Blu, Azzurro, Celeste - What color is blue for Italian speakers compared to English speakers?

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1. Introduction

The objective of this paper is to ascertain contemporary Italian linguistic categorization of the macro-color concept BLUE, and compare the results to English interpretation of the same tasks. Native Italian speakers affirm that they habitually use three blue color terms: *blu*, *azzurro*, and *celeste*; often idealizing *azzurro* over *blu*, as being "more Italian". I propose that according to the task results contemporary *blu* [blue] is the more primary and deeply entrenched basic color term (henceforth BCT); *azzurro* [azure - light blue] could also be a BCT, but should be considered a secondary BCT; and *celeste* [sky blue - pale blue] is a subordinate color term. English interpretation of the same color object/concept associations is different due to the lack of a second English monolexemic basic BLUE color term and to the difference in culturally specific BLUE color term collocations. What are the Italian blue term semantic relations? Do *azzurro* and *celeste* violate the criterion that a BCT not be a hyponym of another color word, *i.e*., *blu* [1]? Does the semantic relation respond to the cognitive need to differentiate between the colors of the sky and the water? Is the principal task color term object/concept association, based on the cognitive linguistic approach to linguistic entrenchment, an original valid method to measure basicness? Various verification measures of basicness are employed to answer these questions.

2. Background

The color spectrum is partitioned into different color terms according to language and the corresponding culture. Color lexemes evolve dividing the color space into more specific concepts. Current research, since Berlin and Kay, generally considers BLUE to be the last primary BCT to emerge in language. Some languages present a variation of BLUE terms; often displaying two functionally distinct blue terms; one for a generic BLUE -primary BCT- and one for a more specific BLUE -secondary BCT- tonal variation. The possibility of there being a twelfth BCT has been theorized by [1][2]. Researchers have proposed a twelfth BCT as being another "tone of blue" —also referred to as dual lexicalization of BLUE— in different languages *e.g*., Italian, Maltese, Greek, Polish, Russian, and Turkish, [3][4][5][6]. BCT criteria are listed as: i. it is monlexemic, ii. its signification is not be included in that of any other BCT, iii. it must not be restricted to a narrow class of objects, iv. it must be psychologically salient, i.e., occur at the beginning of elicited lists of color terms, and have stability of reference across informants and occasion of use, v. if doubtful it should have the same distributional potential [1]. Two specific BCT criteria interest this study: v. the same distributional potential, and the problematic iii. its meaning must not be hyponymic.

The definition of each color term provides an initial idea of what they are understood to mean, and in what contexts the meaning can vary. In some

dictionaries [7] [8] *blu* is defined as a dark *azzurro*, used with the expressions: *cielo blu* [blue sky], *mare blu* [blue sea] | *avere sangue blu* [have blue blood]; though it is translated as blue, dark blue, and navy blue. *Blu* is more productive, BLUE compounds in Italian are currently constructed with *blu* + another term, *e.g.*; *blu marina* [navy blue]. There are only three entries of *blu* lexemes in the Italian dictionary [10]. *Azzurro* is defined as the color of a clear sky, somewhere in between *celeste* and *turchino*; translated with blue, light blue, azure, sky blue; with expressions such as *occhi azzurri* [blue eyes] | *principe azzurro* [the ideal groom, a prince in shining armor] | *gli azzurri* the Italian national sport team color, | *azzurro* del *cielo* [the blue of the sky]. *Azzurro* is sited as synonymous with *blu* [blue], *celeste* [sky blue], *turchese* and *turchino* [turquoise], and *pervinca* [periwinkle]. It entered Italian before *blu* and is listed with over eleven entries in the dictionary, including a verb form: *azzurrare* [7][8]. *Celeste*, translated as sky blue, light blue, baby blue, azure, is defined as analogous to *azzurro*, specifications of which are *celestino* [pale blue], and *acquamarina* [7][8]. There are only two dictionary entries with the color root *celest-* [9].

The principal test of this study was developed to apply a cognitive linguistic approach to verify the level of entrenchment of the color term object/concept association. The multiple senses of color terms create a network that is accessed and elaborated online for the speaker to identify the meaning of the color term in use. The identification of color term entrenchment should measure distributional potential and level of basicness. This approach was developed following Langacker [10] and other cognitive linguists who sustain a functional approach to linguistic investigation. They acknowledge the grounding of language in embodied experience and social interaction, insisting that this interaction is critically dependent on conceptualization. Conceptualization is once again constrained by four aspects: human cognitive capacities, the nature of reality, convention, and context [11]. Therefore, meanings experienced more often, will be encountered more frequently in specific contexts or associations, and will in turn become more entrenched and conventionalized.

