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Mathematics, cybernetics and Ranganathan's APUPA pattern

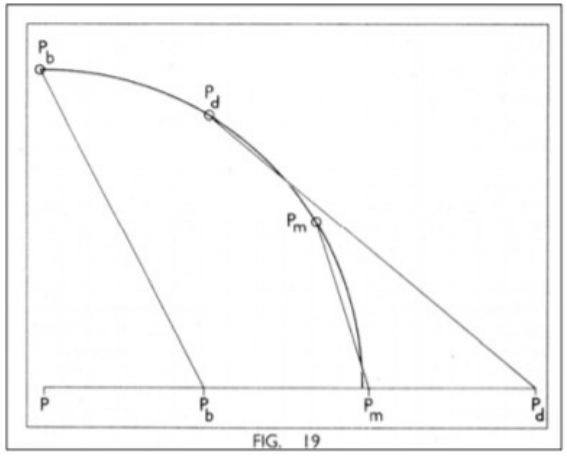

FIG. 19

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From course to article
on magazine *Les Cahiers du numerique*.

UNIVERSITÀ DI PAVIA

Elementi di Classificazione Colon

Corso di aggiornamento professionale

Cremona
Dipartimento di Musicologia e beni culturali, Aula magna
corso Garibaldi 178 [mappa]

venerdì 6 novembre 2015
ore 10.00–13.30 e 14.30–16.30

organizzato da Dip. Musicologia e beni culturali UniPV
e ISKO Italia con il patrocinio di AIB Lombardia

AIB ASSOCIAZIONE ITALIANA BIBLIOTECHE

THE APUPA BELL CURVE

Ranganathan's visual pattern for knowledge organization

CARLO BIANCHINI
LUCA GIUSTI
CLAUDIO GNOLI

1. Introduction
2. APUPA in Ranganathan's works
3. Main classes order in Colon Classification
4. Anteriorizing common isolates
5. Book number
6. Classification as a means of communication
7. Umbral and differential calculus; conscious and unconscious perceptions

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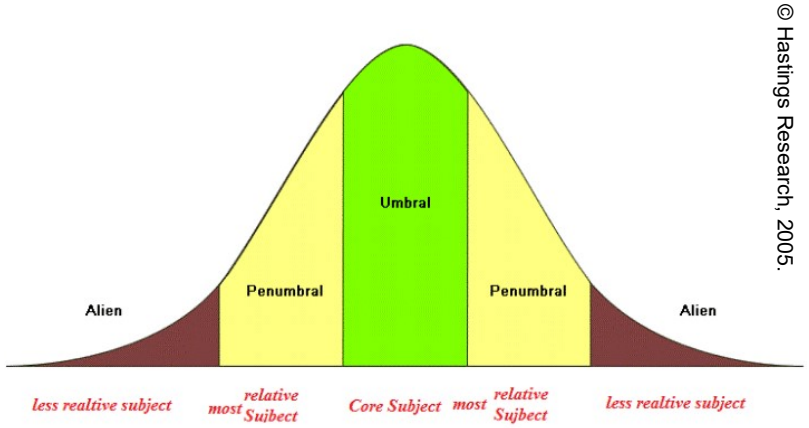
Apupa applications



© Hastings Research, 2005.

APUPA applications in information retrivial

Cited Paper
Umbral, Penumbral, Alien

Citing Paper
Umbral, Penumbral, Alien

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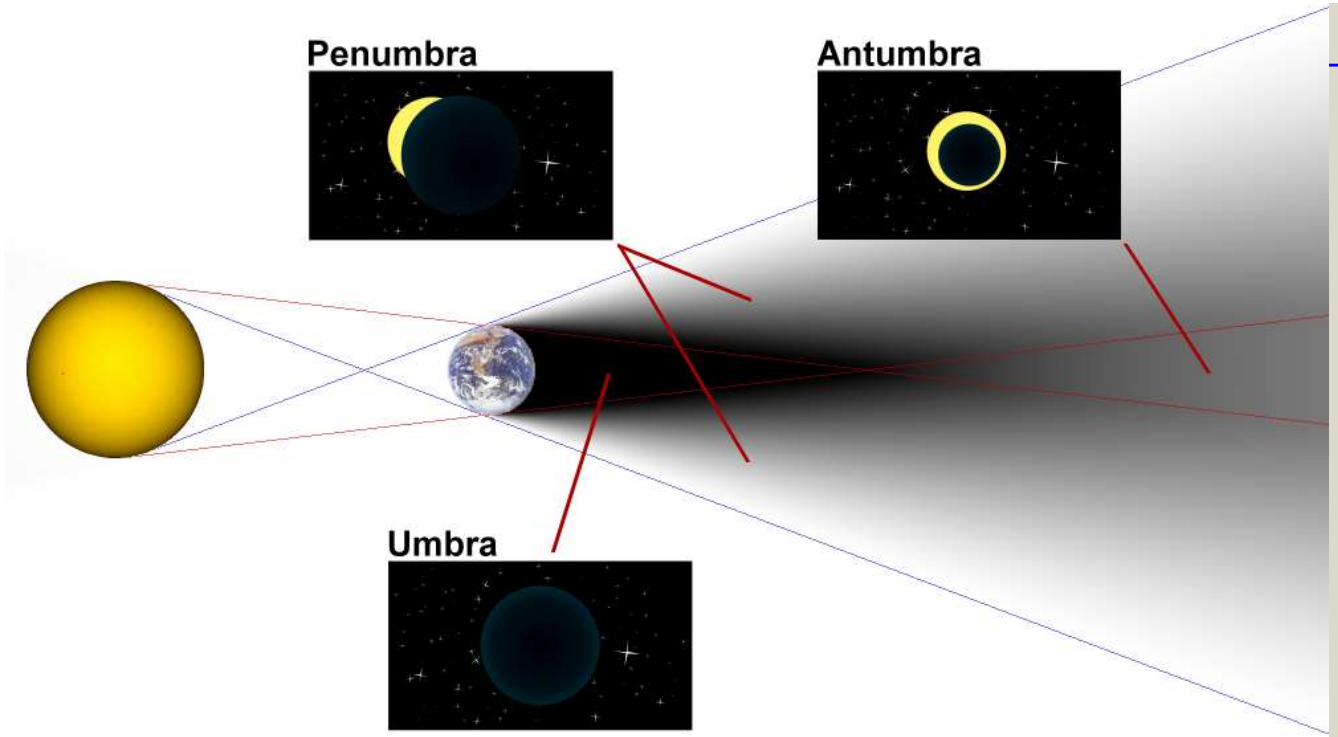
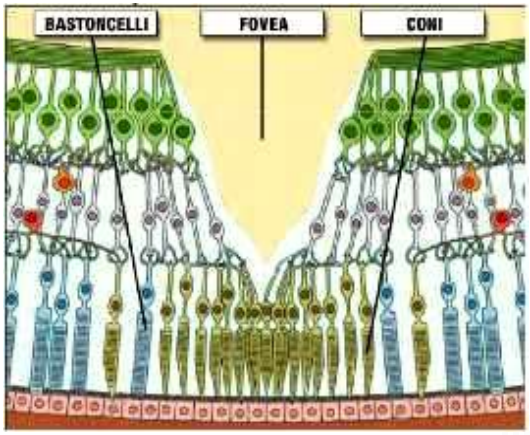
Penumbra - Kepler, 1604

