned pricing, as was the sustentation of the thesis of the inseparability of the plan and prices" (Kantorovich, M. Albegov, and V. Bezrukov 1987)

These reflections are gathered in a discourse, and this discourse is always point towards a legitimation, that is always based on the notion of fact.

As Hayden White states:

> This critical technique manifestly flies in the face of the practice of discourse, if not some theory of it, because the discourse is intended to constitute the ground whereon to decide what shall count as a fact in the matters under consideration and to determine what mode of comprehension is best suited to the understanding of the facts thus constituted. [White, 1978, 3]

In fact, all the authors that have commented on historical or philosophical works on applied mathematics discuss about a previous step to the construction of discourse as conceived by White. For them the discourse takes the shape of a nineteenth century idea of "representation of reality", (see [Hand, 1994]), idea which presupposes an implicit meaning of "transparency" and "neutrality" of language and writing, aspects that simply do not exist in this case, for example just by seeing the American versus the Soviet side in this work.

Discourse in the sense quoted above by White, is crucial as it is linked directly with the notion of understating, as

> The etymology of the word discourse, derived from Latin *discurrere*, suggests a movement' back and forth' or a 'running to and fro'. This movement, discursive practice shows us, may be as much prelogical or antilogical as it is dialectical. [White, 1978, 3]

And he continues,

> A discourse moves 'to and from' between received encodations of experience and the clutter of phenomena which refuses incorporation into conventionalized notions of 'reality', 'truth' or 'possibility'. It also moves 'back and forth' (like a shuttle?) between alternative ways of encoding this reality, some of which may be provided by the traditions of discourse prevailing in a given domain of inquiry and others of which may be

idiolects of the author, the authority of which he is seeking to establish. Discourse, in a word, is quintessentially a mediative enterprise. [White, 1978, 3]

Therefore, discourse in this case, can be understood as the vehicle of understanding in the sense of the re-account of what was known in terms of the expectations of what will be known (we can see here again the idea of past and future, but constructed from another point of view, see page 43), if one prefers, the construction of a horizon d'attente, or in White's words,

> A discourse is itself a kind of model of the processes of consciousness by which a given area of experience originally apprehended as simply a field of phenomena demanding understanding, is assimilated by analogy to those areas of experience felt to be already understood as to their essential natures. [White, 1978, 5]

Thus, understanding means become acquainted with the unknown, action that is, as White says, tropological by nature.

> This process of understanding can only be tropological in nature, for what is involved in the rendering of the unfamiliar into the familiar is a troping that is generally figurative. It follows, I think, that this process of understanding proceeds by the exploitation of the principal modalities of figuration, identified in post-Renaissance rhetorical theory as the 'master tropes' (Kenneth Burke's phrase) of metaphor, metonymy, synecdoche, and irony. [White, 1978, 5]

This position is in line with our constructivist point of view, as the construction of language seen by Piaget, links communication with thought, and not language as information of codification of structures.

> Problème bizarre, au premier abord, car il semble que chez l'enfant comme chez nous le langage serve à l'individu à communiquer sa pensée [Piaget, 1984, 15]

The communication problem in this case is surpassed and is symbolised in the form of language which is itself acquired in the form of information, this is why many authors confuse and use indiscriminately terms like data, information and communication in the same sense. The communication problem now is of the entities that communicate. Language here has a transmition task more than a transmition of information. The one who communicates knows and passes this knowledge to the one that does not, but the one that does not cannot pass this knowledge to another.

To put it in perspective, in the case of some computational methods like Neural Networks, the language is used as a transmission channel which informs; in this case it does not matter if the third or fourth parties do not know, language itself informs.

Mathematical language is not only the expression of nature, but also a syntactical model which operates independently and builds its own operations:

> Un regard sur le langage mathématique permettra peut-etre de comprendre la nature relationnelle de la prose et de la poèsie classique: on sait que dans l'écriture mathématique, encore les rapports qui lient ces quantities sont eux aussi transcripts, par une marque d'opération, d'égalité, ou de difference; on peut dire que tout le movement du continu mathématique provident d'une lecture explicite de ses liaisons [Barthes, 1953, 36]

Therefore the scientist has a double role as cognitive subject and as narrative identity, as it is the same person that performs a dual action.

Brief Introduction to Measure Theory.

In order to understand the basic concepts behind this theory, one must be acquainted with some mathematical concepts of modern analysis, without which modern applied mathematics would have been impossible in the sense of its formalisation and presentation.

The mathematical concept of Measure is a function that assigns a number to a set. And its use in mathematics and many other fields of study, such as theoretical physics, is common and widespread.

Measure is the concept on which the standard, modern theory of integration (Lebesgue integration) is defined. Any theory that uses integration will most likely involve measure. Examples of such theories that involve integration and measure are probability, Fourier analysis, differential equations, and others.

The challenge of handling more general sets requires a theory that can also handle the familiar sets, the countable unions and countable intersections of intervals, in the way already done. The old way of handing intervals is by length. Hence, the interval [1, 4] has length 3; in general, the interval [a, b] has length or distance b – a. There are three properties of length or distance to notice:

Distance Property 1: The length of [0, 1] is 1.
Distance Property 2: For a set that has length, any translation of this set has the same length.
Distance Property 3: For a finite or countable infinite sequence of sets that have length and are disjoint from each other, the length of the union of these sets is the sum of the lengths of these sets.

Property 1 and 2 are clear since it follows from the very definition of length. To see an example of Property 3 for a countable infinite sequence of sets that have length and are disjoint from each other, consider dividing the interval [0, 1] using the following process:

Divide [0, 1] in half to make [0, 1/2] and [1/2, 1]. Keep the first piece and break the second piece in half again to make [1/2, 3/4] and [3/4, 1]. Repeat this process to make a sequence of disjoint sets that begin: [0, 1/2], [1/2, 3/4], [3/4, 7/8]…. Note that each set in the sequence is a half of the length of the set before it. From this sequence of sets, a sequence of lengths is inferred: 1/2, 1/4, 1/8…. This sequence of lengths is a

geometric sequence whose sum converges to 1. Note that the disjoint sets in the sequence of sets come from breaking up [0, 1]. Hence the union of these disjoint sets is [0, 1], which has length 1. This result is consistent with Property 3. To generalize length to arbitrary subsets on the real number line, one requires that the new theory preserve the three properties of length above.

Unfortunately, a problem arises when length is generalized to arbitrary subsets of the real number line. There are subsets, that cannot be assigned a length or distance. One way of constructing such subsets is to consider the following equivalence relation on the interval [0, 1). Let x and y be two real numbers in [0, 1). Define x to be equivalent to y if and only if x – y is a rational number. To ensure that this relation is a well-defined equivalence relation, one must check that it satisfies the three properties of equivalence relations: x is equivalent to itself; if x is equivalent to y, then y is equivalent to x; and if x is equivalent to y and y is equivalent to z, then x is equivalent to z. The properties of the rational numbers used in this example are that the sums of rational numbers are still rational. Finally there is a theorem that states that an equivalence relation partitions the set, in this case [0, 1), into a disjoint union of equivalence classes17, in this case subsets of [0, 1) such that any two elements in the same equivalence class has a rational difference.

