COLOR INTELIGENCE: HUMAN SKIN DATA ANALYSIS FOR DEVELOPMENT OF TINTED COSMETIC PRODUCTS FOR BRAZILIAN MARKET

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1 INTRODUCTION

The development of tinted sunscreens is challenging as they form a translucent film, having the skin colour an important role on the final product appearance over the skin.

The Brazilians skin is diverse due to the high ethnical interbreeding of the population. In addition, there is a crescent need to be more inclusive and to provide the most adapted shades range to the consumers. Indeed, the development of tinted sunscreens that best suit the user's skin colour has become even more demanding.

Over the past few years, L'Oréal Brazil has built knowledge about Brazilians' skin by performing instrumental measurements, generating a huge and alived database. The aim of this study is to use the skin colour database to do predictive analysis and to guide the decision-making process, in a more precise way, for the shades range of tinted sunscreens development.

2 MATERIALS AND METHODS

Data from many studies conducted with subjects living in 3 different regions of Brazil were consolidated and a skin colour database was organized. Each subject had its skin colour cluster classified from I to VI, according to their individual typological angle (ITA°). Then, the CIELAB values were treated and plotted in a graph, according to the L*a*b* space, representing the average values for the different skin colour clusters.

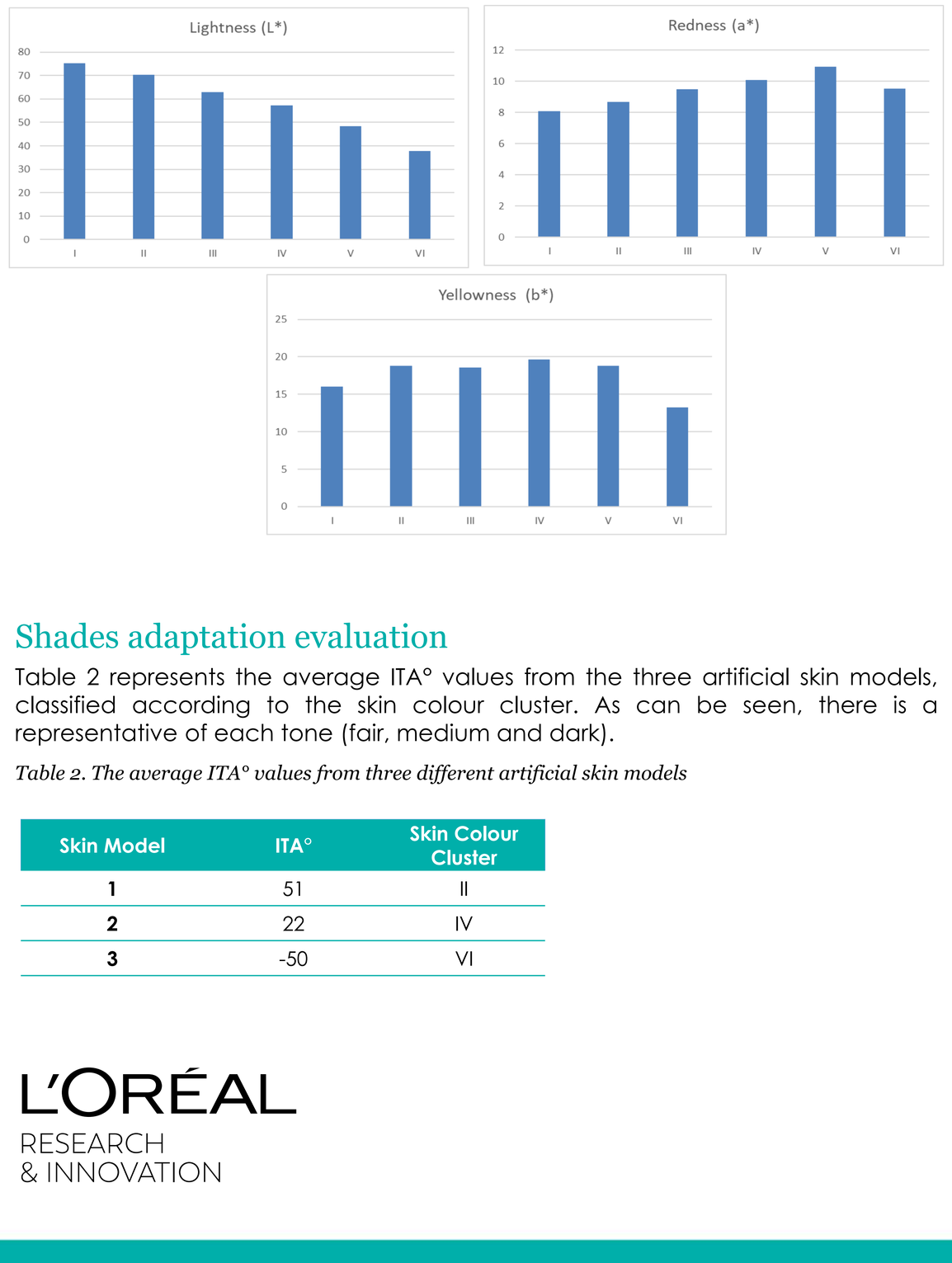
The sunscreen prototypes with different shades were applied to artificial skin models presenting different tones (fair, medium and dark) and measurements were performed before and after the application. The data from artificial skin models without product was collected and plotted in the Brazilian skin colour-based graph to determine the skin colour cluster they shall be classified . Then, the impact that each shade promoted in the L*a*b* coordinates was calculated and extrapolated for all the population of a given tone cluster. Finally, the chosen shades were assessed in a clinical study, combining instrumental assessment and consumers evaluation based on their corresponding skin clusters.