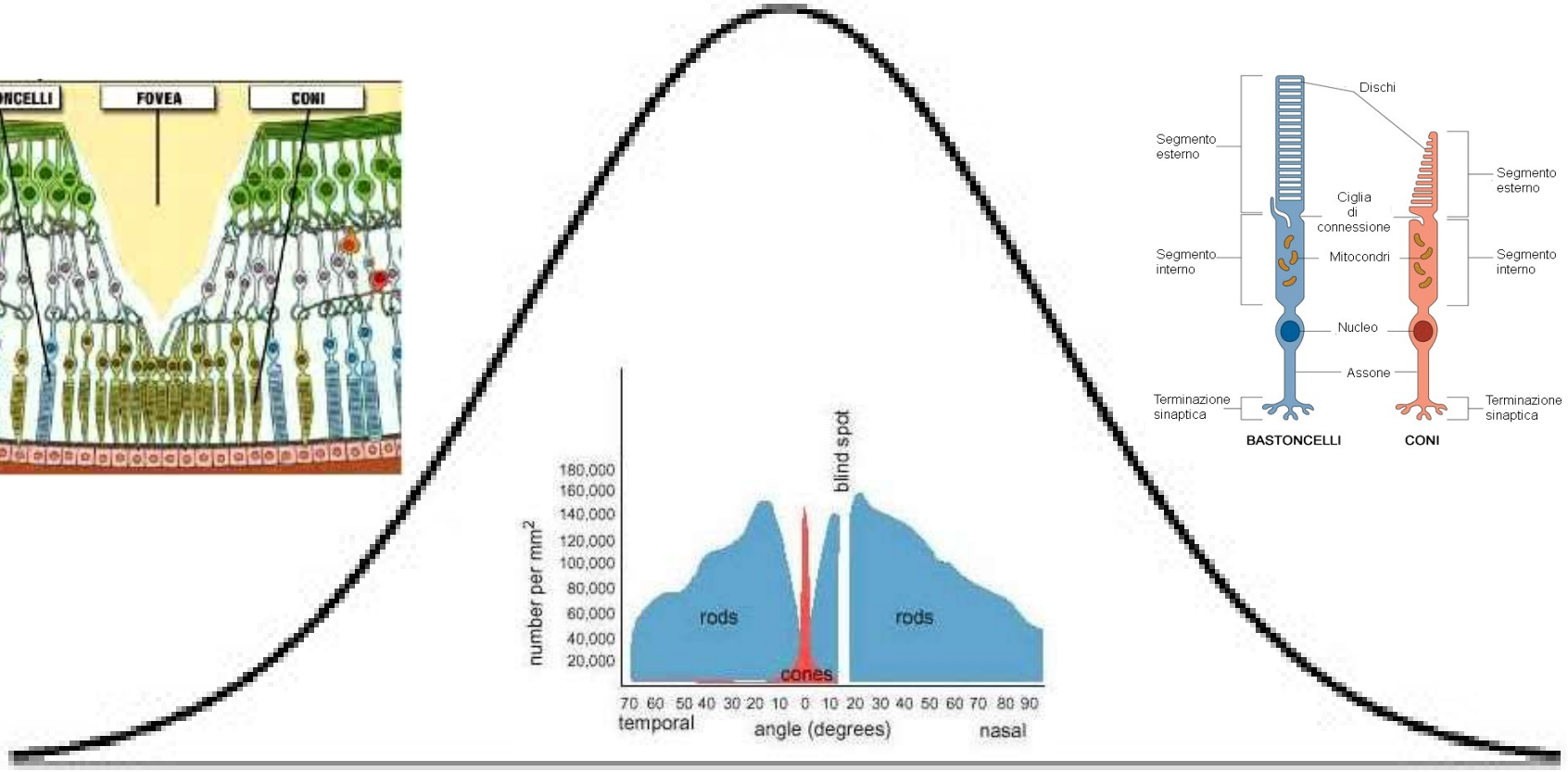


penumbra (n.)

1660s, from Modern Latin *penumbra* "partial shadow outside the complete shadow of an eclipse," **coined 1604 by Kepler** from Latin *pæne* "almost" (see ***penitence***) + *umbra* "shadow" (see ***umbrage***). Related: *Penumbral*.