Let N be the subset of [0, 1) that contains exactly one element from each equivalence class. Translate N by r, a rational number between 0 and 1, including 0, but excluding 1. In the resultant set, take the subset of the elements that are 1 or larger and further translate the subset of these elements by –1. Call this new set Nr. (Note that Nr is a subset of [0, 1).) As stated above, these translations are just the addition of r and –1 to each element of their respective sets. If x is an element of N, then x + r or x + r – 1 (but not both) is in [0, 1) and in Nr. Any element of an equivalence class is some r or r – 1 away from the element of the same equivalence class in N. Consider the equivalence class with 1/4 and 3/4 in it. If 1/2 is added to 1/4, the result is 3/4. If 1/2 is added to 3/4, the result is 5/4. If 1 is subtracted from 5/4, the result is again contained in [0, 1). Hence, every element of each equivalence class is in Nr for some r. Since the disjoint union of the equivalence classes is [0, 1), [0, 1) lies in the union of Nr. Finally, it is necessary to show that for any two different rational numbers in [0, 1), r and s, Nr and Ns are disjoint. If y is in both, then y – r or y – r + 1 and y – s or y – s + 1 are in N. Since all of these numbers merely differ by a rational number, they must lie in the same equivalence class. Since N is constructed with only one element from each equivalence class, these numbers must be the same number. If y – r = y – s, then r = s. If y – r = y – s + 1, then s = r + 1. This case is impossible since s is less than 1, but r is greater or equal to than 0. Hence s = r + 1 is extraneous and discarded. If y – r + 1 = y – s, then r = s + 1. This case is similarly extraneous and discarded. If y – r + 1 = y – s + 1, then r = s. Hence, r = s. This result implies that if two Nr's share one element, they share all elements. Therefore, [0, 1) is the disjoint union of the Nr's for all r, a rational in [0, 1).

What length should be assigned to Nr? By Property 2 of length, the length of Nr for each r must be the same since the Nr's are just translations of N. By Property 3 of length, the length of [0, 1) must be the sum, over the countable infinite number of

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rational numbers in [0, 1), of the length of the Nr's. One can try to assign to each Nr a positive length. Then all the Nr's have this length. Consequently the sum is infinite. This result implies that the length of [0, 1) is infinite in contradiction to Property 1 of length. (Note that the length of a single point is zero. Hence the length of [0, 1] equals the length of [0, 1).) Thus, the Nr's cannot have positive length. One can also try to assign to each Nr zero length. Then the sum is zero again in contradiction of Property 1 of length. Given this paradox, the only possible conclusion is that N cannot be assigned any length. Consequently this result shows that some subsets cannot be assigned any length. To keep the three properties of length stated above, the mathematician must restrict the subsets that are assigned a length to certain "nice" ones. One way of constructing nice subsets is to first consider subsets that satisfy Property 3. These are called sigma-algebras.

Sigma-algebras

As examples of sigma-algebras, consider the sigma-algebras over the real numbers. One example is the two-element sigma-algebra containing the real numbers as an element and the empty set as the other element. Another example is the sigma-algebra containing every possible subset of the real numbers (the Power set). Between these two borders, there are sigma-algebras in which we can generalize length and distance on.

A sigma-algebra is a collection of subsets of a given set. Some other names for this concept are sigma-algebra, sigma-field, and sigma-field. A sigma-algebra is defined in analysis, a branch of modern mathematics dedicated to study real numbers complex numbers and functions and the foundations of calculus as well. Sigma-algebra is a key concept necessary for the definition of measure. In fact, Probability theory employs the concept of sigma-algebra as a key because of its use of measure.

An algebra over a given set X, is a non-empty collection of subsets of X. Algebras over sets are different from the traditional algebras defined in the major branch of mathematics called algebra. In one case (in an algebra over a set), the inverse element does not exist, and in the other case (in a traditional algebra) it does. For example consider the intersection operation; pretend for the moment that it is only a binary operation. Let S be a subset of X. Then $S \cap X = S$ and $X \cap S = S$. Then X is the identical for the intersection operation since any subset S operated under intersections with X equals S. To find an inverse for S, one must find a subset of X such that when intersecting S gives X. The only way this can occur is if $S = X$. Otherwise, inverse elements do not exist. A similar argument can be used for the operation of union.

The succinct definition of an algebra over a set is as follows. Let X be a non-empty set. An algebra over X is a non-empty collection C, of subsets of X that is closed under complements and finite unions.

A sigma-algebra is a generalization of an algebra over a set. Simply add a property: a sigma-algebra is an algebra over a set X that is closed under countable infinite unions.

Finally, a special sigma-algebra is the Borel sigma-algebra on the set of real numbers: Consider the collection of closed intervals (denoted with the form $[a,b]$) on the real numbers. This collection of closed intervals generates the Borel sigma-algebra over the real numbers. One can prove that the Borel sigma-algebra over the real numbers contains all open intervals, closed intervals, countable infinite unions or intersections. This sigma-algebra is, the domain of the length measure.

Sigma-algebras play an important role in the definition of measure, crucial in the modern theory of integration, (Lebesgue integration), which is a cornerstone of mathematics, analysis. The use of sigma-algebras allows us to restrict our attention to a smaller, and generally more useful, collection of subsets of a given set. The measures that take a sigma-algebra as domain can, then, hope to ignore some of the subsets that are difficult to use. This selectivity provides power to measure sets and elements of sets.

The Definition of Measure

Let X be the set whose subsets will be assigned a non-negative real number or infinity. Let M be a s-algebra over X. A measure, µ, is function from M to the non-negative real numbers or infinity such that the following two properties are satisfied:

Measure Property 1: For the empty set, denoted by ø, its value under µ is zero.

Measure Property 2: The value of µ under any finite or countable infinite disjoint union of subsets of X that are also elements of M are equal to the finite or countable infinite sum respectively of the value of µ under each of the subsets.

Note that Measure Property 2 is like distance Property 3. In standard mathematical notation, the definition of measure, µ, is as follows. Given X and M as above, define µ: M ? [0, 8] such that the following two properties hold:

Measure Property 1: µ(ø) = 0.

Measure Property 2: If {En}18 is a sequence of disjoint sets in M, then µ(U18En) = ?18 µ(En).

The triplet (X, M, µ) is called a measure space. An element of M is called a measurable set.

The study of measure, measure theory, allows us to consider distance as a measure. In identifying distance to be a measure, it became possible to generalize and extend length to more sets by utilizing measure theory's power to avoid the problem mentioned above in extending length. The result is the creation of the Lebesgue measure on the real numbers, the name given to the generalized length function that motivated this discussion of measure.

Given this brief introduction to measure theory in the mathematical sense, we can say that the same problem, equation (1) in this section, can be seen in its many variations, depending on the conditions of the sets and measures. For example, when the space X is finite, the problems are reduced to a linear programming transportation problem.

The general problem is called the Kantorovich-Gavurin transportation linear program, and the problem with fixed projections becomes the Hitchcock-Koopmans transportation linear program.

In any case, the most important breakthrough in the applied mathematical work of Kantorovich is the statement of the discrete linear programming algorithm. This is due to its facility to grasp and compute. To understand this specific case of the mentioned above, one does not need "heavy mathematical artillery", like functional analysis theory, as the general standard for of the linear programming problem is as follows:

Maximise or minimise:

$$Z = c_1 x_1 + c_2 x_2 + ... + c_n x_n$$

Subject to:

$$a_{11} x_1 + a_{12} x_2 + ... + a_{1n} x_n = b_1$$
$$a_{21} x_1 + a_{22} x_2 + ... + a_{2n} x_n = b_2$$
$$\vdots$$
$$a_{m1} x_1 + a_{m2} x_2 + ... + a_{mn} x_n = b_m$$
$$x_1 \geq 0, x_2 \geq 0,..., x_n \geq 0$$
$$b_1 \geq 0, b_2 \geq 0,..., b_m \geq 0$$

Being the main features of the standard form:

1. The objective function is of the maximisation or minimisation type.
2. All constraints are expressed as equations.
3. All variables are restricted to be nonnegative
4. The right-hand side constraint of each constraint is nonnegative.