3. Methodology

This study was carried out in five different phases. Each phase had a specific objective and served to confirm or contradict the various results. The first, and most pertinent, phase was the BLUE color association test; constructed to verify color term distributional potential. The second phase was the same BLUE color association test translated and presented to native English speakers, to verify the cross linguistic saliency of the color object/concept association. The third phase comprised a color-list task to confirm the three BLUE color terms' cognitive saliency. The fourth phase was a color-patch naming task; and the fifth phase was a "kind of" survey to verify informant signification and stability of reference. The Italian informants were students at the University of Perugia, they were from mixed regional backgrounds of Italy. The English informants were a variegated group of native speakers.

The first and second phase tasks asked informants to associate 10 BLUE color terms to 38 different prototypical object/concepts. This task was carried out by two groups of Italian university students (49 and 48) for a total of 97 informants (mean age 23).

A comparison group of 15 native English speakers responded to the same task translated into English (mean age 45). A paper questionnaire was handed out to the class of students. One page contained the instructions and one page the list of items with a blank box next to it, where the informant wrote one of the 10 color terms. There was no time limit. Informants took no more than 15 minutes.

The prototypical object/concepts used as stimuli in this task were selected from online dictionaries, databases, and idiomatic expressions, which were double checked through google and confirmed for frequency. The ten colors selected to associate with the stimuli were the three most frequent terms *blu*, *azzurro*, and *celeste*, with four inflected color terms: *blu-astro*, *azzurr-ognolo*, *azzurr-ino*, and *celest-ino*, with three other salient BLUE color terms, *turchino*, *oltremarino*, and *indaco*. All of these terms except *azzurrognolo* appeared later in the listing task.

The third phase, the color-list task, was carried out by 65 university students (mean age 22). It aimed to verify the cognitive salience of the three BLUE terms. This task was based on Davies and Corbett [12]; informants were asked to write down as many color terms as they could in five minutes. The data were then analyzed following the cognitive salience index elaborated by Sutrop [13], taking into account two important aspects of BCT criteria: term frequency and mean position. The cognitive salience index is calculated: S = F/(N x mp), where S is salience, F is frequency in the lists, N is number of informants, and mp is mean position rank.

The fourth phase, the BLUE color-patch naming task, was carried out in a darkened room with a projection of numbered color patches presented on a screen. The stimuli were presented one at a time. They remained on the screen for 10 seconds. 30 informants (mean age 26) wrote the color names in the box next to the slide number. The 30 color patches were set to color RGB parameters distinguished by Maroney [14]. There were the same 10 BLUE color patches. The informants were tested twice on different occasions to verify the within-subject consistence of naming.

The fifth phase of this study, the "kind of BLUE" was carried out by a group of 30 informants (mean age 26). They were asked which BLUE was a kind of BLUE, combining the three terms, *blu*, *azzurro* and celeste, in couples, *e.g.*, Is *azzurro* a kind of blu? The informants answered yes or no.

4. Test Results

"Color association" task results data are presented in percentages in Figures 1 and 2. The total 3686 responses given by 97 Italian informants resulted in 30% of the objects associated with *blu* (blue), 7% *bluastro* (blue-grey), 19% *azzurro* (light blue), 4% *azzurrognolo* (dull bluish), 4% *azzurrino* (light bluish), 11% *celeste* (sky blue), 5% *celestino* (pale blue), 5% *oltremarino* (ultramarine), 7% *turchino* (turquoise), 6% *indaco* (indigo), and 3% no answer. If we group the terms according to tone (dark, medium, light) the division becomes 48% *blu*, 34% *azzurro*, and 16% *celeste*. The spread between the three predominant BLUE color terms does not vary significantly, and the rank remains unchanged. Fig. 2 shows marked differences in English association percentage with *blu, bluastro*, *azzurro*, *celeste*, and no answer.

Figure 3 presents the total Italian results, each color term and the 38 associated items. Each item is presented in Table 1 with the color term with the highest percentage of associated object/concepts agreement, including both the Italian and