Gaussian normal distribution and vision





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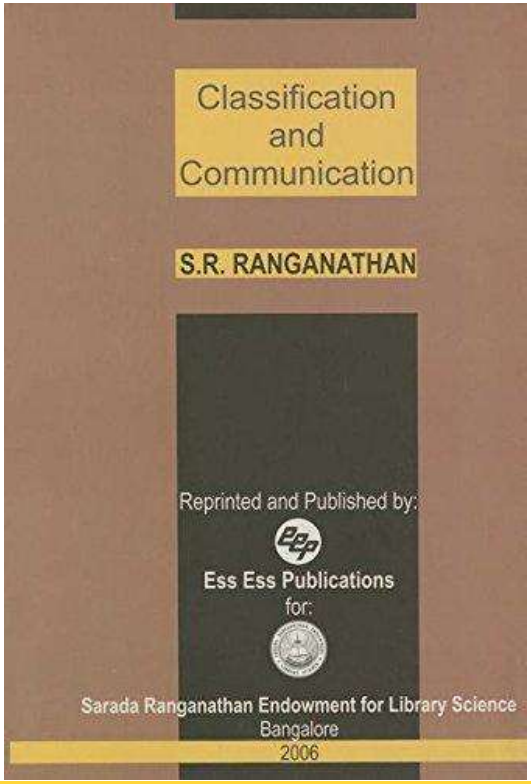
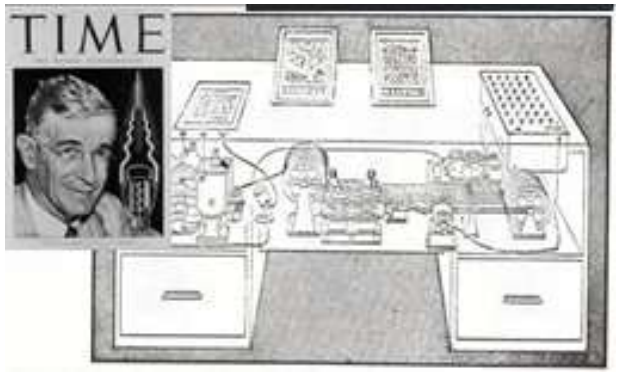
1948/50 to England/USA



"During World War 11, the importance of the dissemination of the latest scientific information to research workers was realised. As a result of this, national documentation centres were organised in many newly developing countries. A filip to this movement was also given by the initiative taken by the Unesco. One of the objectives of the Unesco was to assist in the elimination of barriers in international communication. Recognising that "wars are made in the minds of men", Unesco initiated a programme of developing public libraries and documentation centres as a means of 'improving the minds of men'."
(Ranganathan, 1963, sect. C3)

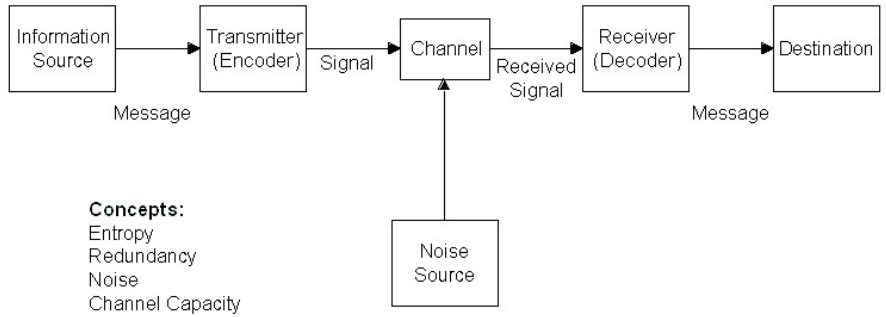
In fact in "1948 he toured the United Kingdom at the invitation of the British Council and lectured at many library schools, and he triggered the spirit of some kindred souls to found the Classification Research Group (London)" *(Drake, 2005, 2422)*

«It was early 1950. The Rockefeller Foundation extended an invitation to visit USA. It was accepted chiefly to observe documentation in action at close quarters in several industries in the USA. But it was learnt that the purpose of the Foundation inviting me was to explore the role of classification in communication"
(Ranganathan, 1963, 18)



Communication models 1949/51

The Shannon-Weaver Mathematical Model, 1949

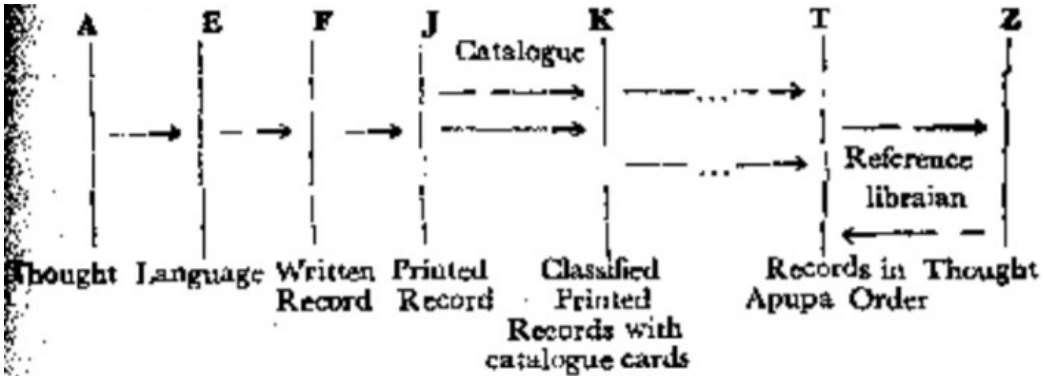


The model used by Ranganathan in the analysis of a whole range of media, that he develops in the first chapter of the third part of Classification and communication (Ranganathan, 1951, 22-27; 31), appears to be similar to Shannon and Weaver's mathematical model of communication.

"Classification is thus a transformation of thought. This change in arrangement from accession or random order to APUPA order is itself a subsidiary transformation. It is the first use of classification in the process of communication. […] The transformer is the classifier. The means is the Classification Scheme"

(Ranganathan, 1951, sect. 3212)

Ranganathan *Classification and Communication* model, 1951



July 1921, assistant professor

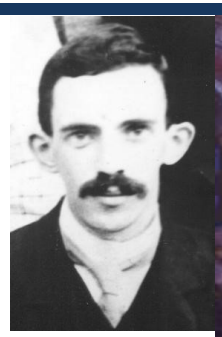
R. taught Physics and Mathematics and at the Presidency College, he taught Algebra, Trigonometry and Statistics.

He was a follower of the individual method of teaching putting discussion method into active use.

The classes used to be lively, learning - active, and teaching - purposive.

Ranganathan earned an epithet born teacher. He would interpose his teaching with many anecdotes and examples from life which would keep his students engaged and attentive.

Each hour of his class used to be punctuated by applauses.



His professor and mentor E.B. Ross

Presidency College, Madras.

