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Introduction

Two relativity hypotheses



□ In 2005, Dan Everett published a paper, "Cultural constraints on grammar and cognition in Pirahā", in the journal *Current Anthropology*. This paper made him famous overnight, not only in the linguistic community, but in the general public, making it into the headlines of daily newspapers.

□Everett began his scientific life as an employee of the SIL (Summer Institute of Linguistics). The SIL is a missionary agency, founded by evangelic churches around the world, which sends people trained in field linguistics to populations whose language has not been completely or not at all described. These linguists have a double mission:

- > Writing a complete description of the language (grammar and dictionary);
- > Translating the bible into the language.



Pirahã

□ Thus Everett was sent to live with the Pirahā, a tribe of Amerindians, living in the Amazonia by the Maici river. The Pirahā tribe counts around 450 individuals, scattered in small villages along the Maici (spread on the 200 miles stretch of the river). There was no reliable grammar or dictionary for the Pirahā language and Pirahā are monolingual (their Portuguese is extremely limited). In other words, there was no interpreter, when Everett went to live with them in 1977.

Everett's paper

□In the paper that made him (in)famous, Everett claimed that there were several striking "gaps" in Pirahā culture and language:

≻ Culture:

Limited technology (bows and arrows), no creation myths, no rituals.



Linguistic gaps

□Syntax:

No movement (no passive), no recursion (no relatives, embedded genitives…), no grammatical number (plural/singular);

□Semantics:

> No quantifiers (some, a/l), no cardinals (one, two, many), no color terms.

An embracing principle...

- □ In addition, Everett claimed that all these specificities of Pirahā culture and language are not coincidental, but are rather a coherent set which can be deduced from or explained by a single overarching principle:
 - Immediacy of Experience Principle:
 "This principle states that formulaic language and action (rituals) that involve reference to nonwitnessed events are avoided" (E., 2008)
 - More generally, it enjoins "the restriction of communication to the immediate experience of the interlocutors" (E., 2005).

Criticisms

- Everett's paper was heavily criticized and all of his claims have been called into doubts, excluding the claim regarding technological culture.
- □Alternatively, some critics noted that these "gaps", taken individually, are not specific to the Pirahã culture or language.
- □Further criticism has been leveled against the IEP itself, to the effect that it does not predict the gaps described by Everett.

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- Ro'btar white (extended) 25 + + bi'i'sai' red/yellow 25 +		+++++	25 25	red/yellow	bi ³ i ^s sai ³	+
o a'hoa'saa'ga' green/blue (green- 25 + focused)		+	25	green/blue (green- focused)	a'hoa'saa'ga'	0



Kay's criticism

the color expressions?

□Regarding the existence of color terms in Pirahã, there are two issues:

- Are the color meanings consensual and applicable to unfamiliar objects (as well
- applicable to unfamiliar objects (as well as familiar objects)?
 Are the color meanings <u>not predictable</u> from the meanings of words that make up
- □Kay notes that, given Sheldon's data, the answer to the first question is clearly positive, though the answer to the second question is less clear.

The etymology problem...

- □Kay notes that there are plenty of languages in which the terms for red and green are related respectively to the terms for blood and immaturity.
- □More generally, Wierzbicka notes that Everett's gloses are debatable:
 - For instance, though etymologically the English verb understand is derived from the preposition under and the verb stand, it would not make sense to glose "Peter understands Japanese" as "Peter stands under Japanese" ...
 - And this seems to be just what Everett was doing!

IEP's predictions

- □ It is indeed hard to see why the IEP should predict (or explain) the lack of quantifier terms, cardinals or color terms:
 - All of these seem directly applicable to immediately experientiable states of affairs:
 - For instance, a// or some are applicable to perceptible situations (e.g. Xahoábisi ate a// the fish).
 - Some cardinals (one, two, many) are also directly perceptible due to subitization (the widespread ability to perceptually evaluate small quartities).

Culture to language

DEverett' s conviction regarding the IEP is that it merely mirrors a more general (and deep) influence of culture on language (including grammar):

Specific values (...), along with the directly biological values (like shelter, clothing, food, and health) act together to produce an integral whole of language and culture, by means of which we interpret and talk about the world". Everett, 2008.

In other words, Everett is advocating what I will call the *Relativity of Language to Culture* (RLTC) hypothesis.

An alternative hypothesis

The alternative hypothesis goes in the opposite direction:

- > It claims that language deeply influences our view of the world (our culture) and even our very perception of it.
- □I will call it the *Relativity of Culture to Language* (RCTL) hypothesis.