In matrix vector notation, the standard form can be expressed as:

Maximise or minimise:

$$Z = cx$$

Subject to:

$$Ax = b$$
$$x \geq 0$$
$$b \geq 0$$

Analysing the $\Re^2$ case, the constraints are seen as lines in the two-dimensional space delimiting a convex subspace in the plane. This subspace is called the feasible region. The objective function (to optimise) is also seen as a line. If there is an optimal solution to the problem, then at least one of the intersections of the constraints (delimiting the border of the feasible region) will always be a possible optimal solution.

This is a fundamental property of the method; in fact, Dantzig's iterative method to solve it called the simplex method is based on this. Even though the feasible region of a linear programming problem contains an infinite number of points, an optimal solution can be determined by merely examining the finite number of intersections (corners in a graphic) in the feasible region.

Finally, a major extrapolation not of the linear programming problem but of the translocation of masses is the transportation problem. This problem involves the task of production and organisation planning. In his [1942] Kantorovich proposed:

> Let a continuous non-negative function $r(x, y)$ be given that represents the work expended in transferring a unit mass from x to y. By the work required for transferring the given mass distributions will be understood
>
> $$W(\Psi, \Phi, \Phi') = \iint\limits_R r(x, x') \Psi(de, de') = \lim_{I \to 0} \sum_{i,k} r(x_i, x_k') \Psi(e_i, e_k')$$
>
> where e_i are mutually disjoint and $\sum_1^n e_i = R$ [Kantorovich, 1942]

The components of a given vector $\Phi = (\Phi_1, ..., \Phi_m)$ (or more precisely, their absolute values) represents volumes of production (when $\Phi_k \leq 0$) or consumption (when $\Phi_k \geq 0$) of some uniform product at m points, labelled by an index k in $K = \{1, 2, ..., m\}$. It is further assumed that the total volume of consumption coincides with the total volume of production, that is, that

$$\sum_{k \in K} \Phi_k = 0$$

A transportation plan is determined by choosing a matrix

$$\Psi = [\Psi_{i,j}]$$

whose elements indicate the planned volumes of transportation from each point i to each point j.

In other words, the problem is reduced to minimise:

$$Z = \sum_{i=1}^m \sum_{j=1}^n c_{i,j} x_{i,j}$$

which represents the total cost of transportation, subject to

$$\sum_{j=1}^n x_{i,j} \leq a_i$$

Which is the supply restriction, for example at a warehouse i, and

$$\sum_{i=1}^{m} x_{i,j} \leq b_j$$

which stands for the demand requirement, for example at market j

$$x_{ij} \geq 0$$

which represents the nonnegative restrictions.

In this way, the demand constrains guarantee that the total amount shipped to the market meets a minimum demand at the market. This form of presenting the problem and its solution threw light in other fields of knowledge such as computer methods and other further application in social areas, becoming the main topic in the field of Applied Mathematics.

Bibliography

BARTHES ROLAND
1953, Le degré zéro de l'écriture, Seuil, Paris.

Beckenbach E.F.
1964, On the Inequality of Kantorovich, The American Mathematical Monthly, Vol. 17, No. 6, 606-619.

Bernal J.D.,
1939, The social function of science, George Routledge & Sons LTD, London.
1949, Science for peace and socialism, Birch Books, London
1952, Marx and Science, Chapel River Press, London

BRENTJES SONJA
1994, Linear optimization, Companion Encyclopaedia of the history and philosophy of the mathematical sciences, Routledge, London.

Comte, Auguste
1969, Cours de philosophie positive, Bruxelles : Culture et Civilisation, 1969.

Crombie A
1952, Augustine to Galileo, the history of science A.D. 400-1650, Falcon Educational Books, London.

Dantzig G.B.
1955, Linear Programming under uncertainty, Management Science, Vol.1 No. 3/4 , 197-206

1956, Recent advances in Linear Programming, Management Science, Vol. 2 No. 2, 131-144

1957, Thoughts on Linear Programming and Automation, Management Science, Vol. 3, No.2 131-139

1960, On the Shortest Route through a Network, Management Science Vol. 6 No.2, 187-190

1960, A machine-job Scheduling Model, Management Science Vol. 6 No. 2,191-196

1967, Management Science in the World of Today and Tomorrow, Management Science Vol. 13 No. 6 Series C, Bulletin February, C107-C111

Evans C. L.
1997, Partial Differential equations and Monge-Kantorovich Mass Transfer, Current Development in Mathematics, ed. By S.T. Yau, University of California, Berkeley.

Freedman Robert
1961, Marx on economics, Penguin Books Ltd., London

Gardner Roy
1990, L.V. Kantorovich: the price implications of optimal Planning, Journal of Economic Literature, Vo. 28, No. 2, 638-648

Henrici P.
1961, Two Reamrks on the Kantorovich Inequality, The American Mathematical Monthly, Vol. 68, No. 9, 904-906

Isbell J.R.
1961, On an Industrial Programming Problem of Kantorovich, management Science, Vol. 8 No. 1, 13-17

Joravsky David
1961, Soviet Marxism and natural Science 1917-1932, Columbia University Press, New York.

Kantorovich L.V.
1940, A new Method of Solving of Some Clases of Extremal Problems, Compte Rendus de la Acdemie des Science de l'URSS, Vol. XXVIII, No. 3, 211-214

1942 On the Translocation of Masses Compte Rendus de la Acdemie des Science de l'URSS, Vol. XXXVII, No. 7 8, 199-201

1960, Mathematical methods of Organizing and Planning Production, Management Science, Vol. 6, 366-422.

Koopmans T.C.
1962, On the Evaluation of Kantorovich's Work of 1939, Management Science, Vol. 8 No. 3, 264-265

Marx Karl
1867, Capital, Translated by Samuel Moore and Edward Aveling, Encyclopedia Britannica Inc, USA.

McLellan David

1977, Karl Marx Selected Readings, Oxford University press, USA.

Ondar, Kh. O
1981, Correspondence of Chuprov-Markov on the Theory of Probability and Mathematical Statistics, translated by Charles and Margaret Stein, Edited by, Springer-Verlag, New York.

Ptak V.
1995, The Kantorovich Inequality, The American Mathematical Monthly, Vol. 2, No. 9, 820-821

Rall L.B.
1980, A comparison of the Existence Theorems of Kantorovich and Moore, SIAM Journal on Numerical Analysis, Vol. 17, No. 1, 148-161.

Shamir R.
1987, The efficiency of the Simplex Method: A survey, Management Science, Vol. 33, No. 3, 301-334

SHEYNIN O. B.
1971, On the Mathematical treatment of observation by L. Euler.

Sinai Yakov
2003, Russian Mathematicians in the 20th century, Princeton University Press, Princeton.

Strang W. G.
1960, On the Kantorovich Inequality, Proceedings of theAmerican Mathematical Society, Vol. 11, No. 3, 468

Swann Brenda
1999, J.D. Bernal a life in Science and Politics, Verso, London.