Send-off from Presidency College, (1924)

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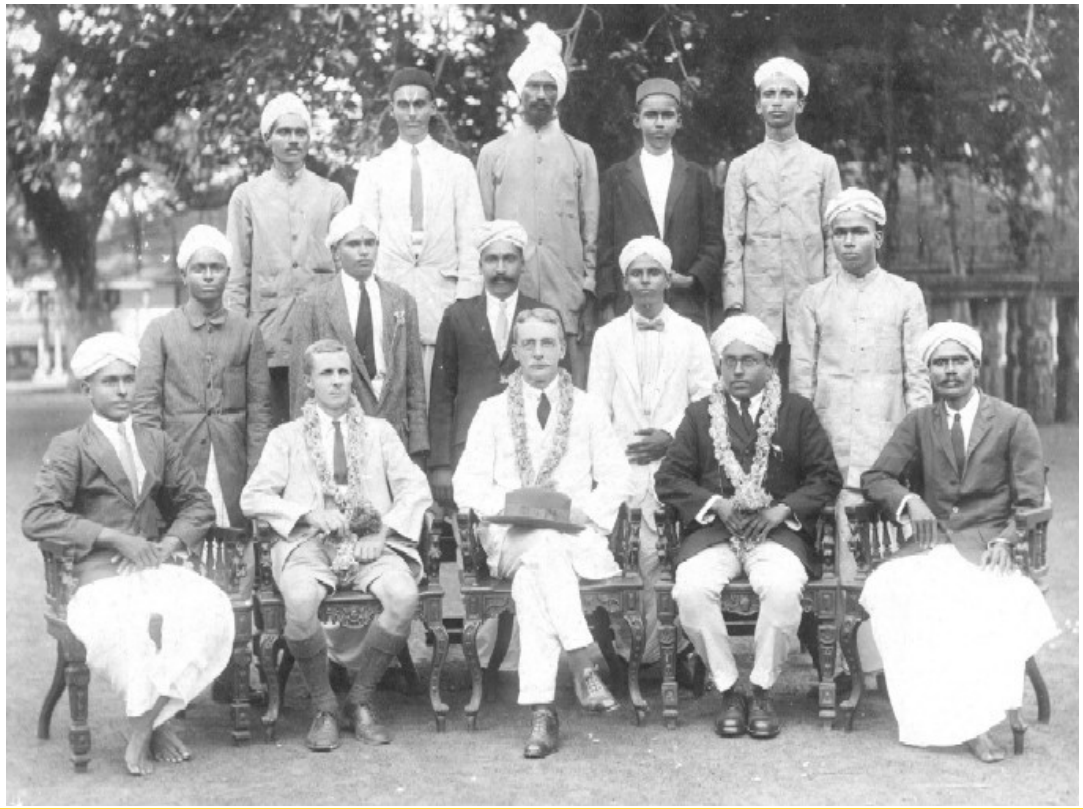
january 1924, librarian



“I can't bear the solitary imprisonment day-after-day.

No human being, except the staff. How different from the life in the college”.

A librarian looks back (1963)

*W*elcome as First Madras University Librarian

The Vice-Chancellor and the Chairman of the Library Committee with the new University Librarian and the entire library staff. (28 Aug. 1924)

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September 1924, to England

R. traveled to England in March 1925 to meet **G.H. Hardy** and receive Ramanujan's handwritten notebooks (Berndt,1985)

"*came in close contact with **W.C. Berwick Sayers**, Chief Librarian of Croydon Public Library and a lecturer in the University School of Librarianship, London. Under his guidance, Ranganathan visited a large number of libraries. He witnessed how the libraries there had become community reading centres*"

«Là vidi per la prima volta un Meccano, che consisteva di strisce, ruote, aste, viti, dadi e stringhe. Dalla combinazione di un opportuno assortimento di questi pezzi, si potevano facilmente costruire parecchi tipi di giocattoli».

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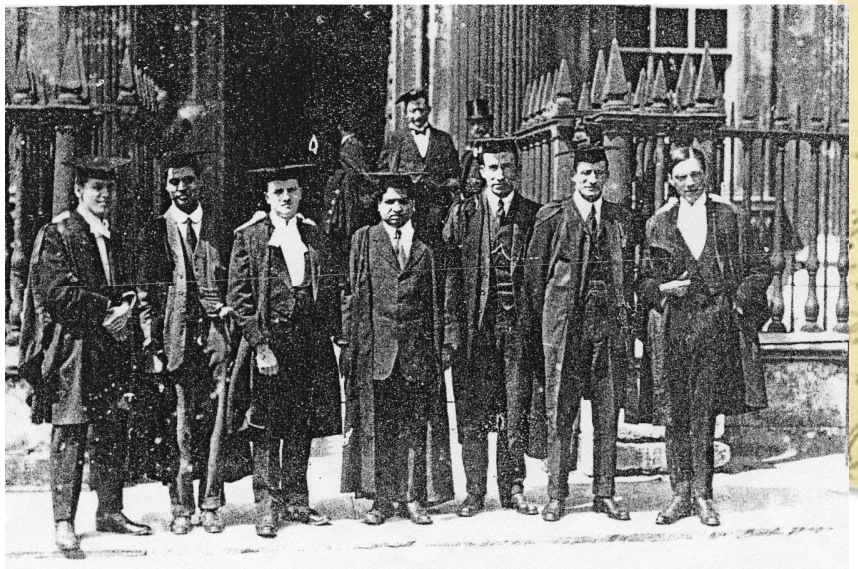
Ramanujan, Srinivasa

Umbral calculus

Lost notebook

Bernoulli numbers

Mock theta functions



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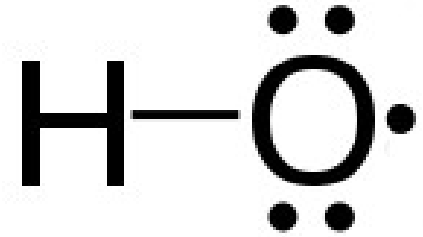
Peirce, Charles Sanders

The label *umbral calculus was* introduced in the second half of 19th century by English mathematician James Joseph Sylvester *from the word 'umbra' (meaning 'shadow' in Latin), and reflects the fact that for many types of identities involving sequences of polynomials with powers, 'shadow' identities are obtained when the polynomials are changed to discrete values and the exponent in is changed to the falling factorial* (Weisstein, s.d.).