3 RESULTS & DISCUSSION

Skin colour distribution

Figure 1 represents the average values of all individual participants in CIELAB L*a*b*, according to the different skin colour clusters. As expected, the darker the skin tone, the lower the L* value. Also, for these individuals it is observed a higher redness, demonstrated by the increase of a* values.

Figure 1. Average CIELAB values of different skin colour clusters



Shades adaptation evaluation

Table 2 represents the average ITA° values from the three artificial skin models, classified according to the skin colour cluster. As can be seen, there is a representative of each tone (fair, medium and dark).

Table 2. The average ITA° values from three different artificial skin models

Skin Model	ITA°	Skin Colour Cluster
1	51	II
2	22	IV
3	-50	VI

The skin model 1 represents a subject from the skin colour cluster II (fair skin tone group), the model 2 represents a subject from the skin colour cluster IV (medium skin tone group) and finally the skin model 3 represents a subject from the skin colour cluster VI (dark skin tone group).

The change that each prototype promoted in the colour coordinates from the artificial skin models can be seen at table 3.

Two options for the light shade was tested using the skin model 1. The prototype A has demonstrated to be more adapted for the lightest skin tone as the deltaE was lower. On the other hand, the prototype B presented higher delta E value, promoting a high skin color change. This prototype would be more adapted for medium skin tones.

The prototype C was tested in the skin model 2 and also promoted changes on the skin color, mainly due to the yellowing. This prototype would be more adapted for skin cluster V for example.

The prototype D presented the lowest color modification (ΔE) compared to the other prototypes. This shade would have a good adaptation to the darker skin tones.

Table 3. The average change caused by 4 prototypes to the artificial skin models

Prototype	Skin Model	ΔL*	Δa*	Δb*	ΔE
A (Light Shade)	1	-1.3	-0.1	3.5	3.7
B (Light Shade)	1	-2.1	3.6	7.9	8.4
C (Medium Shade)	2	2.3	0.8	5.2	5.8
D (Dark Shade)	3	1.5	-0.6	1.9	2.3

4 CONCLUSIONS

The analysis allowed us to better predict the skin clusters that should be included in a clinical study as well as to indicate formulas that are suitable to match different skin tones.

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References:

De Rigal J, Abella ML, Giron F, Caisey L, Lefebvre MA. Development and validation of a new skin colour chart. Skin Research and Technology, 2007, 13: 101–109.

Del Bino et al. Relationship between skin response to ultraviolet exposure and skin color type. Pigment Cell Res, 2006, 19, 606-614

Del Bino S., Bernerd F. Variations in skin colour and the biological consequences of ultraviolet radiation exposure . Br J Dermatol . 2013 ; 169(suppl 3):33-40.