Tapia R.A.
1971, The Kantorovich Theorem for Newton's Method, The American Mathematical Monthly, Vol. 78, No. 4, 389-392

Vucinich A.
1970, Science in Russian culture, Stanford University press, Stanford.
1984, Empire of Knowledge the academy of science of the USSR (1917-1970), University of California Press, Berkeley.

Werskey Gary
1988, The visible College a collective biography of British Scientists and Socialists of the 1930's, Free association books, London.

Grattan-Guinness I, 1989, Modes and manners of applied mathematics: The case of mechanics, The History of Modern Mathematics, USA: Academy Press Inc. 109-126.

Schubring G

1989, Pure and applied mathematics in divergent institutional settings in Germany: The role and impact of Felix Klein, The History of Modern Mathematics, USA: Academy Press Inc. 171-220.

Tobies R, 1989, On the Contribution of mathematical societies to promoting applications of mathematics in Germany, The History of Modern Mathematics, USA: Academy Press Inc., 223-248.

Klein F
1894, Lectures on mathematics, the Evanston Colloquium, New York :Macmillan.
1929, Elementary mathematics from an advanced standpoint : Arithmetic, algebra, analysis, Dover New York.

Von Mises R
1921, Uber die Aufgaben und Ziele der angewandten Mathematik, Zeitschrift fur angewandte Mathematik un Mechanik.

Sanden H
1927, Mathematisches Praktikum, I.Leipzig/Berlin: Teubner

Sample Three

Sociology of Culture — Hand-out Lecture 1/2
[Second Level]

Sociology of Culture in Latin America
2006-2007 — Week 1

Introduction: Why Latin America?

1. Abstract
Why do we use the term of 'Latin America' to represent an ensemble of areas and geographical region which at first glance can hardly be considered as one set? What is the relation between the history of South America, the 'discovery' of America and the creation of the term 'Latin America'? Why on defining 'Latin America' does the notion of culture always appear as an essential item? When and how does the idea of one Latin American culture appear? What is the meaning of culture which allows to group together what, as we said, seems to be incompatible?

What changes if we consider Latin America as a cultural term originated in South America itself or if we consider it as a term invented by Europeans? What changes if instead of considering the history of South America as something produced by natives, we consider it as something generated by Europeans to adequate the American space to a Eurocentric perspective and not to what was existent at the moment of the 'discovery' within South American soil?

How many definitions or concepts of 'culture' can we consider in relation with 'Latin America'? Why? How many meanings of the term 'Latin America' exist today? Who makes use of them? Why?

2. Readings and References
Indicated Reading — Mignolo:
'Uncoupling the Name and the Reference' ['Preface', pp. viii-xx].

Theoretical Readings:
Bourdieu, Pierre. *The Field of Culture Production*, London: Polity, 1993.
DiMaggio, Paul. *Sociology of Culture*, Cambridge: Cambridge University Press, 1997.

DiMaggio, Paul. 'Culture and cognition', in *Annual Review of Sociology*, 23 (1997): 263-287.

Von Barloewen, Constantin. *History and Modernity in Latin America: Technology and Culture in the Andes Region*, London: Berghahn Books, 1995.

White, Leslie/Dillingham, Beth. *The concept of culture*, Minneapolis: Burgess, cop. 1973.

Specific Readings:

Escobar, Arturo. " 'World and Knowledges Otherwise': The Latin American Modernity/Coloniality research program", in Cuadernos del CEDLA, 16 (2004), 31-67.

Escobar, Arturo. *El final del salvaje: Naturaleza, cultura y política en la antropología contemporánea*, Bogotá: CEREC, 1989.

Fanon, Franz. *Black Skin, White Masks*, New York: Grove, 1967. Reprint of *Peau noire, masques blancs*, Paris, 1952.

Fanon, Franz. *Studies in a Dying Colonialism, or A Dying Colonialism*, New York, 1965. Reprint of *L'an cinq de la revolution algerienne*, Paris, 1959.

Fanon, Franz. *The Wretched of the Earth*, New York, 1965. Reprint of *Les damnes de la terre*, Paris, 1961.

Fernández Osco, Marcelo. *La Ley del Ayllu*, La Paz: PIEB, 2000.

García Canclini, Néstor. *Culturas híbridas. Estrategias para entrar y salir de la modernidad*, Buenos Aires: Paidós, 2001.

Geuss, Raymond. *The Idea of a Critical Theory: Habermas and the Frankfurt School*, Cambridge: Cambridge University Press, 1981.

King, John (Editor). *The Cambridge Companion to Modern Latin American Culture*, Cambridge: Cambridge University Press, 2004.

Kowii, Ariruma, "Barbarie, Civilizaciones e Interculturalidad", in Catherine Walsh (ed.), *Pensamiento cítico y matriz (de)colonial*, Quito: Universidad Andina/Abya-Yala, 2005, 277-296.

Mignolo, Walter. *Local Histories/Global Designs: Coloniality, Subaltern Knowledge and Border Thinking*, Princeton: Princeton University Press, 2000.

Nouzeilles, Gabriela, ed. *La naturaleza en disputa: Retóricas del cuerpo y del paisaje en América Latina*, Buenos Aires: Paidós, 2002.

Guaman Poma de Ayala, Felipe. *El primer nueva coronica y buen gobierno*, México: Siglo XXI, 1988. 2a edición a cargo de John V. Murra, Rolena Adorno y Jorge Urioste.

Wolf, Eric. *Europe and the People Without History*, Berkeley: University of California Press, 1982.

3. On-going Practical Task

The list below is a sort of short conceptual vocabulary from Mignolo's book, your task is to find within the text as many definitions as possible of those concepts.

Geo-politics of Knowledge

Decolonial Paradigm of Knowledge and Understanding

Sociology of Culture in Latin America
2006-2007 — Week 2

<div style="border:1px solid black">

Introduction: Why Sociology of Culture?

</div>

1. Abstract
What is the purpose of the sociology of culture? Why should we consider 'Latin America' under the light of this European discipline? Would that be for historical reasons and epistemic reasons? Why should we refer to the past as evolution instead of 'history'? Why can we not employ parameters of time to refer to conditions and characteristics of 'Latin America'? What are the consequences of considering a general analytical perspective grounded on a notion of space?

Why does the European 'Sociology of Culture' become 'Sociology of Knowledge' when deployed locally? Consequences and perspectives.

2.Readings and References
Theoretical Readings:
Crane, Diana, ed. *The Sociology of Culture*, London: Bñackwell, 1994.
Hall, John R. *et al* (eds.). *Sociology of Culture*, London: Routledge, 2003.
Mannheim, Karl. *Essays on the Sociology of Culture*, London: Routledge, 1992. First edition in 1983.
Tester, Keith. *Sociology and Culture*, London: Sage, 2006.
Thompson, Kenneth, (ed.). *The Early Sociology of Culture*, London: Routledge, 2003.
VV.AA. *The Sociology of Culture*, London: Routledge, 1998. Set of various volumes including classic texts from the area.
Williams, Raymond. *The Sociology of Culture*, Chicago: Chicago University Press, 1995.
Williams, Raymond. *Culture and Materialism*, London: Verso, 2005.

Specific Readings:
Appadurai, Arjun. "Globalization and the Research Imagination", in *International Social Science Journal* 51(160) (1999): 229-38.