History of an idea

- □Sapir and Whorf (who was Sapir's student and disciple) were specialized in Amerindian languages of North America:
 - > Such languages do not have tenses;
 - This led Sapir and Whorf to the strong claim that Amerindians speaking those languages had no concept of time.
 - ≻ More generally…

Quotation of Sapir

□Human beings do not live in the objective world alone, nor alone in the world of social activity as ordinarily understood, but are very much at the mercy of the particular language which has become the medium of expression for their society... <u>The worlds in which</u> <u>different societies live are distinct</u> worlds, not merely the same worlds with <u>different labels attached</u>.

Sapir 1929.

Quotation of Whorf

□We dissect nature along the lines laid down by our native languages. The categories and types that we isolate from the world of phenomena we do not find there because they stare every observer in the face: on the contrary, the world is presented in a kaleidoscopic flux of impressions which has to be organized by our minds - and this means largely by the linguistic systems in our minds. Whorf 1956.

Two relativity principles

□These two relativity principles seem go in opposite causal directions:

- > RLTC:
- ♦ Culture →Language;
- ≻ RCTL:
- ◆Language → Culture.
- □However, the fact that they are opposite in causal direction does not mean that they are incompatible:
 - > They could simply apply to different parts of language or cognition at different times.

Nevertheless, the two principles have generally been considered as incompatible and have been discussed as mutually exclusive. Avoiding the triviality charge

General principles

- □The problem with general principles is that they can be too easily satisfied to be interesting, i.e. they can be trivial.
- ■Both RLTC and RCTL are general principles and, on that count, susceptible of the triviality charge:
 - > RLTC is too easily verified;
 - > RCTL can be weakly verified, in which case, again, it is too easily satisfied.

Triviality of RLTC

□Given the lack of definition of the term *culture* in Everett's claim, it is easy to show that the hypothesis is trivially true:

- Even eschewing technological innovation, words enter languages when new objects are introduced:
- For instance, European languages had no words for turkeys, potatoes, tomatoes and maize before the discovery of America in 1495.

□Clearly this is not what Everett had in mind:

 Rather, he thought more of something on the lines of cultural values (as shown by the IEP)

Triviality of RCTL

□RCTL can be read in two ways:

- > Weak reading:
 - Having a word for something will enhance your attention to it and will make you better at discriminating it;
- > Strong reading:
 - It is only if you have a word (or some other linguistic construction) for a thing that you can perceive it.

□Clearly both Sapir and Whorf intended the strong interpretation (and indeed the weak interpretation is both trivial and not specific to language).

Choosing the right

field…

Linguistic variation is rather more limited than Sapir and Whorf thought.

□Three main domains of variation have been identified:

- > Space:
 - Languages vary relatively to the reference frames (egocentric, intrinsic or absolute) they use:
- ≻Time:
- Languages vary relative to the tenses they include:
- > Color terms:

*Languages vary relative to the color terms

Space

- □Space is the wrong choice because, as shown by experimental studies, it leads to the trivialization of both the RLTC and the RCTL hypotheses:
 - Some languages exclusively use the absolute frame of reference (using the cardinal points):
 - That choice seems to occur only in populations living in areas where the geography gives strong clues to the cardinal points:
 Triviality of RLTC:
 - Experimental studies indicate that such populations have a preference for the use of the absolute frame in non-linguistic tasks, but not that they cannot use other frames:

Time

- □A main problem with the perception of time is that it is difficult to isolate precisely the effects of language from other possible effects linked, for instance, to technological instruments for the measure of time.
- $\Box A$ second important problem is that it is not clear what exactly would be meant by a claim such as "Population x does not have the same concept of time as population y".
 - This has to do with the fact that the concept of time is anything but clear, as was noted by Augustine of Hippo in his

□For what is time? Who can consider and briefly explain it? Who even in thought can comprehend it, even to the pronouncing of a word concerning it? But what in speaking do we refer to more familiarly and knowingly than time? And certainly we understand when we speak of it: we understand also when we hear it spoken of by another. What, then, is time? If no one asks of me, I know: if I wish to explain it to him who asks, I know not…

Augustine of Hippo, circa 450.

Color terms

□The field of color has three advantages:

- > Its perception seems to be biologically
 based;
- > Colors are immediately perceptible;
- > It is susceptible of categorical perception.

□Additionally,

Colors have been widely studied in the past fifty years and it is thus time to review the evidence and assess whether it supports either the RCTL or the RLTC hypothesis, none of them or both.

Color perception in animals



The color vision of most mammals is *bichromatic* (blue yellow).

The color vision of most primates is *trichromatic* (blue yellow - red).

Colors or black and white…



We, primates…

…and the other mammals!

Discrete or continuous stimuli



Confronted by discrete stimuli, you can ask whether they belong in the same category, but you don't have to worry about how to distinguish the individuals.



Categorical perception

□ Categorical perception is defined as what happens "when stimuli that straddle a category boundary are perceived as more distinct than equivalently spaced stimuli within a category"

Kay & Regier, 2006.