the English results. The object/concepts associations with the highest percentage of agreement are: 85% *sangue blu*, 84% *fata turchina*, 82% *principe azzurro*, 78% *caschi blu*, 70% *jeans blu*, 64% *Madonna celeste*, 63% *bollino blu*, 63% *tute blu*, 59% *fifa blu*, 57% *telefono azzurro*, 55% *cielo azzurro*, 55% *fiocco azzurro*, 54% *strisce blu*, 52% *camicia celeste*, 51% *machine blu*, 50% *mare blu*, 51% *pesce azzurro*. Of the 38 object/concepts, the number that were mostly associated with a specific color are 19 with *blu*; 10 with *azzurro*; 2 with *celeste*; 2 with *celestino*; 2 with *turchino*; 1 with *azzurrino*, 1 with *bluastro*, and 1 with *oltremarino*. The most prototypical object for *blu is sangue* (85%); for *bluastro* is *fumo* (38%); for *azzurro* is *principe* (82%), for *azzurrognolo* is *fumo* (21%); for *azzurrino* is *airone* (23%); for *celeste* is *Madonna* (64%); for *celestino* is *nuvole* (23%); for *oltremarino* is *sale* (39%); for *turchino* is *fata* (84%) and for *indaco* is *tute* (12%). The English translation of the object/concepts may be found in Table 1.

A significant result was also the similarity of responses between the two groups, even though within the group there were significant differences in color/object association. 59% (169 of 380) of possible color-object/concept associations were made by the same number or ±1 of informants in each group separately, *e.g*., caschi and *blu* were associated by 38 people in the first group and 38 in the second *group*; *cielo azzurro* was associated by 26 and 27. And only 4% (17 of 380) of the associations made by the two groups were different by >5 of the number of informants, *e.g*., *Madonna celeste* was associated by 27 and 35.

Table 1 also shows the percentage of association results for English. The results are significantly different. The highest agreement was 80% for blue flag, 73% for sky-blue sky, blue team, grey-blue heron, and grey-blue smoke. Only 29% (11 of 38) color object/concept associations were the same in both languages, and the percentages varied notably; the number of no answers is relevant in color association saliency. Table 1 lists the change of the color term associated next to the item and the percentage of agreement. The difficulty in responding by the English informants clearly indicates the lack of cultural entrenchment of the Italian prototypes.

"Color-listing" task results reveal two cognitively important aspects: the term frequency and position in the list. Following Sutrop (see 3.2.) color term basicness is estimated independent of the length of any particular list; see results in Table 2. The color term is given followed by frequency in the lists of the 65 informants, and the corresponding rank; the mean position in each list and the corresponding rank; the cognitive salience index and the final cognitive salience rank. The rating of *blu* in fourth position, *azzurro* in ninth, and *celeste* in thirteenth, corresponds in essence to the results acquired through the cognitive linguistic association task.

"Kind of BLUE" task responses show 93% of Italian informants responded affirmatively to *azzurro* as a kind of *blu*, and 100% affirmed that *celeste* is a type of *blu*, but *blu* is not a type of *azzurro* nor celeste. Only 10% of informants claimed that celeste was a type of *azzurro*.

"Color-patch naming" results show that 6 of 10 BLUE color patches were called *blu* by the majority of the informants (not *azzurrino*, *celeste – celestino*, nor *turchino*). The patch considered *blu* was judged *blu* by 94%, *azzurro* was judged *blu* by 74%, *azzurrino* was judged *azzurro* by 60%, *celeste* was judged *celeste* by 80%. The half tone *azzurrognolo* was judged *blu* by 80%, *bluastro* was judged *blu* by 65%,

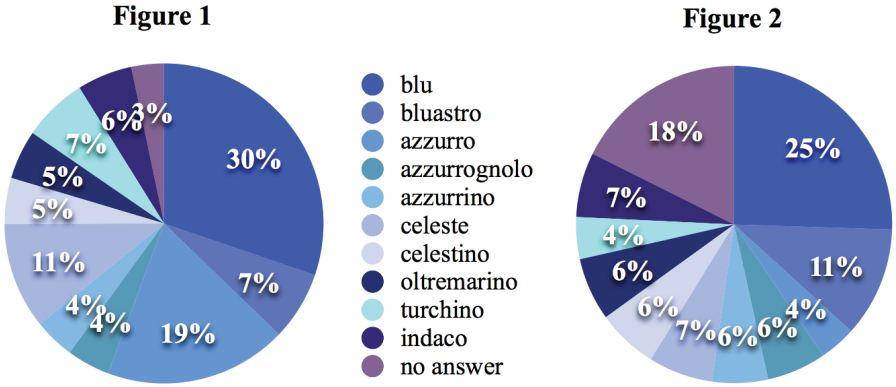

Fig. 1 - Percentage of Italian BLUE color association of 38 objects by 97 informants.

Fig. 2 - Percentage of English BLUE color association of 38 objects by 15 informants.