The hydroxyl radical,
contains one unpaired electron.
(voce "Radical" Wikipedia)

In a 1903 essay, Peirce criticizes the decision to base the analogy on shadow, arguing that analogies with radicals and ions would be better:

***Sylvester's name umbra**, which is the only distinctive name the thing has ever received, must, I fear, be retained, although **ion or radicle** would be far better.*

*For who ever heard of two shadows **combining together to form a substance!** (…)*

***In other mathematics**, they have no existence in the universe of quantity.*

But joined together in sets they do.

They are just like chemicals radicals, each having a certain number of unsatisfied wants.

When each of these is satisfied by union with another, the completely saturated whole has an existence in the universe of quantity.

Few words before, the father of pragmatism and founder of modern semiotics specifies:

*(…) What Sylvester called 'my umbral notation' had first been published in 1693 by another man of some talent, named **Godfry William Leibniz.***

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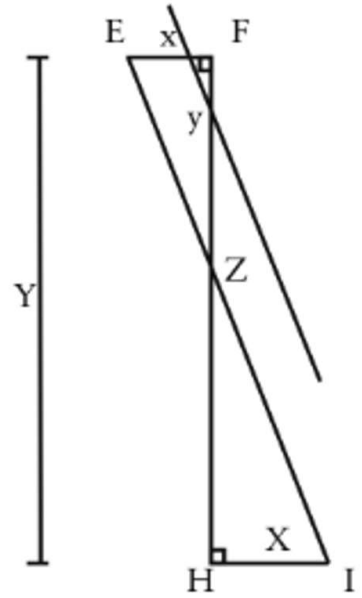
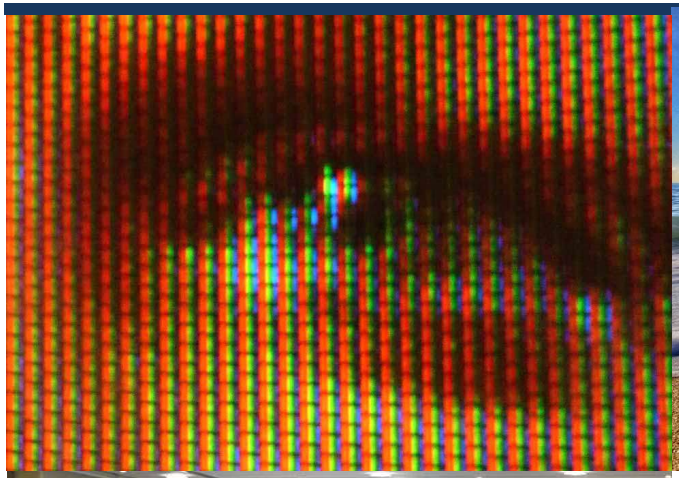
Leibniz, Godfry William



Differential relation



Monad

- Percetions/apperceptions
- Molecular/molar
- Unconscious/conscious

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Leibniz: theory of perception

Leibniz was a rare example of a total genius (and librarian) with the capability of translating into mathematical form his philosophical point of view on human intellect. As explained in a recent study:

> *To understand what this theory of the differential relation n terms, consider the corresponding theory of perception that Leibniz develops in relation to it. Leibniz had observed that we often perceive things of which we are not consciously aware. We recall a familiar scene and become aware of a detail we did not notice at the time; the background noise of a dripping faucet suddenly enters our consciousness at night. Leibniz therefore draw a distinction between conscious perceptions («apperceptions», or molar perceptions) and unconscious perceptions («minute» or molecular perceptions) (…) a conscious perception is produced when at least two of these minute and « virtual » perceptions enter into a differential relation that determines a singularity: that is, a conscious perception. (…) the calculus thus function in Leibniz as the physic mechanism of perception*
>
> (Smith, 2012, 54).

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Theories of the unconscious

While the progression from penumbral to umbral could be perceived as counterintuitive, it is not so if the challenge is to integrate the conscious and the unconscious:

> ***Descartes's principle of «clear and distinct» ideas is broken down into two irreducible values****, which can never be reunited to constitute a «natural light»:*
>
> - ***conscious*** *perceptions are clear but confused (not distinct),*
> - *while* ***unconscious*** *perceptions (ideas) are distinct but necessarily obscure (not clear).*
>
> *Indeed Leibniz can be said to have developed one of the first theories of the unconscious* (Smith, 2012, 55).
>
> *(Smith, 2012, 55),*

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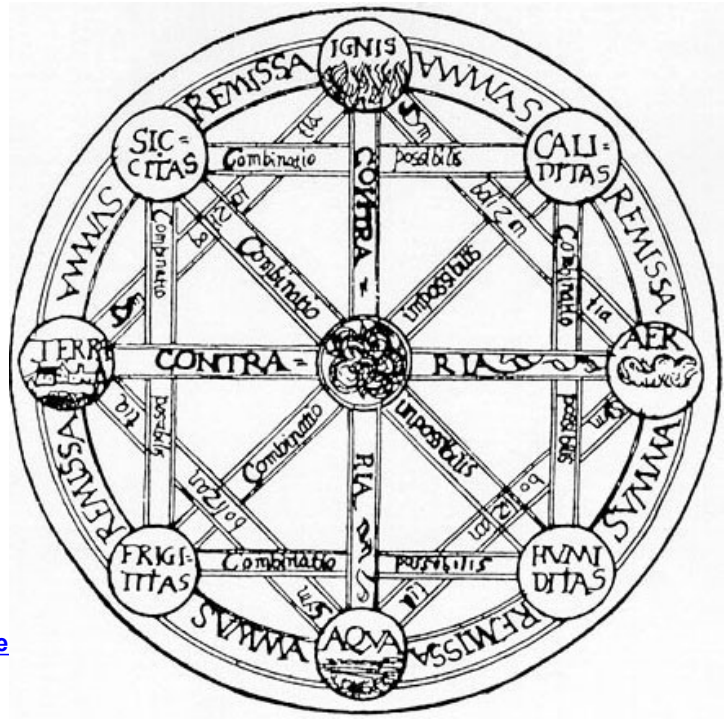
«Calcolemus!»