Linguistic variation

- Differences in color terms between languages can be of two sorts:
 - > Not the same inventory of color terms
 (but common boundaries);
 - > Not the same boundaries between color terms.

Three questions

- □ Is the partition of the colored spectrum universal (identical through languages and cultures)?
 - \succ From the partition in different languages.
- Does categorical perception of colors depend on language?
 - > From prelinguistic infants;
 - > From cerebral lateralization of categorical
 perception.
- □ Is categorical perception arbitrary?





Using the Munsell scale

□Subjects are asked to perform two complementary tasks:

- >Name the color when presented with a swatch (for all the 330 swatches in the scale):
 - This makes it possible to identify the color boundaries for the language;
- Show the best exemplar for a given color on the Munsell scale:
- This makes it possible to identify the "centroid" (or prototype) for the color.

Berlin & Kay

- □In the 60s, Brent Berlin, an anthropologist, and Paul Kay, a linguist, collaborated on a study of color terms in different languages.
- They reached the conclusion that color perception was universal:
 - > Everyone cuts up the color spectrum in the same way;
 - However, languages don't have the same set of color terms:
 - Nevertheless, they all follow the same pattern.





Three types of The two Russian blues variation □ The number of categories (all are not necessarily realized in a language), and when they are not all expressed, two or more different categories are grouped together in a single category (blue/green - grue). □A category is subdivided (in violation siniv of the hierarchy). go luboy The boundaries between color terms vary from one language to the next. Winawer et al. 2007





In other words, it seemed that Berlin & Kay had got things partly wrong…

The World Color Survey

Among the criticisms leveled at Berlin & Kay's model, was the fact that their original survey had been based on languages from industrial countries. This spurred the WCS, initiated by Kay and Stanford University.

The World Color Survey The WCS has collected data on color terms in 110 languages spoken by non industrial populations from 2616 informers most of them monolinguals, using the Munsell scale. Each informer named each of the 330 swatches (presented individually in a

- > Each informer had to indicate, for each color term in his language, the best





Limited effects

Additionally, despite the relative specificity of the color lexicon (3 chromatic terms) of Berinmo, the effects seem limited:

- > In no cases is color perception affected.
- > What is affected, however, are:

✤ Memory;

 Categorical perception (quickness of discrimination).

Boundaries and centroids

□The results of the WCS go into different directions:

> Color boundaries may differ importantly
 (as shown by the Berinmo example);

Color centroids, on the other hand, tend to gather together (even Berinmo centroids).











- A. Lateral view.
 B. Areas of the brain showing a stronger activation in the different-category condition than in the identical-category
- condition. C. Areas of the brain showing a significantly slower activation in the identical-category condition than in the



Siok, Kay et al. 200









Change of lateralization Dame paradigm.

- □Subjects (2 to 5 year-olds) divided in two groups:
 - > "learners" (mean age: 32 months);
 - > "namers" (mean age: 46 months);
 - ◆On the basis of linguistic tests:
 - ◆ Naming the color of a swatch;
 - ◆ Showing a swatch from a name.



In other words, categorical perception for colors exists in prelinguistic infants and is lateralized in the right hemisphere. With lexical acquisition, it is relateralized in the left hemisphere













Fig. 2. Sample display for the visual search task with a between-categories stimulus pair. Participants were required to press one of two response keys, indicating the side containing the target.





□Given that there is no categorical perception involved in categorizing cats and dogs (dogs and cats do not form a continuum), it is doubtful that the lateralization data on colors is directly related to categorical perception.

- □But if lateralization is independent of categorical perception, and if it also exists for categories which are clearly universal, it does not in fact support the RCTL hypothesis.
- □In fact, it merely supports the link between (lexicalized) concepts and language.
- □So the only remaining evidence favoring the RCTL is the (limited) variability for color terms in languages

Color variability in languages

Universality and differences

□ "The empirical literature suggests that, on the one hand, there is a good deal of universality in color categorization across cultures, whereas on the other hand, a considerable amount of variation is also observed"

Komarova & Jameson 2008

Two sources

- □Here we come back to the RLTC (relativity of language to culture) and two sources for variability in color lexicons come to mind:
 - > Observer heterogeneity:
 - Differences in people's abilities to discriminate colors may lead to differences in the color lexicon.
 - > Color space:
 - Differences in the colors available in the environment make a difference for the color lexicon:
 - In fact, this was the rationale for the WCS' s concentrating on languages from nonindustrial populations.

Perceptual variation

- □One of the more striking results of the WCS is the variability between subjects speaking the same language:
 - In that case, the variability is not linguistic (they speak the same language), but perceptual:
 Not everybody perceives the same Munsell swatch in the same way.
- □Incidentally, this goes rather <u>against</u> the RCTL, but possibly in favor of the RLTC.