Corradi, Juan E. *The sociology of knowledge in Latin America. A history and trend report with a preliminar bibliography*, Paris: Evian, 1966.

Fields, Karen E. "Individuality and the intellectuals: An imaginary conversation between W. E. B. Du Bois and Emile Durkheim", in *Theory & Society* 31(4) (2002): 435-462.
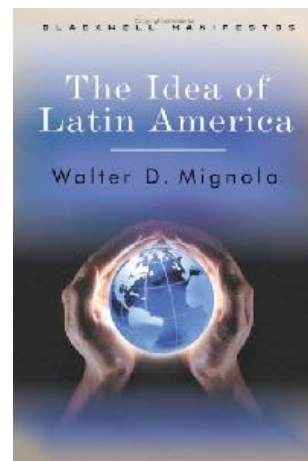
Leys Stepan, Nancy. *The Hour Of Eugenics: Race, Gender and Nation in Latin America*. 1991. Cornell University Press.

Martínez Estrada, Ezequiel. *Radiografía de la pampa*, Buenos Aires: Editorial Losada, 1968. First edition in 1933.

Monsivais, Carlos. *Los rituales del caos*, México: Era, 1995.

Development 4
Brief Lexicon

GILLES DELEUZE
FELIX GUATTARI

QU'EST-CE QUE
LA PHILOSOPHIE ?

The Idea of
Latin America

Walter D. Mignolo

'Philosophie – Géophilosophie'

From G. Deleuze/F. Guattari, *Qu'est-ce que la philosophie?*, Paris: Minuit, 1991.

[La philosophie est un constructivisme, et le constructivisme a deux aspects complémentaires qui diffèrent en nature : créer des concepts et tracer un plan.]

Bref, la philosophie se reterritorialise trois fois, une fois dans le passé sur les Grecs, une fois dans le présent sur l'Etat démocratique, une fois dans l'avenir sur le nouveau peuple et la nouvelle terre. Les Grecs et les démocrates se déforment singulièrement dans ce miroir de l'avenir.

Nous ne manquons pas de communication, au contraire nous en avons trop, nous manquons de création. *Nous manquons de résistance au présent.* La création de concepts fait appel en elle-même à une forme future, elle appelle une nouvelle terre et un peuple qui n'existe pas encore.

Hegel et Heidegger restent historicistes, dans la mesure où ils posent l'histoire comme une forme d'intériorité dans laquelle le concept développe ou dévoile nécessairement son destin. La nécessité repose sur l'abstraction de l'élément historique rendu circulaire. On comprend mal alors l'imprévisible création des concepts. La philosophie est une géo-philosophie, exactement comme l'histoire est une géo-histoire du point de vue de Braudel.

Historicism − 'Philosophie' − 'Géophilosophie'

L'utopie n'est pas un bon concept parce que, même quand elle s'oppose à l'Histoire, elle s'y réfère encore et s'y inscrit comme un idéal ou comme une motivation. Mais le devenir est le concept même. Il naît dans l'Histoire, et y retombe, mais n'en est pas. Il n'a pas en lui-même de début ni de fin, mais seulement un milieu. Aussi est-il plus géographique qu'historique. Telles sont les révolutions et les sociétés d'amis, sociétés de résistance, car créer, c'est résister : de purs devenirs, de purs événements sur un plan d'immanence. Ce que l'Histoire saisit de l'événement, c'est son effectuation dans des états de choses ou dans le vécu, mais l'événement dans son devenir, dans sa consistance propre, dans son auto-position comme concept, échappe à l'Histoire. Les types psycho-sociaux sont historiques, mais les personnages conceptuels sont des événements. Tantôt l'on vieillit suivant l'Histoire, et avec elle, tantôt l'on devient vieux dans un événement très discret (peut-être le même événement qui permet de poser le problème « qu'est-ce que la philosophie ? »). Et c'est la même chose pour ceux qui meurent jeunes, il y a plusieurs manières de mourir ainsi. Penser, c'est expérimenter, mais l'expérimentation, c'est toujours ce qui est en train de se faire — le nouveau, le remarquable, l'intéressant, qui remplacent l'apparence de vérité et qui sont plus exigeants qu'elle. Ce qui est en train de se faire, ce n'est pas ce qui finit, mais pas davantage ce qui commence. L'histoire n'est pas expérimentation, elle est seulement l'ensemble des conditions presque négatives qui rendent possible l'expérimentation de quelque chose qui échappe à l'histoire. Sans l'histoire, l'expérimentation resterait indéterminée, inconditionnée, mais l'expérimentation n'est pas historique, elle est philosophique.

EXEMPLE IX

C'est dans un grand livre de philosophie que Péguy explique qu'il y a deux manières de considérer l'événement, l'une qui consiste à passer au long de l'événement, à en recueillir l'effectuation dans l'histoire, le conditionnement et le pourrissement dans l'histoire, mais l'autre à remonter l'événement, à s'installer

en lui comme dans un devenir, à rajeunir et à vieillir en lui tout à la fois, à passer par toutes ses composantes ou singularités. Il se peut que rien ne change ou ne semble changer dans l'histoire, mais tout change dans l'événement, et nous changeons dans l'événement : « Il n'y a rien eu. Et un problème dont on ne voyait pas la fin, un problème sans issue... tout d'un coup n'existe plus et on se demande de quoi on parlait » ; il est passé dans d'autres problèmes ; « il n'y a rien eu et on est dans un nouveau peuple, dans un nouveau monde, dans un nouvel homme »[19]. Ce n'est plus de l'historique et ce n'est pas de l'éternel, dit Péguy, c'est de l'*Internel*. Voilà un nom qu'il a fallu que Péguy crée pour désigner un nouveau concept, et les composantes, les intensités de ce concept. Et n'est-ce pas quelque chose de semblable qu'un penseur loin de Péguy avait désigné du nom d'*Intempestif* ou d'*Inactuel* : la nuée non-historique qui n'a rien à voir avec l'éternel, le devenir sans lequel rien ne se ferait dans l'histoire, mais ne se confond pas avec elle. Par-dessous les Grecs et les Etats, il lance un peuple, une terre, comme la flèche et le disque d'un nouveau monde qui n'en finit pas, toujours en train de se faire : « agir contre le temps, et ainsi sur le temps, en faveur (je l'espère) d'un temps à venir ». Agir contre le passé, et ainsi sur le présent, en faveur (je l'espère) d'un avenir — mais l'avenir n'est pas un futur de l'histoire, même utopique, c'est l'infini Maintenant, le Nûn que Platon déjà distinguait de tout présent, l'Intensif ou l'Intempestif, non pas un instant, mais un devenir. N'est-ce pas encore ce que Foucault nommait l'*Actuel* ? Mais comment le concept recevrait-il maintenant le nom d'actuel tandis que Nietzsche le nommait inactuel ? C'est que, pour Foucault, ce qui compte est la différence du présent et de l'actuel. Le nouveau, l'intéressant, c'est l'actuel. L'actuel n'est pas ce que nous sommes, mais plutôt ce que nous devenons, ce que nous sommes en train de devenir, c'est-à-dire l'Autre, notre devenir-autre. Le présent, au contraire, c'est ce que nous sommes et, par là même, ce que nous cessons déjà d'être. Nous devons distinguer non seulement la part du passé et celle du présent, mais, plus profondément, celle du présent et celle de l'actuel[20]. Non pas que l'actuel soit la préfiguration même utopique d'un avenir encore de notre histoire, mais il est le maintenant de notre devenir. Lorsque Foucault admire Kant d'avoir posé le problème de la philosophie non pas par rapport à l'éternel mais par rapport au Maintenant, il veut dire que la philosophie n'a pas pour objet