Leibniz Characteristica universalis («calcolemus»)

[Gli uomini] potrebbero avere in mano i rimedi per molta parte dei loro mali, se si servissero insieme, nel modo dovuto, dei ricchissimi dati raccolti in questo secolo, delle osservazioni e della vera analisi. Attualmente la conoscenza umana della natura mi sembra simile a un bazar, fornitissimo di ogni genere di merci, ma mancante di ordine e di inventario.



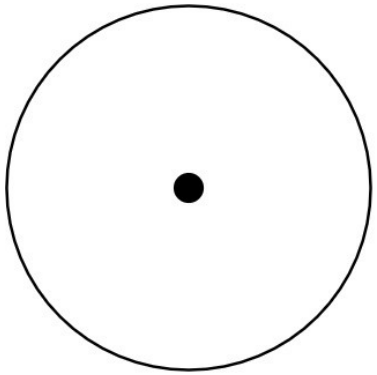
Universal languages

- Borges «The analytical language of John Wilkins»
- Wilkins was a member of Royal Society

"Organisation del conneissance et resurgeance de pensee baroque

Leibniz monad and colon

The circled dot was used by the Pythagoreans and later Greeks to represent the first metaphysical being, the **Monad** or The Absolute.



the fact that zero is elliptical in shape gave a clue. According to the Geometry of Conics a point-pair may be deemed to be a degenerated form of an ellipse. This suggested that a point-pair may be taken to be a “greater zero”; in other words, as a digit with an ordinal value between those of zero and one.

The semantically rich digits used in the Colon Classification are normally a to z, 1 to 9, and A to Z. Thus the digit used to separate one facet number from the succeeding facet number should have an ordinal value less than that of one. At this juncture the fact that zero is elliptical in shape gave a clue. According to the Geometry of Conics a point-pair may be deemed to be a degenerated form of an ellipse. This suggested that a point-pair may be taken to be a “greater zero”; in other words, as a digit with an ordinal value between those of zero and one. Sayers agreed with the idea of using (:) colon as the digit needed for insertion between any two facet numbers. (…) It was called “Colon Classification” to emphasize the rich potential added to the scheme by the semantically poor digit (:) colon (Ranganathan, 1965, 14-15). His awareness of the necessity to reconcile the potentially infinite expansion of possible approaches to the issue (foci) with the human limits in development and fruition of classification systems. (Ranganathan, 1967a, sect. RA)

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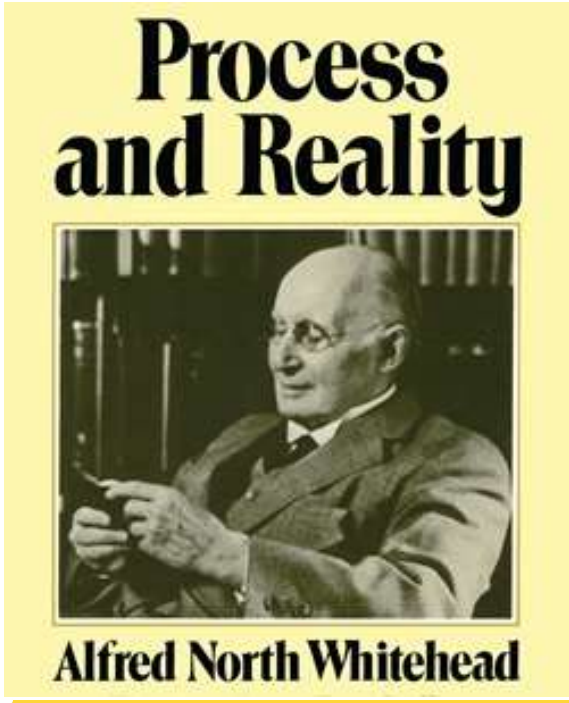
Whitehead, Alfred North

Odin, S. (2016) *Tragic Beauty in Whitehead and Japanese Aesthetics* –Lexington Books, Lanham

Art and the Unconscious

Whitehead discusses how the penumbral beauty of darkness and shadows charactering an artwork springs from the depths of the unconscious. For Whitehead, the "penumbra of consciousness" (AI 249), or "penumbra of feeling" (AI 260), is to be explained by *prehension* (AI 176) as vague unconscious feelings of the whole in each part disclosed through the dimly felt qualitative background of aesthetically immediate experience. In contrast to "ap-prehension" denoting conscious awareness, and "com-prehension" denoting cognitive awareness, the Whiteheadian term "prehension" signifies a vague, unconscious, intuitive feeling of relationships to the surrounding environment in the vague penumbral background. Just as for Leibniz's monadology there is a distinction between conscious apperception of parts and unconscious perception of the whole in each perspective, for Whitehead an actual occasion can have both conscious apprehension of focal elements and unconscious prehension of background elements in each perspective of the universe. Furthermore, Whitehead goes on to account for the penumbral beauty of art in terms of his theory of perception in three modes, whereby aesthetic sense qualities such as vivid colors make symbolic reference to this unconscious penumbral background of vague feeling-tone.



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Otlet and Ranganathan

The spiral is for Otlet and Ranganathan an expression of expansion of total knowledge on the long term, which encompasses (non visible) short successive cyclic movements. (Otlet 1935, 318; Ranganathan 1957, 249)

Otlet as we will see called these short term cyclic movements “evenements” and Ranganathan decribed them as a **“continuous cascade of new micro-thoughts”** in the universe of knowledge. Both Otlet and Ranganathan were **aware of the tensions between the factors time and evolution** on the one hand and the synthesis of elements of facets of knowledge within their classification systems.

In a unpublished manuscript in the Archives of the Mundaneum in Mons (Belgium) with the title **“Relations fondamentales” of 9 April 1928, Otlet refers explicitly to the works of Samuel Alexander** (known for this concept of bottom-up emerging synthesis) and the philosophers/mathematicians **Bertrand Russell and Alfred North Whitehead who both questioned the idea of an universal synthesis** and who used notions of events as occurrences. In this manuscript, that according to its subheading discusses“ the philosophy and research of a new scheme (schema) of time and space”, Otlet stated that Alexander and Russell, replaced the classical view of permanent synthesis by “a collection of relative events.”