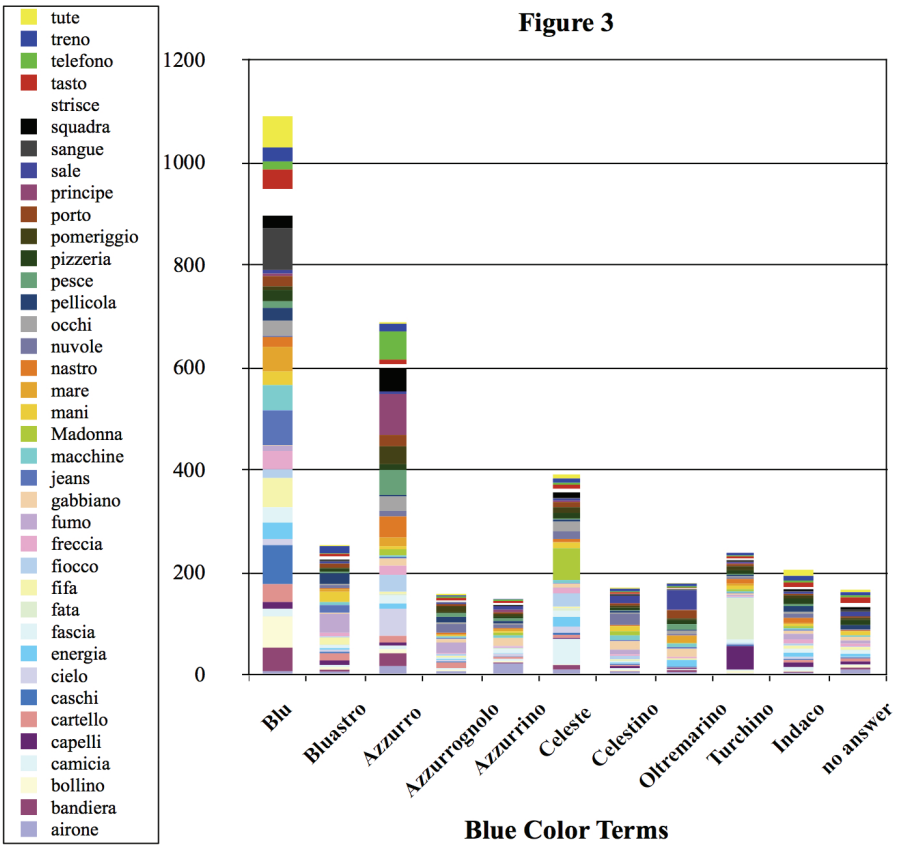

Fig. 3 - Italian BLUE color term 38 object/concept associations by 97 informants.

Rank Ital. Ass. 38 obj/conc.	Object/concept in Italian	Color max. agreement	% agreement Italian	% agreement English	Object/concept in English
1	***sangue***	***Blu***	**85%**	47% blue	blood
2	***caschi***	***Blu***	**78%**	27% blue	helmets
3	***jeans***	***Blu***	**70%**	47% indigo	jeans
4	***bollino***	***Blu***	**63%**	47% blue	sticker
5	***tute***	***Blu***	**63%**	**53% blue**	**collar**
6	***fifa***	***Blu***	**59%**	33% no answer	fear
7	***strisce***	***Blu***	**54%**	40% blue	lines
8	***macchine***	***Blu***	**51%**	40% blue	cars
9	***mare***	***Blu***	**50%**	33% azure	sea
10	*bandiera*	*Blu*	47%	**80% blue**	**flag**
11	*tasto*	*Blu*	39%	27% no answer	button
12	*freccia*	*Blu*	37%	33% no answer	arrow
13	*cartello*	*Blu*	36%	**53% blue**	**sign**
14	*energia*	*Blu*	33%	27% ultramarine	energy
15	*fascia*	*Blu*	31%	**60% no answer**	**band**
16	*occhi*	*Blu*	30%	40% pale blue	eyes
17	*treno*	*Blu*	28%	47% no answer	train
18	*mani*	*Blu*	27%	27% blue	hands
19	*pellicola*	*Blu*	26%	33% no answer	film
1	***principe***	***Azzurro***	**82%**	33% blue	prince
2	***telefono***	***Azzurro***	**57%**	27% blue	phone
3	***cielo***	***Azzurro***	**55%**	**73% sky blue**	**sky**
4	***fiocco***	***Azzurro***	**55%**	33% blue	bow
5	***pesce***	***Azzurro***	**51%**	40% ultramarine	fish
6	*squadra*	*Azzurra*	47%	**73% blue**	**team**
7	*nastro*	*Azzurro*	42%	20% sky blue	ribbon
8	*pomeriggio*	*Azzurro*	36%	27% sky blue	afternoon
9	*pizzeria*	*Azzurro*	23%	47% no answer	pizzeria
10	*porto*	*Azzurro*	23%	27% ultramarine	port
1	***Madonna***	***Celeste***	**64%**	27% no answer	Madonna
2	***camicia***	***Celeste***	**52%**	40% blue	shirt
1	*nuvole*	*Celestino*	23%	33% pale blue	clouds
2	*gabbiano*	*Celestino*	18%	**60% grey-blue**	**seagull**
1	***fata***	***Turchina***	**84%**	20% light blue	fairy
2	*capelli*	*Turchini*	47%	20% blue	hair
1	*airone*	*Azzurrino*	23%	**73% grey-blue**	**heron**
1	*fumo*	*Bluastro*	38%	**73% grey-blue**	**smoke**
1	*sale*	*Oltremarino*	39%	27% pale blue	salt