19. Péguy, *Clio*, Gallimard, p. 266-269.
20. Foucault, *Archéologie du savoir*, Gallimard, p. 172.

de contempler l'éternel, ni de réfléchir l'histoire, mais de diagnostiquer nos devenirs actuels : un devenir-révolutionnaire qui, selon Kant lui-même, ne se confond pas avec le passé, le présent ni l'avenir des révolutions. Un devenir-démocratique qui ne se confond pas avec ce que sont les Etats de droit, ou même un devenir-grec qui ne se confond pas avec ce que furent les Grecs. *Diagnostiquer* les devenirs dans chaque présent qui passe, c'est ce que Nietzsche assignait au philosophe comme médecin, « médecin de la civilisation » ou inventeur de nouveaux modes d'existence immanents. La philosophie éternelle, mais aussi l'histoire de la philosophie, font place à un devenir-philosophique. Quels devenirs nous traversent aujourd'hui, qui retombent dans l'histoire, mais qui n'en viennent pas, ou plutôt qui n'en viennent que pour en sortir ? L'Internel, l'Intempestif, l'Actuel, voilà des exemples de concepts en philosophie ; des concepts exemplaires... Et si l'un appelle Actuel ce que l'autre appelait Inactuel, c'est seulement en vertu d'un chiffre du concept, en vertu de ses proximités et composantes dont de légers déplacements peuvent entraîner, comme disait Péguy, la modification d'un problème (le Temporellement-éternel chez Péguy, l'Eternité du devenir selon Nietzsche, le Dehors-intérieur avec Foucault).

Historicism – Modernity

From W. Mignolo, *The Idea of Latin America*, London: Blackwell, 2005.

Pages 48-49

The important observation to make here is not simply whether there are other perspectives about the "same event" but that an-other paradigm emerges across the epistemic colonial difference. The dominant theo- and ego-politics of knowledge is being contested by the emerging shift to the geo-politics and body politics of knowledge: knowledge produced from the geo-historical and bio-historical perspective of racialized locations and people. The deeper problem is that all existing different interpretations about the same event are still within the same overarching paradigm of European modernity and its continuity and transformation in US government, universities, and media. What I have been arguing here is that an-other paradigm (the decolonial, globally diverse one) is at work; and my own argument is intended to be inscribed in it. "America" becomes a "conceptual node" around which not only do different interpretations within the same paradigm come into conflict but, more radically (and I mean here at the roots of the epistemic principles underlying different conceptions of knowledge and understanding), multiple paradigms are at war at the other end of the colonial difference. Once you get out of the natural belief that history is a chronological succession of events progressing toward modernity and bring into the picture the spatiality and violence of colonialism, then modernity becomes entangled forever with coloniality in a spatial distribution of nodes whose place in history is "structural" rather than "linear." Further, since modernity and coloniality are two sides of the same coin, each node, in addition to being structural and not linear, is heterogeneous and not homogeneous. Thus, the point here is not so much "the end of history" as "the end of Hegelian concepts of history." If instead of conceiving of history as a linear chronological process we think instead of "historico-structural heterogeneity" (*heterogeneidad histórico-structural*),[42] of historical processes interacting, we will better understand the role of the "idea" of America and of "Americanity" in it.

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as well as what it means to talk about modernity and coloniality as two sides of the same coin.

Taking this step moves us away from the Bible's sacred and Hegel's secular narratives and also offers a radical departure from the early Marx's canonization of "historical materialism." Why *heterogeneous historico-structural nodes* instead of a linear succession of events? Because history seen as a series of nodes in which historico-structural heterogeneity is deployed provides a theoretical anchor in the perspective of local histories (and languages) instead of grand narratives. Space is made for multiple and contesting perspectives and historical processes. We can then look at history as a set of historico-structural heterogeneities that are the consequence of a given set of events being cast and interpreted both from the rhetoric of modernity (progress, happiness, wealth) and from the *constitutive* logic of coloniality (stagnation, death, poverty). Instead of looking at "modernity" as a triumphal historical process, like Santa Claus bringing happiness to needy children, historico-structural heterogeneity highlights the fact that such dreams of happiness have been achieved at the cost of enormous sacrifices of human lives (Indian and Afro genocides in the conquest of America), and will continue to be so (as in the lives lost in the "miscalculated" war in Iraq) as long as the rhetoric of modernity keeps on convincing and enforcing the idea that history is a linear process, with neo-liberalism now the goal.

Today, as the "idea" of America, as well as of Asia and Africa, is in the process of being transformed through neo-liberal globalization, "Latin" America is a place for the exploitation of natural resources and human labor. The colonial matrix of power continues to be rearticulated, and the appropriation and control of space (not just land) are at the core of the new form of colonialism we have been witnessing developing since the early 1990s. The control of space entails the control of intellectual resources, as capitalism grows now also by the appropriation of knowledge.

Geography of Knowledge

From W. Mignolo, *The Idea of Latin America*, London: Blackwell, 2005.

The following discussion is, thus, written within the frame of what Arturo Escobar has called the modernity/coloniality research project.[2] Some of the premises are the following:

1. There is no modernity without coloniality, because coloniality is constitutive of modernity.

2. The modern/colonial world (and the colonial matrix of power) originates in the sixteenth century, and the discovery/invention of America is the colonial component of modernity whose visible face is the European Renaissance.

3. The Enlightenment and the Industrial Revolution are derivative historical moments consisting in the transformation of the colonial matrix of power.

4. Modernity is the name for the historical process in which Europe began its progress toward world hegemony. It carries a darker side, coloniality.

5. Capitalism, as we know it today, is of the essence for both the conception of modernity and its darker side, coloniality.

6. Capitalism and modernity/coloniality had a second historical moment of transformation after World War II when the US took the imperial leadership previously enjoyed at different times by both Spain and England.

wonder whether the Indigenous people had a perspective because. You may you imagine that *history* is *history* and what happened-just happened, and argue that there are of course "different interpretations" but not "different perspectives." Different interpretations presuppose a common and shared principle of knowledge and of the rules of the game, while different perspectives presuppose that the principles of knowledges and the rules of the game are geo-historically located in the structure of power of the modern colonial world. To show how this works, we need something such as "dependency theory" for the epistemological domain.[10]

I call the uneven distribution of knowledge the *geo-politics of epistemology*, just as I call the uneven distribution of wealth the *geo-politics of economy*. The "idea" of America and of "Latin" America emerged and has been maintained in the field of forces in which knowledge and wealth are unevenly distributed, and where the colonial difference has been silenced by the trumpeting and celebration of cultural differences.

The geo-politics of knowledge (the local historical grounding of knowledge) goes hand in hand with the body politics of knowledge (i.e., the personal and collective biographical grounding of understanding). The view of events and the conception of the world provided by a Spanish Jesuit or soldier (or later on, by a French or British traveler or philosopher) were geo- and bio-graphically grounded in languages, memories, and histories not shared in the views and conceptions of the world experienced by Aymara- or Nahuatl-speaking intellectuals whose geo- and bio-graphies were grounded in other memories and histories. There is a *difference* in this apparent symmetry: the Spanish missionary and the French philosopher did not have to incorporate Indigenous languages and experiences into their theological or egological frame of thinking. The Aymara or Nahuatl intellectuals of what are now Bolivia, Mexico, and Central America had no choice, because Spanish and French institutions were set up in their territory, on top of and around their dwelling places. For that material reason, border thinking is the consequence of the power differential under modern/colonial conditions, a power differential that constitutes the *colonial difference*.