Van den Heuvel, C. (2011). *Multidimensional classifications: Past and future conceptualizations and visualizations*. In Smiraglia, Richard P., ed. Proceedings from North American Symposium on Knowledge Organization, Vol. 3. Toronto, Canada, pp. 105-121.

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in a continuously flux

Whitehead, in Otlet's view, broke with the notion of synthesis all together.

Whitehead rejected indeed the idea that each object has a simple spatial or temporal location.

If he had been familiar with the work of Otlet he would probably had reckoned it to what he called in his Science of the Modern World of 1926: "The Fallacy of Misplaced Concreteness", or the error of mistaking the abstract for the concrete.

According to Whitehead it would be wrong to see in a spatial point more than abstraction and every real-life object may be understood as a constructed series of events: "In a certain sense everything is everywhere at all times.

For every location involves as aspects of itself in every other location.

Thus every spatio-temporal standpoint mirrors the world. (Whitehead 1945, 114) **Whitehead's view that all things are in a continuously flux, is quite different from the spatio-temporal notions of Otlet and Ranganathan**.

Otlet in Monde made a distinction between a) the development of reality and b) the development of "ideas in systems and syntheses with an assimilation and remodelling of what is new", which c) at certain moments in time intersect at certain points. (Otlet 1935, 331)

Ranganathan does follow this line of reasoning of successive syntheses in his loops of "micro-thought".

However, whereas Otlet thought that this development could be handled by an update of the UDC from time to time, Ranganathan was convinced that it implied a fundamental change in classification.

The latter observed that there is "wastage incidental to 'research in parallel'" in the development universe of knowledge that has to be eliminated "by organizing 'research in series'." (Ranganathan 1957, 248)

To this end Ranganathan introduced "depth classification" which he defined as: "a scheme of classification fitted to reach coextensiveness and expressiveness in the classification of micro-thought having many rounds and levels of facets, and isolates of high orders in any all of them." (Ranganathan 1957, 241) This dept

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Cascade of new micro-thoughts

The Library Research Circle that was formed in 1951, discussed every Sunday on **Ranganathan's veranda** mathematical aspects of classifications.

Otlet as we will see called these short term cyclic movements "**evenements**" and Ranganathan decribed them as a **"continuous cascade of new micro-thoughts"** in the universe of knowledge.

Otlet stated that Alexander and Russell, **replaced the classical view of permanent synthesis by "a collection of relative events."**

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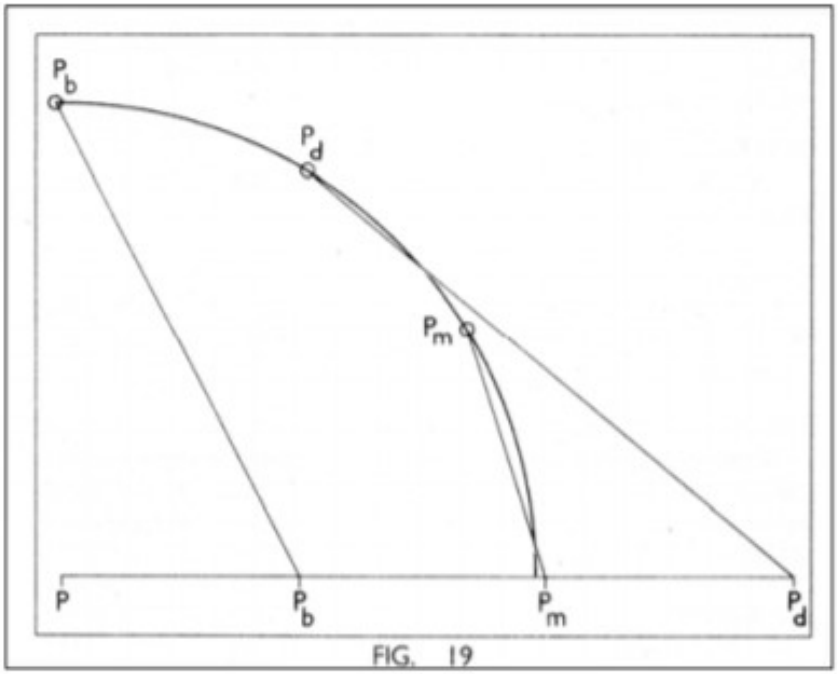
Multi>Uni-dimensional



Dimension reduction (Ranganathan 1957)

the multidimensional reduction of the content of various formats to one line and the recombination of these elements in multi-dimensional knowledge constructions.

Ranganathan's description of how the successive isolates in a chain within a facet, considered from the angle of the idea plane, form a "**Nest of Cells in many dimensions**" and from the notational plane a "**Nest of Intervals on a line**" might have been **inspired by Whitehead's views on projective geometry**.

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Al centro chi cerca

Il modo di metterlo al centro rimanda a una concezione della percezione, che

- non si rifà a una **ontologia della sostanza**
  - In cui il mondo è un insieme di soggetti separati che occupano uno spazio puntuale preciso e la percezione è una cattura.

- ma a una **ontologia della continuità**
  - il mondo è un sistema di relazioni differenziali che si determina come un processo (Whithead)
  - la percezione è l'emergenza di una complessità a partire da un mondo di eventi di cui non siamo consapevoli (percezioni molecolari Leibniz)

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Lighthouse/torch

The metaphor of light to look for our path in the wood

Ranganathan, Classification and communication (1951)