Tab. 1 - The maximum percentage of informant agreement on the color associated with each of the 38 object/concepts. Grey for same color-object/concept association in both language groups; bold for majority.

Color Name	Frequency	Frequency Rank	Mp	Mp Rank	Cognitive Salience Index	Cognitive Salence Rank
rosso	63	3	3.71	11	0.2612	1
giallo	62	4	4.70	13	0.2029	2
verde	61	5	5.42	14	0.1731	3
blu	60	7	6.03	18	0.1531	4
nero	64	2	7.89	22	0.1248	5
bianco	64	1	8.28	24	0.1189	6
arancione	58	9	8.48	25	0.1052	7
viola	61	6	9.61	30	0.0977	8
azzurro	54	11	9.59	29	0.0866	9
rosa	54	12	9.66	31	0.0860	10
marrone	60	8	11.16	37	0.0827	11
grigio	58	10	11.34	38	0.0787	12
celeste	44	13	10.63	34	0.0637	13
lillà	34	15	13.38	50	0.0391	14
fucsia	37	14	15.10	63	0.0377	15
indaco	29	18	12.96	48	0.0344	16
beige	30	16	15.20	64	0.0304	17
oro	30	17	15.93	71	0.0290	18
porpora	20	21	13.70	51	0.0225	19
rosso bordeaux	20	22	14.20	55	0.0217	20

Tab. 2 - First 20 colors in color listing - cognitive salience rank of 65 informants. Grey background for BLUE terms.

oltremarino and *indaco* were judged *blu* by 67%. Color referents for the color patches used in this task correspond to the legend in Figures 1 and 2.

5. Conclusion

As expected BCT's can be distinguished from non-BCTs by the high scores on the first phase task distributional potential and the third phase task cognitive saliency, and the fourth and fifth phase task significations and stability of reference results. The use of a specific set of the 10 most common BLUE terms in Italian and the lack of restrictions between BCT and non-BCT provided a mode of testing the relationship between the three most common BLUE terms: *blu*, *azzurro*, and *celeste*. The subordinate terms were associated less often than the BCT term(s). Moreover, the use of all the terms determined a decrease at the expense of the more specific terms. This provided a further check on robustness and stability of the BCT terms.

In the past *azzurro* has been used as the prototypical basic blue, Grossman [15] identifies it as the BLUE *arcilessema* and translates blue with it. Diagrams and color systems published in the past translated labels and indications of blue with *azzurro*; contemporary texts translate blue with *blu*. This study lends support to the claim that there has been a semantic shift in BLUE lexicalization. I argue that *azzurro* was previously the Italian BLUE primary BCT. It has been present in Italian for longer and has diachronically developed a more elaborate grammaticalization. It no longer demonstrates the same saliency, however, as it did in the near past. Summarizing,

azzurro was identified in this study as a type of *blu*, and *celeste* was not identified as a type of *azzurro* by the study informants. Though they may be considered synonyms, there is a different degree of inclusion in contemporary Italian; the hypernym is now shifted to *blu* and the hyponyms are *azzurro* and celeste. In this sense, according to the "non hyponym" BCT criteria *azzurro* would not be a secondary BCT. Considering, the first phase task, however, a more dynamic analysis of color term entrenchment, and an apparently valid measure of basicness and "distributional potential", *azzurro* still has robust associations and collocations in both conceptual metaphoric and metonymic extensions. For example, the informants associated the sea with *blu*, the sky with *azzurro*, blood with *blu*, eyes with both *blu* and *azzurro*, and the prince with *azzurro*. The results of the four phases of this study converge to suggest that contemporary Italian use of BLUE color terms reveals a twelfth BCT, a tone of BLUE. *Azzurro* has not yet been pushed out of basicness, but may be on its way. It still has a high cognitive salience rank. Furthermore, the tasks verify current Italian conceptualization and dual lexicalization of BLUE as language specific and not corresponding to English.

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