Changing the geography of knowledge requires an understanding of how knowledge and subjectivity are intertwined with modernity/coloniality. The imperial and colonial differential of languages shapes the modes in which knowledge is produced and circulated. As such, knowledge and subjectivity are two sides of the same coin. Political theory and political economy, for example, were thought out and written down by men who did not have a conflict between the language they spoke and the civilization carried in that language. Not just knowledge is carried in language. Social order, organization, and ranking values are as well. Political theory, political economy, ethics, and knowledge we call "scientific" are all determined in the conceptual fabric of a given language. There is a continuum, so to speak, between the English language and experience and Adam Smith's political economy in *The Wealth of Nations* and *Theory of Moral Sentiments*, or between the French subjectivity of Marie Jean Antoine Nicolas de Caritat, marquis de Condorcet, and his mapping of the human spirit in his *Esquisse d'un tableau historique des progrès de l'esprit humain*.

Geography of Knowledge: 'Japan' in 'Latin America'

"Occidentalism," more than a field or domain of study like "Orientalism" in the hands and pens of French and British intellectuals since the late eighteenth century, is itself the perspective from which the Orient can be conceived. For how could "Orientalism" become a geo-political concept without the presupposition of an "Occident" which was not only its counterpart, but also the very condition for the existence of "Orientalism"? Furthermore, "Occidentalism" was both a geo-political concept and the foundation of knowledge from which all categories of thought emerged and all classifications of the rest of the world were determined. "Orientalism" did not have this privilege. Western people have disciplines and Eastern people have cultures to be studied by Western disciplines. The West was, and still is, the only geo-historical location that is both part of the classification of the world *and the only perspective that has the privilege of possessing dominant categories of thoughts from which and where the rest of the world can be described, classified, understood, and "improved."*[27]

The enchanting power of Occidentalism resides in its privileged geo-historical location, a privilege that was self-attributed by the growing hegemonic belief in its own racial, religious, philosophic, and scientific superiority. One of the most devastating consequences of such a system of belief is that the world seems to be what European (and later US) categories of thought allow you to say it is. The rest is simply wrong and any attempt to think otherwise opens one up to harassment, demonizing, and, eventually, elimination. The idea of America (and subsequently of Latin and Anglo America) is a product and a consequence of this Occidentalist

ideology of Western expansion and civilization. The Occidental is, primarily, the place of hegemonic epistemology rather than a geographical sector on the map. Samuel Huntington demonstrated as much when he placed Australia in the First World and in the West while leaving Latin America out.[28] For, after all, "(Latin) America" is not an "entity" that can be observed and experienced, but an "idea" that arises in the conflicts of interpretation across the colonial difference. The "differences" between Latin America and Europe and the US are not just "cultural"; they are, well and truly, "colonial differences." That is, the *links* between industrial, developed, and imperial countries, on the one hand, and could-be-industrial, under-developed, and emerging countries, on the other, *are* the colonial difference in the sphere where knowledge and subjectivity, gender and sexuality, labor, exploitation of natural resources, and finance, and authority are established. The notion of cultural differences overlooks the relation of power while the concept of colonial difference is based, precisely, on imperial/colonial power differentials.

We can deepen our understanding of the functions and implications of the idea of Occidentalism by contrasting it with the formation of the ideas of other areas that were constructed vis-à-vis a hegemonic idea of Europe. The contrast between Asia or Africa and the Americas can also illuminate the importance of the emergence of "Occidentalism" as part of the ideology of colonization during the Renaissance, and of "Orientalism" as its counterpart to justify the later expansion of England and France. Both rely on the image of the world put in place in the sixteenth century when "America" emerged in the European consciousness and in the global designs of capitalist empires.

In "How Does Asia Mean?" Sun Ge presents a compelling argument that from the beginning Asia:

> is not only a political concept, but also a cultural concept; it is not only a geographical location, but also a measure of value judgment. The Asia question itself does not bear any necessary relation to the question of hegemony and counter-hegemony, although the attempts to tackle this question have brought into play considerations of hegemony of the East and the West.

More specifically, Sun Ge frames the problem as follows:

> For a long historical period, Asia has not been treated as a
> self-contained geographical concept, *but has only been put forward
> ideologically in opposition to Europe.*The discussion of Asia involved
> not only the question of Eurocentrism, but also the question
> of hegemony within the East. As difficult as it is to sort out
> the question of Asia, it remains an underlying thread running
> through the intellectual history in the *modern world.* Hence, we
> still have to grapple with the question of Asia as one that
> constitutes a totality in itself.[29]

The general statement that Asia has "been put forward ideologi-
cally in opposition to Europe" already reveals the fact that "Asia"
surfaced out of the political project of European agents more than
from the spirit imbedded in the ontology of a continent. In the
same way as the people living in Tawantinsuyu and Anáhuac did
not know that they inhabited a continent named America, the
people of China, Japan, and India did not know that they were
living in a continent named Asia (and, of course, the equivalent
holds for Indigenous people in what later came to be called New
Zealand and Australia). *Who really knew that Incas and Aztecs were
living in America and that Chinese and Japanese were in Asia? The
Western Christians, who drew the maps and named the areas, were the only
ones who knew.* And how and when did Chinese and Japanese and
other people in "Asia" know that they inhabited a continent named
Asia? To determine the precise moment or period in which the
different people and institutions in China, Japan, India, etc. accepted
the idea that they were living in a continent named "Asia" and
began to associate a particular territory with that specific name, we
would need to do further investigation. One answer, however, can
be taken as a given: *not before 1582.* Why? Because it was in the
decade of 1580 that Italian Jesuit Mateo Ricci presented a world
map (presumably Ortelius' "Orbis Universalis Terrarum") to the
intellectuals and officers of the Ming Dynasty.[30] We can be almost
certain that it was only then that people inhabiting China and Japan
"learned" for the first time that they were living in a space called
Asia, just as the Indigenous people and African slaves transported to

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America learned, also in the sixteenth century, that there was a continent named "America." And what about Africa? A similar "learning" curve can be traced. People from the Maghrib, the empire of Mali, the kingdoms of the Niger Bend and of Chad, etc. began to learn, in the fifteenth and sixteenth centuries, that they belonged to a continental unit called "Africa." *There was no good reason for the different people of "Africa" to spontaneously conceive of themselves as they were conceived of by the European Christians!* The adoption of an image, Africa, which belonged not to their memories but to the memories of Christian Europe, accompanied the increasing force of the colonial matrix of power, which as we have seen came into the picture with the "discovery of America" and the Christian maps locating the "barbarians" of the world.