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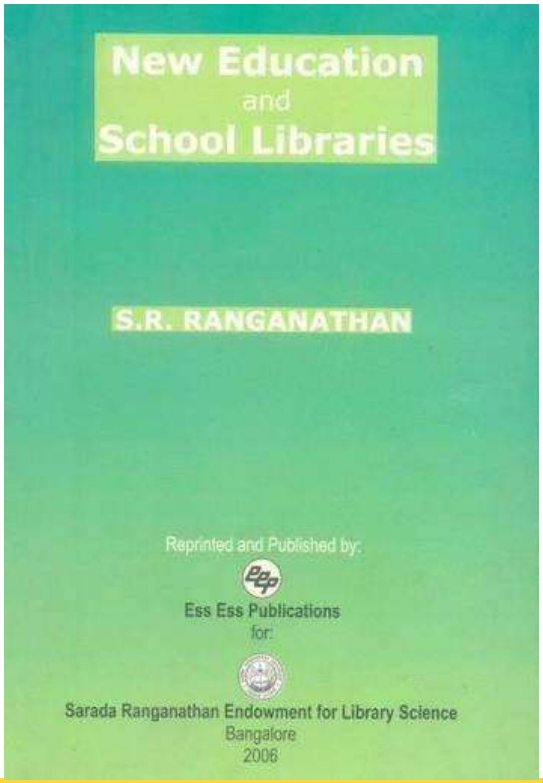
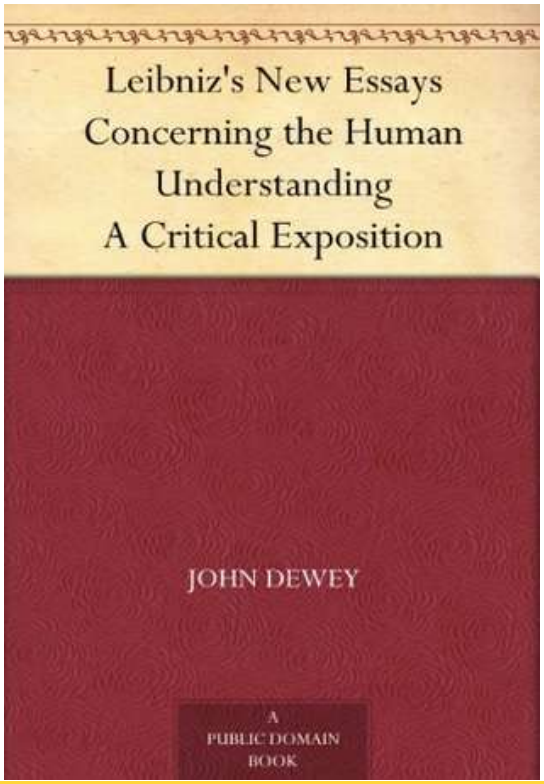
Dewey, John *(non Melvil)*



personalizzazione dei servizi:

se prima (Ranganathan) era convinto della necessità di un insegnamento individuale, non ex-cathedra,

poi diverrà un incrollabile sostenitore del servizio di reference individuale, o meglio della personalizzazione come elemento necessario e fondante del servizio di reference.



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Fortuna critica della Cc

- **E’ difficile da tradurre in una biblioteca**

  perché i libri hanno una sola posizione (le schede del catalogo)

  - E poi comunque è molto difficile per i bibliotecari
    - (molta stima, poche adesioni)
- **E diventa più semplice in un sistema digitale**
  - con una rete di link che rimandano in più direzioni
    - (molte adesioni, poca comprensione)

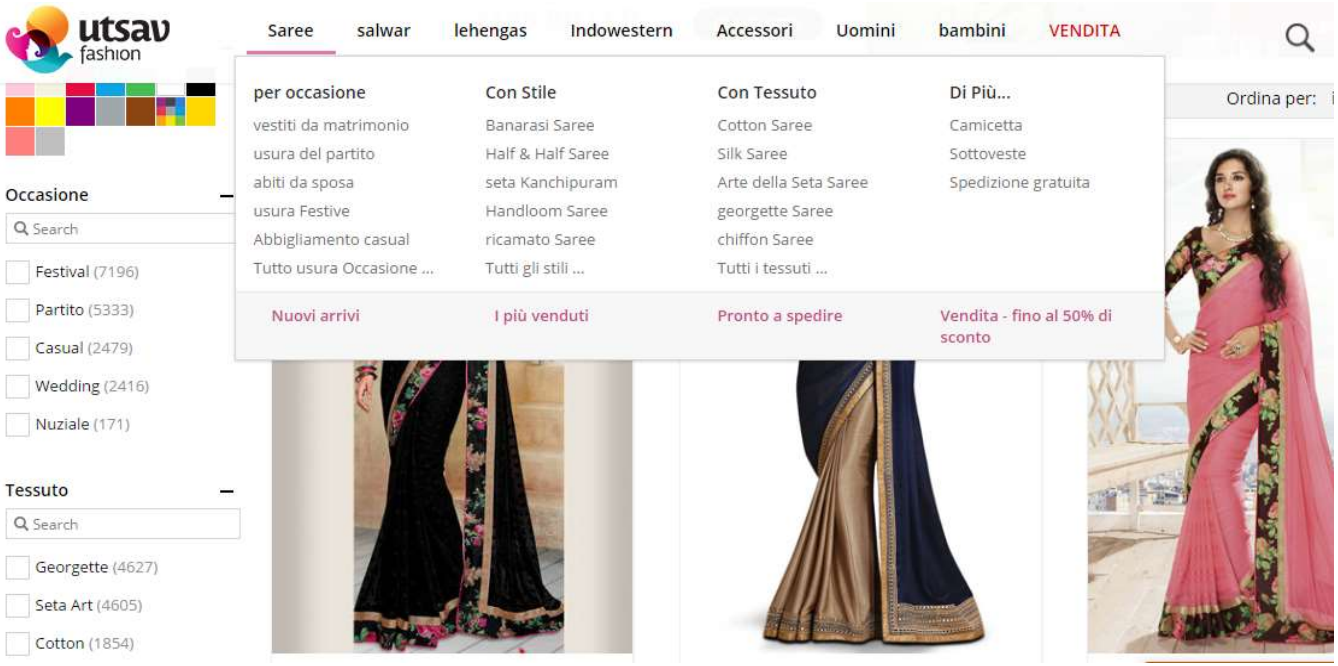
Classificazione multidimensionale

"Una signora che mandi il marito a comprarle un sari, difficilmente riuscirà a specificare colore esatto, motivo ed altri dettagli desiderati.

Quando invece il commesso del negozio le srotolerà davanti un assortimento di sari colorati, la signora riuscirà a fare la sua scelta con piena soddisfazione e senza perdite di tempo.

Così è con un lettore…"

S.R. Ranganathan 1967



www.utsavfashion.com/saree