Genetic factors…

- □Colored perception is genetically determined:
 - There are sexual differences:
 Women are better discriminators of colors than men.
- □In a small and isolated population (which is often the case of preindustrial populations), even recessive genes can have an important effect.
- □Komarova et Jameson (2008) have shown that even a small number of individuals with atypical colored perception is enough to induce a variation in color boundaries in a given language.

Environmental factors

- □ In preindustrial populations, there are generally fewer artifacts than in industrial populations.
- □Artifacts are an important source of colors.
- □In preindustrial populations, the colors available in the environment (the color space) are limited.
- □ It is likely that it is precisely the small number of colors available in the environment, which produces the often relatively poor repertory of colors in



RLTC and RCTL

RLTC:

"Specific values (...), along with the directly biological values (like shelter, clothing, food, and health) act together to produce an integral whole of language and culture, by means of which we interpret and talk about the world".

RCTL:

"The worlds in which different societies live are distinct worlds, not merely the same worlds with different labels attached".

The evidence...

□RCTL:

 As we have seen before, the evidence at best favors the weak reading of RCTL:
 Language makes it easier to discriminate those categories that are expressed in the language;

RLTC:

- > Again, the evidence at best verifies the trivial reading of RLTC:
- Environment and material culture influence the existence of words for important objects in the environment.

When it comes to the weak reading of RCTL or to the trivial understanding about RLTC, they seem to come to about the same thing: customary objects and actions tend to go into language and are facilitated...

Should we abandon RCTL and RLTC?

- □It is always difficult to interpret negative evidence, especially when it is limited.
- The present data is limited to color.
- □ The WCS is limited to 110 languages, while there are 6912 known languages in the world (Gordon 2005).
- □Some cases may turn out where either or both of the RLTC and RCTL are verified in their nontrivial forms.

Top-down influences

■Basically, both the RCTL and the RLTC in their non-trivial forms assume that there can be top-down influences from culture on language and from language on discrimination and perception.

□So, a relevant question is:

> Is there any evidence of such top-down influences on perception?

Data from perception

□There is indeed a lot of evidence from the perception literature showing that we don't see things which are in full view:

- ➤ Change blindness;
- > Inattentional blindness;
- > Contextual blindness.

Change blindness



Inattentional blindness

- □Inattentional blindness occurs when attention is focused on a perceptual task and leads to ignoring what is irrelevant to the task:
 - This was demonstrated spectacularly by Simons & Chabris (1999) who presented subjects with a video showing 6 students in a hall, 3 dressed in white, 3 in black, exchanging balls (each "team" had one):
 - They asked the subjects to count the number of passes made by the players dressed in white:



Contextual blindness Expectations influence what we see. RAF





RLTC and **RCTL**

□These data show an influence of higherlevel processes (attention, expectations, etc.) on perception:

> This would be in favor of RLTC and RCTL.

Material engagement theory

□ "Material engagement theory considers the processes by which human individuals and communities engage with the material world through actions that have simultaneously a material reality and a cognitive or intelligent component. It is concerned with actions that are meaningful and purposive. People's purposes as knowledgeable agents are the result of social motivations that arise in relation to a person's worldview. So these actions are at once both physical and mental'

Renfrew 2007

 \Box "In humans, such actions are based (…) upon culturally determined patterns of learned behavior that are themselves the product of human experience and innovation over long trajectories of time. Such actions may be regarded as the result of human agency"

Renfrew 2007.

- □This permeates human life, from the most daily actions to the rarest ones (material culture):
 - > Politeness, tools, food, buildings, etc.; ≻Rituals, institutions (religion, government, etc.);
 - Worldviews (including cosmological

For instance, for **RLTC**····

□Renfrew reports that:

> The high cultures of Mesoamerica believed that the world was divided in four quarters, each associated with a color (red, black, yellow, or white), with the center of the world (blue or green) divided by the path of the sun along an east-west main axis. The cosmos was divided between sky and earth: it was a realm imbued with sacred forces, such as lightning.

Renfrew, 2007.

RLTC

- □RLTC makes sense on the material engagement theory.
- □It makes the existence of single overarching principles such as Everett's IEP rather unlikely:
 - > One would more expect a whole set of circumscribed principles, each specific to a domain (economic exchanges, wedding, food, etc.) as the result of an accumulation over long periods of time.
 - However, such an accumulation might well have an effect on language, which in its turn might have an effect on categorization, discrimination and perception.



However...

However the top-down influences on perception examined above are <u>contextual:</u>

- > They do not make us blind to gorillas or to sofas in general:
 - If we are not focused on a task in the gorilla video, we do see the gorilla;
 - And of course, we do see sofas in normal environments.