The political project subjacent to and invisible under the continental division has important consequences for contemporary intellectual debates. Sun Ge appropriately brings to the forefront the need for a radical revisiting of Edward Said's concept of Orientalism (a revisiting to radicalize the concept, and not to favor the Bernard Lewises of the world that have been attacking Said for his critique both of Orientalism and of Israel). "Asia," writes Sun Ge, is a singular term that "has emerged to name collectively a plurality of countries and regions." However, "in the hands of Asians, Orientalism becomes different from that which Said criticizes, for it is directed against the Asian Occidentalism."[31] Recognizing the fundamental contribution made by Said, she calls for an equally fundamental revision. Sun Ge makes an epistemic geo-political move (that is, a move that shifts the geo-politics of knowledge) "to take a different perspective from that of Western intellectuals on the question of Asia – a question that deserves greater attention from intellectuals in both the East and the West."[32] Sun Ge observes, rightly in my view, that when Said declares:

> To speak of scholarly specialization as a geographical "field" is, in the case of Orientalism, fairly revealing since no one is likely to imagine a field symmetrical to it called Occidentalism. Already the special, perhaps even eccentric attitude of Orientalism becomes apparent. For . . . there is no real analogy for taking a fixed, more or less total geographical position

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towards a wide variety of social, linguistic, political and histori-
cal realities.[33]

Here, Sun Ge goes on to make a weighty observation:

> what Said fails to understand is that *there is another side to this
> problem. That is, for the Asians engaged in the discussion of the Asia
> question, though one cannot say there is precisely something called
> "Occidentalism"* worked out by them, there indeed exists, and
> not without reason, in abstraction an ambiguous single entity
> named the "West." Although it is no longer meaningful today
> to consider the "West" as a single entity, Occidentalism had, at
> least in the modern history of East Asia, once played a key
> role in mediating the self-knowledge of the nations within
> the East with important questions being stirred up in the
> process.[34]

Sun Ge is correct to point out that Said only saw half of the
problem and did not stop to wonder how Orientalism could have
emerged without a previous notion of Occidentalism. The problem
in Said's argument, which is very clear in the statement just quoted,
is that he takes for granted that the "beginning" of modern history
(and the very idea of modernity) is located in the eighteenth
century. He, along with many others, particularly scholars in post-
colonial studies, was blind to the sixteenth and seventeenth centuries
and the consequences of the "discovery" of America. This means,
really, that the emergence and configuration of the colonial matrix
of power of "Orientalism" are but a second round of world-order
transformation.

Asia or (Latin) America are, to paraphrase Sun Ge, mediums
through which *we* are effectively led to *our* history, and it is precisely
because of this historical significance that it is important we keep
asking how Asia (or "Latin America") signifies.[35] I take *we* and *our*
in the previous sentence to refer to the inscription of the geo-
politically identified subject (that is, the geo-politically marked loci
of enunciations). The history of Asia or (Latin) America could be
written by someone for whom it is not "our history" but "theirs."
This is precisely what happened in the sixteenth century when

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Spanish missionaries decided that the Indians did not have history while they, the Spanish missionaries, were God-appointed to write the history that Indians did not have. Spanish missionaries could not have said "our" or "my" when they were writing the history of the Mexica people, as they could with the memories and subjectivity of their own past.

And how does "Africa" signify, then? A substantial answer has been advanced in two of Valentin Mudimbe's classic books: *The Invention of Africa* (1988) and *The Idea of Africa* (1994).[36] As we have said, "Africa" was not the name and the spatial image "Africans" had of their territory. It was a growing and changing conceptualization from the times of Strabo and Ptolemy (who used the name "Libya"), and a construction of theirs and other Greek and Latin geographers and historians. Thus, the invention of Africa has its foundation in the "Greek paradigm of thought" (as Mudimbe analyzes it in *The Idea of Africa*). The Greek paradigm was subsequently translated into the "Christian/Latin" one. The legacies of Greek cartography were translated into the T-in-O map with a clear articulation between the three continents and the three sons of Noah, as I described above. However, with the discovery/invention of America, Africa went through a redefinition and this time through the adaptation of the Christian T-in-O map to accommodate the existence of a fourth continent: the invention of America forced a redefinition of the idea of Africa. The "idea" of Africa was transformed due to the emergence of the Atlantic commercial circuits that displaced the "centrality" that the Mediterranean had for the consolidation of Western Christians. From the sixteenth century on, northern Africa became the location of the Moors who had been expelled from European territories, and sub-Saharan Africa became the territory where African slaves could be found and transported to the Americas. One of the consequences of the transformation of the "idea" of Africa was that slavery came to be more identified with Africanness and Blackness. For sure, not every slave was Black; there were Indian and White slaves too, particularly in the early colonial period, but "reality" does not always match the idea or the image that people make for themselves of that "reality." Slaves in Greece and Rome, of course, were not defined by skin color or continental provenance. Rather, they were people who were not

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considered competent for other kind of labor and roles in the organization of society. The massive slave trade prompted by the colonization of America changed that frame of mind and those assumptions.

Thus, the "West," evolving from its very inception as a marker of the Christian T-in-O map, implied Europe (basically Spain and Portugal at that point) and the New World, the "Indias Occidentales." The fact that a significant sphere of modern history has been silenced is a consequence of the perspective of European modernity (of Occidentalism as a locus of enunciation), from where the history of modernity has been written. When Said says that "no one is likely to imagine a field symmetrical to it [Orientalism] called Occidentalism," many intellectuals thinking from the underside of history – like myself – would remain on Said's side and support his scholarly and political project while disagreeing with this particular statement. And this means, precisely, that decolonial projects had to be pluriversal, not universal like the imperial projects of Western modernity. The issue at stake here is not to make a claim for Occidentalism to be a remembered, symmetrical field of study. To the contrary, Occidentalism is not a field of study (the enunciated) but the locus of enunciation from which Orientalism becomes a field of study (with Said's critique of its Eurocentric underpinning). The idea of "America" was part of "Occidentalism," and the idea of "Latin" America became problematic later when South America and the Caribbean were progressively detached from the increasing identification of Occidentalism as a locus of enunciation with Western Europe and the US. To review, the decisive points for my argument, as well as for the understanding of the colonial matrix of power (i.e., coloniality of power), are that:

1. Occidentalism was the name of the sector of the planet and the epistemic location of those who were classifying the planet and continue to do so.
2. Occidentalism was not only "a field of description" but was (and still is) also and mainly the locus of enunciation; that is, the epistemic location from where the world was classified and ranked.

The Americas, Christian Expansion, and Racism

When I say "from where" (both as a location and as a starting point) I am assuming that knowledge is not something produced from a postmodern non-place. On the contrary, knowledge is always geo-historically and geo-politically located across the epistemic colonial difference. For that reason, the geo-politics of knowledge[37] is the necessary perspective to dispel the Eurocentric assumption that valid and legitimate knowledge shall be sanctioned by Western standards, in ways similar to those in which the World Bank and the IMF sanction the legitimacy of economic projects around the world. Here Eurocentrism is equivalent to Occidentalism, as both refer to a centralization and hegemony of principles of knowledge and understanding, even if there are differences within it such as those between Christians, liberals, and Marxists. Of course, it is hardly enough to live in Asia or America to inscribe oneself in a genealogy of thought that implies the language, and also the weight that the language carries in the memory and in the knowledge of people inhabiting that particular language. Of course, physical space does matter, because if you live in Bolivia or in China you will be soaked, so to speak, in the language, the memory, the concern, the television, the everyday life of that particular place. You can certainly make an abstraction of it and devote your life, in Bolivia, to studying Leibnitz. However, whatever you can do with Leibnitz in Bolivia, assuming that you are not a German person living in Bolivia but someone who was born and educated in Bolivia and whose native language was Aymara or Spanish, will differ from what someone who was born and raised in Germany, has a PhD from Heidelberg, speaks German, and has learned Latin since primary school will do.